Australian Government
Department of Education, Employment and Workplace Relations

IBSA
Innovation & Business Skills Australia

ICT02 Telecommunications Training Package

Volume 2 of 4 Telecommunications Units of Competency

Volume 1: Introduction, Qualifications Framework, Assessment Guidelines
Volume 2: Telecommunications Units of Competency
Volume 3: Skills and Knowledge Register
Volume 4: Technical Assessment Records

This volume comprises part of ICT02 endorsed components. It is not to be used in isolation, but needs to be used in the context of the whole Training Package.

Version number: 3.0
Review date: September 2005

ISC INDUSTRY SKILLS COUNCILS
Creating Australia's Future

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Published by: Innovation & Business Skills Australia Ltd
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Hawthorn VIC 3122
Phone: +61 3 9815 7000 Fax: +61 3 9815 7001
www.ibsa.org.au e-mail: reception@ibsa.org.au

ISBN: 978-1-921439-11-7 (Full Text Hard Copy)
978-1-921439-12-4 (CD Rendition)
978-1-921439-13-1 (A5 Summary)

Stock code: BICT02R1 Full Text Hard Copy (2 Folders)
BICT02C1 CD Rendition with Full Text Hard Copy
BICT02C2 CD Rendition with A5 Summary Booklet

First published: January 2003

AEShareNet code: FfE

Print version: 3.0

Release date: October 2008

Printed by: Solutions Digital printing
99 Camberwell Rd
Hawthorn East VIC 3123

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ICTTC001D Identify requirements for customer's telecommunications equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

It applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify services required	1.1 Types and model details of existing and proposed customer equipment are identified
	1.2 Intended uses of customers equipment are established to assist in identifying cabling requirements
	1.3 Required speed, response time, capacity and compatibility of proposed cabling installation is established with customer
	1.4 Alternative options, if required, are identified and discussed with customer to ensure customers needs can be satisfied
	1.5 Financial expectations of customer are identified to ensure solutions are within budgetary constraints
	1.6 Facilities, systems including network facilities are identified
2 Identify locations for service delivery	2.1 Physical assessment of service locations is made where possible to ensure accuracy
	2.2 Building construction is identified to confirm accessibility

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	2.3	Service locations are checked and confirmed with customer to avoid errors
	2.4	Existing floor plans are utilised where available and integrated into subsequent documentation
	2.5	Customers are notified where physical location may incur additional cost
3 Establish availability and access to existing cabling	3.1	Pre existing and associated cabling installations are identified from building plans where available
	3.2	Availability, security, safety and other constraints on use of existing systems are established
	3.3	Capacity of existing cabling against proposed usage is calculated to ensure appropriate decisions are taken on extent of new cabling required
	3.4	Cabling is inspected to ensure compliance with ACMA regulations
4 Complete required reports and documentation	4.1	All required documents are completed promptly and accurately in accordance with company policy
	4.2	Customer confirmation of documented requirements is obtained where required
	4.3	Relevant documentation is distributed promptly to required parties

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.:

- CA310 Cabling Techniques 3
- CA370 Cable Installation Practices
- CS410 Customer Relations 4
- EL410 AC/DC Theory 3
- EN470 Selling 4
- IN410 Interpersonal Relationships 4
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- PS420 Basic Building Trades 4
- RE340 Regulations for CPE

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- SU415 Human Resources 4
- TE410 Basic Telephony 4
- TO330 Installation Practices 3
- TO410 Use of Tools 4
- TR420 Light/Laser Theory 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Team or single operator	This unit may be carried out in teams representing the sales and technical components of the cabling installation function. It may also be undertaken by a single operator in some environments
Customer premises for telecommunications cabling purposes	May include any area under the control of the customer as distinct from areas controlled by a network carrier
Equipment types	May include: single line telephones, PABX, bandwidth managers, telephone systems, modems, network equipment, video, data, RF equipment, DSL – Digital Subscriber Line including Asymmetrical (ADSL), Digital Broadcasting and CTI (Computer Telephony Integration) technologies
Facilities	May be associated with network: rotary dialling, easy call, business links, city links, data links, metering, CENTEL, call barring, call diversion, incoming lines only, dial tone, least cost routing
Information	Is usually collected and documented on: services required, speed, interface types, location, ISDN application, Primary Rate access, bandwidth management, telephone distribution, future needs, video distribution
Documentation	May include: order forms, services checklists, quotation forms
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards

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Cable	Used must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Mining legislation • Noise Abatement and Heritage legislation • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Placement of cables on support structures and building faces for both internal and external locations
- Securing methods for above locations
- Work practices which avoid cable damage: i.e. crushing, burning, kinking, sheath twist, cutting and nicking
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items)
- Ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, frame locations
- Safe use of general hand and power tools and general equipment normally related to these tasks
- Correct interpretation and application of relevant regulations and standards
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC002D Prepare design drawings and specification for cable installation

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to commercial and industrial contexts.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Obtain information on existing and proposed installation	1.1 Building planning documentation is confirmed where possible through site inspection 1.2 All existing plans and drawings are obtained and reviewed
2 Identify installation options	2.1 Available installation options are assessed against identified customer requirements 2.2 The cost of options are established and assessed against customers financial expectations 2.3 Most suitable option is selected based on function and cost considerations

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3	**Prepare suitable drawings**	3.1 Drawings prepared show all outlets and services proposed
		3.2 Drawings are clear and accurate and do not confuse users of the document
		3.3 Drawings are distributed to relevant parties and copies filed for later reference in accordance with company policies
4	**Prepare cabling specifications**	4.1 Estimates allow for contingencies during installation
		4.2 All required services are incorporated without omission
		4.3 Level of detail enables accurate costings to be prepared
		4.4 Tool and material requirements can be accurately prepared from the specification
		4.5 Capacity for future expansion of cabling system is allowed for where possible
5	**Verify specifications with customer**	5.1 All documentation prepared is verified with customer and authorisation to proceed obtained in accordance with company policy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA370 Cable Installation Practices
- CI410 Communication 4
- CS410 Customer Relations 4
- EL410 AC/DC Theory 3
- IN410 Interpersonal Relationships 4
- MA420 Mathematics 4
- OH410 Occupational Health and Safety 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- PS420 Basic Building Trades 4
- RE210 ACMA Licensing Standards, Rules and Regulations
- SU415 Human Resources 4

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- TE410 Basic Telephony 4
- TO330 Installation Practices 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Design drawings	Cover both schematic and floor plan drawings
Schematic drawings	May be formal or informal and cover: frame locations, frame capacities, proposed cable routes, box input/output, site locations
Floor plan drawings	May be formal or informal and may include: location and entry points of risers, location of existing cabling, service delivery points, frame location, cable routes, support systems, box locations
Other drawing terminology in use	May include: cable plan, termination drawing, reflected ceiling plans
Specifications	May include: volume of cable, capacity of cable, type of cable, support requirements, termination system, proprietary system requirements, estimated labour hours
Relevant parties	May include: customer, contractor, cablers, builders, relevant regulatory authorities
'Industry standards'	May include regulated or industry codes of practice and include appropriate Standards Australia and ACIF technical standards
Cable	Used must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved

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Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australia Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Industry drafting codes of practice • Mining legislation • Noise abatement and heritage legislation Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Completion of schematic drawings covering frame locations, frame capacities, proposed cable routes, box input/output, site locations for each of commercial, industrial and domestic cabling installations. • Completion of floor plan drawings showing location and entry points of risers, location of existing cabling, service delivery points, frame location, cable routes, support systems, box locations for at least three cabling installations. • Completion of a detailed specification itemising volume of cable, capacity of cable, type of cable, support requirements, termination system, proprietary system requirements, estimated labour hours, detailed costings for each of commercial, industrial and domestic cabling installations.

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- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Communicate effectively with customers, work associates.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC003D Estimate and quote for customer equipment installation

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Confirm and update schematic drawings and specifications	1.1 Establish availability of specifications and drawings 1.2 Where required, prepare additional or new schematic drawings and specifications for installation 1.3 Where applicable, all fittings, cable types and equipment locations are confirmed with customer
2 Price labour, materials and other relevant items and establish availability	2.1 Distributors are requested to provide supply quotations to ensure fair comparisons between suppliers is made 2.2 Company and/or industry based labour rates and conditions are applied to establish labour costs 2.3 Confirmed delivery dates are confirmed with suppliers to reduce delays in installation 2.4 Volume and supply based pricing is encouraged from suppliers where appropriate to reduce costs 2.5 Pricing documentation is checked to ensure supply proposal matches customer specification for material, quality and performance

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3	**Estimate labour, materials and other relevant item requirements**	3.1 Estimations allow for contingencies during installation
		3.2 Integration with existing building works schedules is planned for, where available
		3.3 Estimations take into account relevant constraints
		3.4 Requirements for installation method or of any proprietary system being installed are identified and considered
		3.5 Cost calculation is made using standard unit measures where relevant
		3.6 Estimations plan to return a profit on installation where appropriate
4	**Prepare and confirm quotation with customer**	4.1 Quotation provided reflects customer requirements
		4.2 All documentation is clear and accurate and presented in a format required by customer and/or company policy
		4.3 Changes and variations are negotiated to meet customer and company needs
5	**Establish customers financial arrangements**	5.1 Customers decision as to purchase arrangements is clearly established
		5.2 Method of payment is successfully negotiated and arranged with the customer
		5.3 Finance company negotiations are completed successfully where required

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA370 Cable Installation Practices
- CI410 Communication 4
- IN430 Negotiation 4
- MA420 Mathematics 4
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PS420 Basic Building Trades 4

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- RE340 Regulations for CPE
- SU415 Human Resources 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Work	Is usually done individually
Schedule	A schedule may also be a 'scope of works'
Other relevant items	May include: testing requirements, preparation of manuals, maintenance
Scheduling	May align with an existing builders or electrical contractors schedule
Schedules	May cover requirements for: materials, equipment, labour, other resources, timeframes
Customers	May include: building owners, architects, consultants, building management
Customers purchase decision	Could be buy, rent, lease
Unit measures	May include: cost per cable length installed, per outlet
Equipment types	May include: single line telephones, PABX, bandwidth managers, telephone systems, modems, network equipment, video, data, RF equipment, DSL – Digital Subscriber Line including Asymmetrical (ADSL), Digital Broadcasting and CTI (Computer Telephony Integration) technologies
Materials	May include: cable, support system, connectors, frames

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Contingency factors	May include: internal/external, insurance, time penalties, disputes, availability, delivery, competencies, network/system security implications, restricted site access
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Commercial conditions	May include: conditions of payment, legal requirements, conditions surrounding installation/modification, service and warranty arrangements
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australia Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Acts • Fire Regulations • Trade Practices Act • IEEE (International Electrical Electronic Engineers Association) • Mining legislation

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- Noise abatement and heritage legislation
- Relevant international standards
- Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Preparation of detailed estimates for installation including material and labour costs for at least three cabling installations.
- Negotiation with contractors as to material availability and pricing for at least three cabling installations.
- Completion of detailed quotes for at least three installations.
- Allowance for contingencies such as insurance, time penalties, disputes, material availability and delivery, restricted site access is provided for in the estimate/quote.
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Communicate effectively with customers, work associates.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC004D Schedule and supply cabling installation

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Schedule supply and installation events	1.1 Key dates and milestones for installation are identified
	1.2 Work schedules and installation plans for other services are considered to ensure coordination
	1.3 Material supplies are scheduled to be available when required for installation
2 Monitor and adjust supply requirements	2.1 Labour load variations are adjusted to meet installation needs to enable completion within budget and timeframes
	2.2 Additional work requests are quoted and confirmed with customer prior to commencement
	2.3 Work progress is monitored against project schedules and budgets
	2.4 Compliance with customers licensing and relevant industry standards is monitored regularly

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- IN430 Negotiation 4
- OH410 Occupational Health and Safety 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE320 Employment Regulations
- SU470 Project Management 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Key dates and milestones	May include: start and finish date or time, materials delivery, installation of other services
Licences	May include: ACMA Customer Premises Cabling, heavy vehicles, power tools
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved

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Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Industrial Awards and Conditions • Trade Practices Act • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Planning and provision of appropriately skilled labour and volume and type of material to meet key dates and milestones for at least three complex installations.
- Identification of labour and material sources and negotiation with contractors, suppliers, other service providers to meet installation deadlines for at least three installations.
- Monitoring of work progress and adjustment of resource requirements to meet both customers' needs and costing parameters in at least three different installations.
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Communicate effectively with customers, work associates.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC005D Install cable support systems

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Confirm access to site	1.1 Confirm approval for site access with customer prior to site entry
	1.2 Identify and comply with site security arrangements
	1.3 Confirm access times and methods to comply with customers requirements and relevant legislation
	1.4 Confirm site capacities for storage and location of cable feeders or establish alternative methods

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2	**Meet the cabling requirements for commercial buildings**	2.1 Identify other services in commercial buildings 2.2 Understand building construction of commercial buildings 2.3 Use correct methods of running and fastening cables in commercial buildings
3	**Determine cable routes**	3.1 Identify and verify cable locations accurately by reviewing relevant plans 3.2 Select cable routes appropriate to the location of building services 3.3 Plan safe and efficient installation by accurate identification of structural building requirements, obstacles and hazards 3.4 Identify cable and services segregation clearances to ensure cable route complies with manufacturers, enterprise, legislative and industry codes of practice 3.5 Select cable routes which provide access to all outlets and enable cable to be supported direct to the outlet point
4	**Determine support method**	4.1 Identify customer specifications, manufacturers and enterprise requirements for cable support 4.2 Select an appropriate support system for the planned cable route and identified site constraints 4.3 Check that the support system is capable of supporting the planned concentration of cable in any location 4.4 Check that the support system facilitates ready access to cable for maintenance and allows for future expansion in services
5	**Obtain tools and materials**	5.1 Confirm an inventory of tools and materials necessary to install the support system from work specifications and schedules 5.2 Check all tools and equipment are in a safe working order and adjusted, if required, to manufacturers specifications 5.3 Locate tools and materials to ensure ready access during installation of support system

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6	**Mark out and install fixings**	6.1 Install fixings in a safe manner to manufacturers specifications
		6.2 Install fixings to specifications and have sufficient strength to contain planned cable installation
		6.3 Align fixings correctly with environment to facilitate installation of the support system
		6.4 Conduct work in a safe manner with minimal disruption to on-going customer activity
7	**Install support structure**	7.1 Install structures in a safe manner in accordance with installation designs, manufacturers and legislative requirements
		7.2 Select and wear protective clothing suitable to conditions to reduce risk of injury during installation
		7.3 Secure support structures to building surfaces and tension where necessary to ensure cable weight can be carried in all operating conditions
		7.4 Align support structure correctly to enable cable to be installed evenly, in order and without damage
		7.5 Install protective earthing to industry standards where required
		7.6 Conduct work with minimal disruption to on-going customer activity
8	**Inspect and adjust installation**	8.1 Check installed supports to ensure cable will not be exposed to damage during installation and operation
		8.2 Install support system in accordance with installation design and customers requirements
9	**Clean up work site**	9.1 Clean and adjust all tools and equipment and store in an accessible location
		9.2 Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
10	**Manage Remote Power Feed**	10.1 Identify the risks posed by contact with Remote Power Feeding services
		10.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA210 Cable Support Systems
- CI210 Communication 2
- IN210 Team Work Skills
- OH210 Occupational Health and Safety 2
- PS210 Building Plan Reading
- PS211 Cable Support Plan Reading
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE216 Australian Standards and Regulations
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Other services in commercial buildings	Includes but not limited to High Voltage power, other services, availability and suitability of existing cabling trays and fixing systems
Running and fastening cables in commercial buildings	Applies to false ceilings, workstations, ducting systems
Support Systems	May be installed individually or in small teams
Cable Support Systems	Suspension, catenary wire, ducts, cable tray, line poles, back-mount frames for distributors (formally MDF, IDF, FDP)

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Support systems	May be installed in: ceilings, exposed areas, under floors, in building risers designed for services installation, on external building walls, between buildings or poles
Cable tray	May be galvanised steel or PVC and may be: cable ladder, perforated, low or high sided, single or multi channel
Ducts	May be: closed, open, PVC, metal, single or multiple channel
Site access	Approval may be verbal or written
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points
Plans	May include: floor plans, building plans, reflected ceiling plans, schematic drawings
Customers specifications for support systems	May be found in: contract documents, cable plans and designs, specification schedules
Support systems	Need to be: free of burrs, sharp edges and sharp angles to ensure cable can be installed without damage
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Tools	May be: hand or power (electrical or air) tools and include: leads, hammer, drills, cutters, explosive tools where applicable
Manufacturers specifications	May be: found in printed instruction leaflets or pre printed on materials or on product packaging
‘Industry standards’	May include: regulated or industry codes of practice and include appropriate ACMA technical standards

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All cable used	Must be: compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australia Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Acts • Mining legislation • Noise abatement and heritage legislation • Confined spaces regulations • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Cable support systems: catenary wire, ducts and/or trays, and frame back-mounts
- Typical locations: ceilings, exposed areas, under floors, building risers, external building walls
- All related OHS requirements and work practices (including protective clothing and personal safety items)
- Read and interpret related floor plans, building plans, reflected ceiling plans, schematic drawings
- Safe use of general hand and power tools normally related to these tasks
- Safe use of general equipment normally related to these tasks
- Correct interpretation and application of relevant regulations and standards
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC006D Place and secure cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit applies to high speed data and fibre optic cabling.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify cable route	1.1 Identify existing support structure location and confirm access
	1.2 Identify hazards to installation and for cable operation accurately

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	1.3	Cable route can maintain required clearances and segregations as required by relevant industry standards
	1.4	Where no pre-existing support system exists, determine a cable route to comply with relevant industry standards
	1.5	Confirm cable route with customer
2 Obtain tools and materials	2.1	Check that all tools and equipment are in a safe working order and adjusted to manufacturers specifications
	2.2	Confirm an inventory of tools and materials necessary to install and secure the cable in accordance with work specifications and schedules
	2.3	All equipment and cables are suitable for installation and are approved under relevant industry standards
	2.4	Locate tools and materials to ensure ready access during installation
3 Set up cable dispensers	3.1	Set up feeders in locations to provide ease of access during hauling of cable
	3.2	Determine feeder locations to minimise wastage of cable
	3.3	Secure feeder locations to minimise safety risks during installation
	3.4	Label hauling end of the cable with unique identifier prior to placement
4 Haul cable into terminating position	4.1	Select and wear protective clothing and equipment to reduce risk of injury during cable placement
	4.2	Handle cable in accordance with manufacturers specifications
	4.3	Avoid all damage to cable to ensure operation capability is maintained at manufactured levels
	4.4	Allow sufficient excess at cable ends to facilitate termination
	4.5	Label outlet end of cable promptly with unique identifier to match identifier at originating location
	4.6	Cable placement is within clearances required by industry standards, manufacturers and work specifications

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	4.7	Cable placement is neat, orderly and methodical
	4.8	Conduct work with minimal disruption to on-going customer activity
5 Inspect cable route to ensure correct separations	5.1	Check separations along the entirety of the cable route
	5.2	Rectify separations which do not comply with regulations
	5.3	Install barriers to achieve separations where spatial separation can't be met
6 Secure cable to support system where required	6.1	Secure cable promptly in accordance with manufacturers and industry standards
	6.2	Apply securing anchors to restrain cable movement to manufacturers specifications
	6.3	Trim cable ties flush to ease future access and reduce risk to maintenance persons
	6.4	Align and space cable ties to manufacturers specifications and industry standards
7 Create or update cable records and plans	7.1	Update record sheets and cable plans promptly and accurately
	7.2	Store record sheets and plans in accordance with customer and company requirements
8 Clean up worksite	8.1	Clean and adjust all tools and equipment and store in an accessible location
	8.2	Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
9 Manage Remote Power Feed	9.1	Identify the risks posed by contact with Remote Power Feeding services
	9.2	Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA200 Cable Installation – General
- CA220 Cable Types
- CI210 Communication 2
- IN210 Team Work Skills
- OH210 Occupational Health and Safety 2
- PS210 Building Plan Reading
- PS211 Cable Support Plan Reading
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE216 Australian Standards and Regulations
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Placing and securing activities	May be done: individually or in small teams
Cable	May be placed on: support structures, vertically, within cavities, under floors, in ceilings, through modular furniture ducts, on external poles, external face of buildings
Clearances and segregation requirements	Are defined in ACMA regulations and other relevant Australian standards
Cable damage	Can include: crushing, burning, kinking, sheath twist, stretching, cutting, nicking
Cable dispensers	May include: manufacturers coils

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Cable anchors	May include: ties, brackets etc
Heavy vehicle licence:	May be required in some environments
Site access approval	May be verbal or written
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points
Considering access to sites	May also include: loading limits, storage areas, door and/or lift access, floor loadings
Customers specifications for placing and securing cable	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, work platforms, working in close proximity to exposed electrical conductors, testing of external poles prior to access, asbestos
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Separations	The distance between communications cable and other services. This includes Low Voltage (LV), High Voltage (HV) – Single core and HV Multi-core, Open terminations
Regulations	Cover separation and will generally be covered by Wiring Rules standard AS/ACIFS009
Spatial separations	Is the distance between communications cable and other cable required by regulations where no barrier is installed
Barriers	Are physical barriers installed when there is not enough space to achieve spatial separations
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs

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Tools	May be hand or power (electrical or air) tools and include: pulling sock, cutters, hauling rope, work platforms
Record and plans	Can include information on: cable layout, outlet location, cable coding system and identifiers, frame location
Manufacturers specifications	May be found in: printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include: regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)

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Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australia Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Acts • Noise abatement regulations • Heavy equipment licensing and regulations • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- placement of cables on support structures and building faces for both internal and external locations
- securing methods for above locations
- work practices which avoid cable damage: i.e. crushing, burning, kinking, sheath twist, cutting and nicking
- application of all related OHS requirements and work practices (including protective clothing and personal safety items)
- ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, frame locations
- safe use of general hand and power tools and general equipment normally related to these tasks
- correct interpretation and application of relevant regulations and standards
- interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC008D Terminate metallic conductor cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit applies to all metallic conductor cable types including coaxial and structured (Category 5 or Category 6, 6A, 7 or 7A,) cabling. It also applies to the joining of cable in a terminating block (in/out block). Specific units of competency apply to the placing, securing and termination of particular cable types and should be used in association with this unit where applicable.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

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ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify termination system	1.1 Identify correct termination requirements for installation
	1.2 Select termination system to meet customer performance needs
	1.3 Termination system conforms to work specifications and relevant industry standards
2 Set up suitable work area	2.1 Remove all contaminants from work site that may adversely effect termination
	2.2 Work site has adequate visibility to minimise errors and reduce eye strain
	2.3 Work site is safe and secure
	2.4 All required tools and equipment are available and in a safe working order and adjusted to manufacturers specifications
3 Plan frame/outlet layout	3.1 Design cable and block location within frame with capacity for expansion where possible
	3.2 Segregate incoming and outgoing cables for ease of access and to minimise overlaying and backtracking of cable
	3.3 Check environmental conditions are suitable for termination
	3.4 Terminating equipment layout is systematic and follows relevant industry codes of practice and standards, and customer requirements where appropriate
	3.5 Back-mount or outlet layout conforms to manufacturers specifications
	3.6 Layout allows for adequate workspace to ensure ease of access for installation and service purposes

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4	**Prepare cable for termination**	4.1 Remove cable sheath to allow for conductor length and installation requirements
		4.2 Handle cable strictly in accordance with manufacturers specifications
		4.3 Conductors, sheath and insulation are not damaged during preparation
		4.4 Work in a safe manner to manufacturers specifications
		4.5 Layer out cable out by reference to manufacturers coding system to ensure correct terminating sequence and unique identification where appropriate
		4.6 Fit over voltage protection devices to all cables with metallic component where required
5	**Terminate conductors**	5.1 Install terminating modules to frame in accordance with manufacturers specifications
		5.2 Fan cable pairs neatly to termination equipment to facilitate accurate termination
		5.3 Terminate cable to manufacturers specifications using correct tool
		5.4 Earth cable shield to manufacturers specifications and industry standards
		5.5 Confirm that the termination colour code sequence has been followed by visual inspection
6	**Label and document pair location**	6.1 Label cable pairs promptly and clearly to provide for accurate identification in accordance with manufacturers requirements and industry standards
		6.2 Update record books and plans to show pair locations in accordance with industry codes of practice
7	**Clean up work site**	7.1 Clean and adjust all tools and equipment and store in an accessible location
		7.2 Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
8	**Manage Remote Power Feed**	8.1 Identify the risks posed by contact with Remote Power Feeding services
		8.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA201 Cable Termination Products: General
- CA202 Cable Conductor Identification Codes
- CA220 Cable Types
- CI210 Communication 2
- EL210 AC/DC Basic Theory
- OH210 Occupational Health and Safety 2
- PS212 Read Plans and Specifications – General
- PS213 Cable Record Systems: General
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE216 Australian Standards and Regulations
- TE210 Basic Telephony 2
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Strategies to manage infrastructure	Appropriate separations, fastening techniques, correct use of cable trays and support systems
Cable termination	May occur at a frame or outlet location
Cable termination:	Is usually done individually
Termination systems:	May be manufacturers proprietary systems
Work site contaminants	Include: dust, water, paint, building debris, asbestos
Cable conductor identification codes	May be: colour coded, banded, numbered, lettered

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Record	May be: record cards, record books, cable drawings, cable plans
Site access approval	May be verbal or written
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points
Customers specifications for support systems	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers)
Tools	May be: hand or power and include manufacturers proprietary terminating tools
Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
Industry standards	May include regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or like Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable must be:	ACMA approved
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003

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- AS/NZS 3084:2003
- AS/NZS 3085.1:2004
- AS/NZS ISO/IEC 15018:2005
- AS/NZS ISO/IEC 24702:2007
- AS/NZS IEC 61935.1:2006
- AS/NZS IEC 61935.2:2006
- AS/NZS ISO/IEC 14763.3:2007
- ISO Draft 11801 (International)
- Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- demonstration of a minimum of at least one manufacturer's termination system at both frame and outlet locations and at least 1-50 pair cable
- ability to read and interpret cable drawings and plans for locations and terminations
- accurate application of cable conductor identification codes
- application of all related OHS requirements and work practices (including protective clothing and personal safety items)
- safe use of general hand and power tools and general equipment normally related to these tasks
- correct interpretation and application of related regulations and/or industry codes
- interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC009D Place, secure and terminate structured cabling and certify installation

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit applies to all metallic conductor cable types such as Category 5 or higher like Category 6, 6A, 7 or 7A cabling.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Place structured cable	1.1 Cable and services separations are maintained in runs and cross overs to meet manufactures and industry standards
	1.2 Installed structured cable is free from damage to ensure twist ratio in cable is maintained to optimise performance
	1.3 Twist ratio defects are minimised to avoid accumulation effect on structured cable performance
	1.4 Correct structured cable type is installed to meet intended installation environment and customer requirements
	1.5 Maximum structured cable runs lengths are not exceeded to maintain system performance level

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	1.6	Environment conditions are assessed to meet manufactures specifications prior to installation
	1.7	Structured cable is placed in methodical manner taking due care to maintain manufactures performance specifications
	1.8	Bending ratios are maintained to manufacturers and industry standard requirements to ensure system performance at rated level
2 Secure structured cable	2.1	Securing method avoids damage to cable and/or sheath
	2.2	Cable anchors maintain pair alignment and do not compress cable sheath
	2.3	Cable is free from tension
	2.4	Bending ratios are maintained to manufacturers and AS/ACIF or ACMA standard requirements to ensure system performance and ratio speed level
	2.5	Over voltage protection devices are fitted to all cables and metallic component where required
3 Terminate structured cable	3.1	Twist ratio is maintained to manufacturers specifications and as close as possible to termination point to optimise system performance at rated level
	3.2	All termination hardware used is rated as structured cable to ensure integrity and performance of termination and terminated using appropriate termination tool
	3.3	Cable shield is earthed to manufacturers specifications and relevant industry standards if applicable
	3.4	Cable sheath removal is minimised in accordance with manufactures instructions
4 Certify system performance to required level	4.1	Certification requirements are identified to ensure tests and recording of results are relevant
	4.2	Tests of performance are accurate and valid and are conducted impartially
	4.3	System performance is recorded promptly and verified where required
	4.4	Appropriate documentation is authorised and issued to certify system performance

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA250 Cable Types: Structured Cable
- CA251 Installation Methods and Terminations: Structured Cable
- CA252 Cabling Products: Structured Cable
- CA253 Cable Installation Testing: Structured Cable
- OH211 Safe Work Practices: Structured Cable
- PS214 Plan Reading, Specifications and Records: Structured Cable
- RE220 ACMA Standards and Regulations: Structured Cable
- TO211 Hand and Power Tools and Equipment: Structured Cable

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Structured metallic cable	Includes: solid conductor, stranded conductor (short links only), shielded, non-shielded, twisted pair
Physical damage to structured metallic cable	Includes: crushing, burning, kinks, cuts, sheath twist, stretching, bending over maximum radius
Termination hardware	May include: connectors, frames, blocks, sockets
Certification:	May be installer based or independent and include manufacturers certificate, installers warranty, formal and documented testing procedures and results
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA and AS/ACIF technical standards

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All cable used	Must be compliant with appropriate ACMA and AS/ACIF technical standard requirements (eg. for underground, aerial, structured metallic, UTP etc)
All cabling products other than cable	Must be ACMA approved
Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Where applicable, cable installation	Should conform to applicable security standards
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • ISO Draft 11801 (International) • Relevant IEEE standards • Cabling security codes and regulations • Occupational Health and Safety

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • placing, securing and terminating cable types to include: solid conductor, stranded conductor (short links only), shielded, non-shielded, twisted pair • work practices which avoid cable damage: crushing, burning, kinks, cuts, sheath twist, bending radius

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- installation of termination hardware to include: connectors, frames, blocks, sockets, patch panels
- application of all related OHS requirements and work practices associated with structured metallic cable installation (i.e. segregation and securing)
- ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, frame locations
- conduct and interpret test results, complete relevant documentation, determine compliance from manufacturer's certification, warranty and other related documentation requirements
- correct interpretation and application of regulations and standards related to the installation of structured metallic cable
- interpersonal skills related to work associates, supervisors, team members

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC010D Place, secure and terminate customer premises optical fibre cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Place optical fibre cable	1.1 Maintain cable and services separations in parallel runs and cross overs to meet manufacturers and industry standard requirements
	1.2 Test cable on drum for optical continuity
	1.3 Installed optical fibre cable is free from damage
	1.4 Match optical fibre cable type to installation environment and customer requirements
	1.5 Install cable in a safe manner to meet design and manufacturer specifications
2 Secure optical fibre cable	2.1 Bend ratios meet manufacturer specifications and industry standards
	2.2 Secure cable using methods that avoid damage to cable and/or sheath

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	2.3 Fit over voltage protection devices to all cables with metallic component
	2.4 Leave sufficient coil of cable on box for strain and termination
3 Set up work area for optical fibre joining and/or direct termination	3.1 Place work area waste disposal containers in an accessible location
	3.2 Remove contaminants from the work area sufficiently to minimise damage to optical fibre
	3.3 Ensure work area size is suitable for work with fibre without risk of damage or breakage
	3.4 Check that lighting enables fine eye work without strain
	3.5 Locate equipment work area to ensure ease of access
	3.6 Select and wear protective clothing suitable for work with glass fibre
4 Install optical fibre connectors for direct termination where required	4.1 Select connector to match terminating frame to design specifications
	4.2 Strip cable end and remove sheath in accordance with connector type in use
	4.3 Handle optical fibre cable in a safe manner
	4.4 Remove coatings from exposed optical fibre to remove all possible contaminants
	4.5 Fit and crimp connector without damage to fibre or thread
	4.6 Apply and cure adhesive following manufacturers specifications to ensure fibre is held firm within connector, if applicable
	4.7 Test termination cable for signal strength to manufacturer specifications and design requirements
	4.8 Use strain relief boots to protect connector and fibre cord cable
	4.9 Polish connection end to a smooth flat surface to ensure no optical path redirection after connection is made
	4.10 Use protection boots to protect connector and fibre from exposure to contaminants

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5 Fusion splice optical fibre cable where required	5.1 Strip cable end and remove sheath to expose optical fibres in accordance with splicing method in use
	5.2 Handle optical fibre cable in a safe manner
	5.3 Remove coatings from exposed optical fibre to remove all possible contaminants
	5.4 Apply cleaver to ensure a clean flat surface is available for joining
	5.5 Fuse fibres using manufacturers fusion tool at correct heat levels
	5.6 Align fused fibres absolutely in a straight line and with no bubbles or cracks in join
	5.7 Test join for signal strength to manufacturers and design requirements
	5.8 Fit splice protector in accordance with manufacturer specifications
	5.9 Support fused fibre joints in a suitable splice tray or rack
6 Join optical fibre mechanically where required	6.1 Strip cable end and remove sheath to expose optical fibres in accordance with mechanical joining requirements
	6.2 Handle optical fibre cable in a safe manner
	6.3 Remove coatings from exposed optical fibre to remove all possible contaminants
	6.4 Apply cleaver to ensure a clean flat surface is available for joining
	6.5 Use index matching gel at join to reduce variation in refractive index
	6.6 Use splicing jig in accordance with manufacturers specification to reduce the incidence of high loss joins
	6.7 Test join for signal strength to manufacturers and design requirements
	6.8 House and support joined fibre is in a suitable container
7 Remove fibre hazards from work area	7.1 Clean work area thoroughly to minimise risk of injury from loose glass fibre
	7.2 Dispose of waste of safely in accordance with relevant environmental requirements

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA250 Cable Types: Structured Cable
- CA261 Installation Methods and Terminations: Optical Fibre Cable
- CA262 Cable Products: Optical Fibre Cable
- CA263 Cable Installation Testing: Optical Fibre Cable
- CA264 Optical Cable Theory
- CA260 Cable Types: Optical Fibre Cable
- OH212 Safe Work Practices: Optical Fibre Cable
- PS215 Plan Reading, Specifications and Records: Optical Fibre Cable
- RE221 ACMA Standards and Regulations: Optical Fibre Cable
- TO212 Hand and Power Tools and Equipment: Optical Fibre Cable

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cable	May be single mode or multimode
Optical fibre	May be installed individually or in small teams
Direct termination	Is the termination of optical fibre to a connector that allows for direct fibre to fibre connection with a similarly prepared connector or terminating unit
Fusion splicing	Is heat induced joining of optical fibre
Mechanical splicing	Is the mechanical joining of optical fibre
Optical fibre cable	May be: internal/external, loose tube, tight buffered, air blown, armour plated

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Optical fibre cable	May be supplied in: various grades as designed for different environments and intended uses
Work area contaminants	Include: moisture, dust, dirt, builders waste, paint
Connectors types	Include: ST/SC connector (glued), fusion splicing (joins)
Customers specifications	May be found in contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms, asbestos, laser devices
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Tools	May be hand tools and include: oven, cleaver/cutter, splicing jig, stripper, microscope, crimping tool, syringe, polishing papers
Waste disposal containers	May include: drop sheets, sharps containers
Manufacturers specifications	May be found in: printed instruction leaflets or pre printed on materials or on product packaging
‘Industry standards’	May include regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial)
All cabling products other than cable	Must be ACMA approved
Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements

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Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- placing, securing and terminating cable types to include: single mode or multi-mode, internal or external
- work practices which avoid cable damage: crushing, burning, kinks, cuts, sheath twist, bending radius
- installation of at least one connector type for both fusion splicing and direct terminations
- safe use of any specialised hand or power tools normally used for optical fibre cable installation
- application of all related OHS requirements and work practices associated with optical fibre cable installation (including protective clothing and personal safety items, waste disposal practices)
- ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, frame locations
- conduct and interpret test results, complete relevant documentation, ensure join tested for signal strength to manufacturer's and design requirements
- correct interpretation and application of regulations and standards related to the installation of optical fibre cable
- interpersonal skills related to work associates, supervisors, team members

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC011D Place, secure and terminate coaxial cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue `including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Place coaxial cable	1.1 Maintain cable segregation to industry standards
	1.2 Protect integrity of the coaxial shield cable to ensure no loss of signal during operation
	1.3 Bend radius does not exceeded manufacturer specifications
	1.4 Place cable with sufficient slack to allow termination
	1.5 Place cable accurately in accordance with installation designs and manufacturer specifications
	1.6 Install cable safely without damage to cable or clients premises
	1.7 Cable lengths do not exceed manufacturer or design specifications and maintain RF signal integrity

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2 Secure coaxial cable	2.1	Locate securing hardware at uneven distances to minimise the cumulative effect on cable wave shape properties
	2.2	Cable ties and brackets are flexible and do not damage cable
	2.3	Fit over voltage protection devices to all cables with metallic component where required
	2.4	Bend ratios do not exceeded manufacturer specifications and industry standard
3 Terminate coaxial cable	3.1	Strip coaxial cable cleanly to required length using manufacturers tool
	3.2	Select connectors specified to match the type of coaxial cable in use
	3.3	Select terminating method in accordance with manufacturer specification
	3.4	Connector fitting retains the segregation of conductor and shield
	3.5	Terminate connectors to torque as recommended by manufacturers to ensure no RF leakage can occur
	3.6	The termination maintains a continuous reference
	3.7	All terminations are waterproof where appropriate to prevent risk of damage to termination and cable function

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA272 Cabling Products: Coaxial Cable
- CA273 Cable Installation Testing: Coaxial Cable
- CA270 Cable Types: Coaxial Cable
- CA271 Installation Methods and Terminations: Coaxial Cable
- OH213 Safe Work Practices: Coaxial Cable
- PS216 Plan Reading, Specifications and Records: Coaxial Cable
- RE222 ACMA Standards and Regulations: Coaxial Cable
- TO213 Hand and Power Tools and Equipment: Coaxial Cable

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Coaxial	May be installed: individually or in small teams
Coaxial cable	May be: hard line (internal/external), flexible (internal/external), underground, aerial, powered/unpowered
Coaxial cable	May be supplied in various grades as designed for different environments and intended uses
Connectors types	Include: internal/external, pin type, integral pin, separate pin
Customers specifications	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Tools	May be hand or power tools and include: coring, stripping, torque spanner, stripping and preparation tool, crimping
Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
‘Industry standards’	May include regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved

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Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Relevant IEEE standards • Australia Building Codes and Regulations • Occupational Health and Safety • Other services and utilities codes of practice and standards (electricity, water, gas) • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- placing, securing and terminating cable types include: hard line (internal or external) and flexible (internal or external)
- work practices which avoid cable damage: crushing, burning, kinks, cuts, sheath twist, bending radius
- installation of at least two different connector types
- safe use of any specialised hand or power tools normally used for coaxial cable installation
- application of all related OHS requirements and work practices associated with coaxial cable installation (including protective clothing and personal safety items)
- ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, frame locations
- conduct and interpret test results, complete relevant documentation, determine compliance from manufacturer's certification, warranty and other related documentation requirements
- correct interpretation and application of regulations and standards related to the installation of coaxial cable
- interpersonal skills related to work associates, supervisors, team members

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC012D Install functional and protective telecommunications earthing system

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, SOHO (Small Office Home Office), commercial or industrial installations and covers multi-storey and multi-site locations.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

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ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate earthing needs for cable systems on customer premises	1.1 Identify the role of functional, protective and CES earthing systems in customer premises
	1.2 Recognise existing earthing systems in customer premises
	1.3 Analyse the earthing needs of cable systems in a range of building types
	1.4 Identify cable characteristics relevant to the calculation of earthing requirements
	1.5 Calculate the upper and lower limits of resistance for a variety of cable system earths
2 Determine type and location of earthing requirements	2.1 Identify required earthing applications and their location accurately
	2.2 Identify industry standards relevant to the applications to ensure compliance
3 Determine earth route and support system	3.1 Confirm availability of riser access where required
	3.2 Select route to minimise interference to system performance
	3.3 Use existing cable support systems where suitable and available
	3.4 Select route and system to ensure safe operation and minimise risk factors
4 Set up tools and materials	4.1 Select earthing materials to enable system compliance with relevant industry standards
	4.2 Check tools and equipment are in a safe working order and adjusted to manufacturers specifications
	4.3 Conduct an inventory of tools and materials necessary to install earthing the cable from specifications where available
	4.4 Locate tools and materials for ready access during installation

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5	**Install and secure earth cable**	5.1 Maintain cable separations to meet performance requirements of application environment
		5.2 Check earth cable insulation is undamaged to ensure integrity of earth provided
		5.3 Isolate protective and functional earths at all times to ensure operation in accordance with industry standards
		5.4 Install and secure cable to manufacturers specifications in a safe manner
6	**Terminate earth cable**	6.1 Terminate earth with connectors recommended by manufacturers and in accordance with industry standards
		6.2 Maintain earth continuity at all times to ensure safe and reliable system operation
		6.3 Observe interface requirements with electrical systems in accordance with industry standards
7	**Test earth installation**	7.1 Calibrate test equipment and set current reference prior to use
		7.2 Select and conduct a repeatable type and method of testing to produce valid and reliable results
		7.3 Compare test results accurately with specifications and standards to ensure compliance
		7.4 Identify earth system faults and rectify, where required, prior to re-testing
8	**Label earthing systems**	8.1 Identify label requirements for all types of earthing systems
		8.2 Label earthing systems in accordance with industry regulations
9	**Manage Remote Power Feed**	9.1 Identify the risks posed by contact with Remote Power Feeding services
		9.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA200 Cable Installation – General
- CA201 Cable Termination Products: General
- CA202 Cable Conductor Identification Codes
- CA210 Cable Support Systems
- CA220 Cable Types
- CI210 Communication 2
- EL210 AC/DC Basic Theory
- EL220 Earthing Systems
- EL221 Earth Testing
- MA210 Basic Telecommunications Mathematics
- OH210 Occupational Health and Safety 2
- PS212 Read Plans and Specifications – General
- PS213 Cable Record Systems: General
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE216 Australian Standards and Regulations
- TE210 Basic Telephony 2
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Earths	May be: functional, protective and CES earthing. The three common types of earthing system used in customer premises for cabling systems. Cablers must understand the features and application of each type

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Cable characteristics	This includes the electrical performance of the cable and it physical characteristics. Cabers must be able to identify the critical characteristics for each type of cable they use
Cable function	Is determined by: colour coding, current capacity and installation method
Protective earths	Are installed to provide for safe operation of the installation and include: screening, over voltage, surges and spikes, lightning conductor, link to MEN (Multiple Earth Neutral)
Functional earths	Are installed to allow systems to work to specifications and include: reduction/elimination of interference from electromagnetic, radio frequency and power sources
Earth applications	May include: screen earth, distributor (MDF) bonding, barriers, telecommunications reference conductors, telex earth (single function earth), data rack, exposed metal work, equipment earthing
Locations	Includes: cable routes, CET (Communications Earthing Terminal), cable trays, data cabinets, telecommunications closures, cross connects, MDF (Main Distribution Frame), IDF (Intermediate Distribution Frame), FDP (Final Distribution Point), TRC (Telecommunications Reference Conductor)
Site access approval	May be: verbal or written where required
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points
Customers specifications for earth systems	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Tools	May be hand or power (electrical or air) tools and include: leads, hammer, drills, cutters

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Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Label requirements	Industry regulations define the labelling requirements in detail. Cablers must meet these requirements whenever installing earthing
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS 3260 • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Acts

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- National Association of Testing Authorities requirements
- Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- installation of protective earth installations related to at least one of the following: screening, over voltage, surges and spikes, lightning conductors
- installation of functional earth installations including equi-potential bonding
- identification of potential earthing locations: cable routes, cable trays, data cabinets, telecom enclosures, cross connects, distributors (MDF, IDF, FDP)
- ability to read and interpret contract documents, cable plans and designs, specifications and schedules
- interpret test results
- application of all related OHS requirements and work practices (including protective clothing and personal safety items)
- safe use of general hand and power tools and general equipment normally related to these tasks
- correct interpretation and application of relevant regulations and standards
- interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC013D Perform an accurate customer premises cable and system test

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Confirm site and service access for testing	1.1 Confirm approval for site access with customer prior to site entry
	1.2 Identify and comply with site security arrangements
	1.3 Confirm access times and methods to comply with customers requirements and relevant legislation
	1.4 Confirm service is available for testing
	1.5 Isolate or disconnect service from use and from carriers network/equipment to ensure no equipment damage can occur during testing
	1.6 Make work area and cable system safe for testing
2 Establish what tests are to be performed	2.1 Identify the purpose of the test and the performance to be measured
	2.2 Identify required tests from site conditions, client documentation and manufacturer specifications
	2.3 Tests are relevant to cable and system type installed

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3	**Obtain and set up test equipment**	3.1 Select equipment suitable for the tests to be performed to ensure relevance of test data
		3.2 Set up test equipment in accordance with manufacturers specifications
		3.3 Set test reading error against a known reference where appropriate
		3.4 NATA calibration certification is current where appropriate to reduce possibility of unreliable test data and ensure traceability
4	**Perform tests**	4.1 Use tools and test equipment in accordance with manufacturers specifications
		4.2 Perform work safely to remove risk of injury to operator, other users and/or equipment
		4.3 Perform checks and adjustments to ensure operating environment will not prejudice test results
5	**Interpret test results and determine action**	5.1 Read test results accurately and compare with manufacturer and site specifications for cable performance
		5.2 Evaluate test results considering all test requirements and parameters
		5.3 Assess test results fairly and accurately using verifiable data
6	**Document test results**	6.1 Document results of tests accurately and promptly to ensure test results remain current
		6.2 Verify test results and provide to client where required
		6.3 Update site and installation files to ensure information on system performance is traceable

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA315 Cabling Techniques for CAN
- CA340 Cable Systems and Products
- CI310 Communication 3
- EL310 AC/DC Theory 3
- PR310 Problem Solving 3
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TR420 Light/Laser Theory 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Testing	Can be conducted on:100% coverage, systematic samples, randomly, as part of fault identification or to assess continuity
Test clients	Can be: end user, supervisor, consultants or building owner
Client specifications, standards and quality assurance requirements may define test and documentation requirements	Tests can be: one or two directional, balanced or unbalanced
Test	May be: within a building, between sites or between a site and other customers equipment
Cable types	May include: copper (all categories), optical fibre, coaxial

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Tests	May typically address the following items: near end cross talk, attenuation, length, balance, noise levels, pair assignment, reversals, short circuits, open circuits, insulation resistance, reflection, signal loss, expected response times, speed
Test devices	May include: TDR (Time Domain Reflectometer), OTDR (Optical TDR), multimeter, proprietary devices, oscillator and probe set, insulation resistance tester, pulse echo, hand held cable testers, signal level meter, spectrum analyser, signal generator
These factors	May impact on the operating environment: dirt, humidity, dust, temperature, magnetic radiation, vibration, radio frequency
Test results	May be documented: written on paper forms, record cards, direct to computer disks
Manufacturers specifications	May be found in: printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include: regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with: appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards include:	• Technical Standards AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • National Association of Testing Authorities requirements • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Identification of required test – 100%
- Systematic sampling, random sampling and random assessment of continuity.
- Use of at least six test devices which may include for example –OTDR (Optical Time Domain Reflectometer), multimeter, proprietary devices, oscillator and probe set, insulation resistance tester, pulse echo, hand held cable testers, signal level meter, spectrum analyser, signal generator – on both metallic and optical fibre.
- Identification of at least six different faults to be addressed via the test which may include for example – near end cross talk, attenuation, length, balance, noise levels, pair assignment, reversals, short circuits, open circuits, insulation resistance, reflection, signal loss, response times, speed.
- Interpret test results for at least three different tests.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Safe use of general hand and power tools and general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Communicate test procedure and test interpretation effectively with customers, work associates

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC014D Hand over systems and equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Explain system functions and capacities	1.1 Present system explanation to client or client representative
	1.2 Provide opportunities for client to view installation and question system functions
	1.3 Confirm variations to specifications as built with client
	1.4 Provide clear and concise information to client on request
	1.5 Explain and demonstrate system functions to client
2 Hand over records and documentation	2.1 Present complete, clean and orderly records and system documentation to client
	2.2 Adhere to all relevant company policies and/or industry standards
	2.3 Documentation and plans are relevant, accurate and up to date
	2.4 Meet agreed client expectations for provision of information
	2.5 Provide, and document where required, clear instructions are provided on system maintenance

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3 Complete contract documentation	3.1 Provide guarantees to client in the required format where work is subject to guarantee
	3.2 Prepare and present invoices and other financial documentation to client to complete contractual arrangements
	3.3 Obtain authorised signature(s) on documentation to confirm acceptance of cabling work completed by client, where required
	3.4 Make the client aware of opportunities that exist for system upgrades, additional services and training, where appropriate

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA340 Cable Systems and Products
- CI310 Communication 3
- CS310 Customer Relations 3
- CS320 Customer Training 3
- PK310 Product Knowledge 3
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RE330 Contract Law
- RE340 Regulations for CPE

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

The unit	Applies to all cable systems, when complete, handover effectively transfers ownership of the cable system to the client

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Records and documentation	May be: paper or computer based and may include compliance sheets, plans, test results, specifications, as built variations
Authorised persons	May include: contract supervisor, consultant, building owner or agent, direct customer
Demonstration or instructions	May cover: physical frame and point locations, basic safety functions, patch layout and function, label system in use
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Contract Law • Trade Practices Act • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Demonstration and system explanation to the customer including- physical frame and point locations, basic safety functions, patch layout and function, labelling.
- Completion of all relevant documentation.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.
- Customer focus and consideration of customer needs

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC015D Locate and identify cable system faults

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify and clarify nature of fault	1.1 Problem is clearly described or identified from test data
	1.2 Likelihood of a cable system problem existing is assessed
	1.3 Urgency and impact of fault is determined and required response timeframe identified
	1.4 Fault is referred to other relevant parties where preliminary assessment is made that cable system is not at fault
2 Establish context and background information	2.1 Safety hazards and risks associated with the site and installation are identified
	2.2 Site variables are determined to enable a full assessment of the fault context
	2.3 System, cable, hardware type and functions are identified accurately
	2.4 Existing warranty and maintenance contracts are identified and coverage established

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3	**Determine and rank likely causes of fault**	3.1 Most probable causes of fault are determined from data and historical trends where available
		3.2 Ranking of causes work from system wide impacts to specific impacts where relevant to fault
		3.3 Likely causes are ranked in order of probability to ensure a methodical approach to fault identification is used
4	**Apply simple checks and tests**	4.1 Continued existence of problem is confirmed
		4.2 Visual inspection of likely damage is undertaken
		4.3 Simple connections, plugs and leads are checked for operation and against reference items
5	**Obtain suitable tools and equipment to test fault if required**	5.1 Tools and test equipment relevant to the identified system type and fault are obtained
		5.2 Equipment is set up in accordance with manufacturers specifications and checked to be in safe working order
		5.3 Test equipment is referenced and calibration is current
6	**Apply fault finding methodology**	6.1 Approach to fault identification is methodical, safe and suitable for system and problem type
		6.2 Fault is progressively isolated to removed likely variables from assessment
		6.3 Continued existence of problem is verified regularly
		6.4 Site installation records and manufacturers documentation is obtained and reviewed to identify likely solutions
		6.5 Fault is identified without undue interruption to other client activity in the shortest time possible
7	**Recommend means to rectify fault**	7.1 Options to rectify fault are determined and presented to customer for decision
		7.2 Test methods and results are promptly documented and filed with other system installation records
		7.3 Where appropriate, faults are referred to other parties for further action

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CS310 Customer Relations 3
- EL310 AC/DC Theory 3
- PE310 Personal Skills 3
- PR310 Problem Solving 3
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RE210 ACMA Licensing Standards, Rules and Regulations
- SU210 Basic Supervision
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TO330 Installation Practices 3
- TR420 Light/Laser Theory 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Application	May be for communications and/or data systems
Fault finding	May be done under maintenance contract within specified response times, on an ad hoc basis or as part of on-going arrangements with a client.
Faults	May be identified during initial installation or when a system is operational. May be reported by: customers, system managers, Information Technology managers/operators, building owners

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System faults	May include: crossed wires, open circuits, incorrect terminations, cable damage, high impedance, near end crosstalk, attenuation, bad connections, reversal, cracked fibre, faulty splice
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, environmental and atmospheric conditions
Fault finding methods	Include: cable testing, visual inspections, component replacement
Customers specifications and system documentation	May be found in: contract documents, cable plans and designs, specification schedules, installed variations (as built) documentation, quality assurance procedures
Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable used	Must be compliant with appropriate ACMA technical standard requirements.(eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety

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- Contract Law
- Trade Practices Act
- National Association of Testing Authorities requirements
- Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history in fault identification for at least three different faults.
- Identification and ranking of likely causes of faults in at least three different fault situations.
- Methodical approach to fault identification.
- For at least three different fault situations conduct of tests appropriate to the type of fault identified.
- Given at least three different fault investigations, interpret test results.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Safe use of general hand and power tools and general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Communicate fault information effectively with customers, work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC016D Joint metallic conductor cable on customer premises

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit applies to the jointing of copper telecommunications cable that may occur in underground situations, in pits or in jointing enclosures or above ground customer premises.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify need for jointing	1.1 Establish type of fault and relevant urgency promptly where appropriate
	1.2 Identify jointing requirements by review of site plans and documentation where appropriate
	1.3 Jointing requirements are in accordance with relevant industry standards
	1.4 Determine joint requirements (temporary or permanent) in accordance with work situation
2 Prepare work site	2.1 Make work site safe in accordance with relevant safety legislation and company work practices
	2.2 Erect safety barriers to divert persons and traffic safely around work site

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	2.3	Remove obstacles and rubbish from work site to ensure clear and safe access
	2.4	Make cable locations accessible, clean and dry to ensure joint is not contaminated during construction
	2.5	Remove lids and coverings and store safely where required, and
	2.6	Prepare site with suitable light and ventilation for safe work
	2.7	Identified and adhered to special access requirements for site
	2.8	Replace or repair damaged pit or cable support system is where necessary to avoid further damage to joint in accordance with industry standards
	2.9	Decommission and isolate work site and/or lines prior to commencement of jointing
	2.10	Identify other services, including power and gas, and work planned to avoid damage or safety risk
3 Identify cable type and jointing requirements	3.1	Identify existing cable types and installation systems accurately
	3.2	Assess degree of urgency, site access and cable function in order to determine joint type required and appropriate work methods
	3.3	Cable joint type is in accordance with requirements of specifications, plans and industry standards
4 Set up tools, equipment and materials	4.1	Confirm an inventory of tools and materials necessary to install the support system from work specifications and schedules
	4.2	Check all tools and equipment are in a safe working order and adjusted, if required, to manufacturers specifications
	4.3	Locate tools and materials to ensure ready access during installation of support system
	4.4	All equipment and materials are suitable for cable and system installed and are approved where required under relevant industry standards
5 Joint cable	5.1	Joint cable in a methodical manner to ensure full continuity is restored to cable
	5.2	Cable joints conform to manufacturer requirements and relevant industry standards

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	5.3	Joints are water proof and vermin proof to avoid damage during expected operating conditions
	5.4	Jointed cable is supported to ensure effective curing and alignment, where appropriate
6 Test joint	6.1	Check and adjust test instruments to ensure that they are referenced and calibration is current
	6.2	Perform Relevant cable tests are performed to ensure joint complies with site specifications, manufacturers and industry standards
	6.3	Make a visual inspection of the joint to confirm soundness and completeness
7 Complete records and clean up site	7.1	Complete required records and file promptly and accurately
	7.2	Clean and adjust all tools and equipment and store in an accessible location
	7.3	Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
	7.4	Reinstated site in accordance with customer and company requirements
8 Manage Remote Power Feed	8.1	Identify the risks posed by contact with Remote Power Feeding services
	8.2	Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA202 Cable Conductor Identification Codes
- CA220 Cable Types
- CA230 Copper Cable Jointing Methods
- CI210 Communication 2
- EL220 Earthing Systems
- OH210 Occupational Health and Safety 2

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- PS212 Read Plans and Specifications – General
- PS213 Cable Record Systems: General
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE216 Australian Standards and Regulations
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cable types	include: copper (all types)
Cable jointing	Usually occurs in the following situations: cable damage, long cable runs, fault rectification, where specifications require access points, where additional service points need connection
Cable jointing	May be located at/in – Underground pits, jointing enclosures, stub joints
Likely hazards	Include: live power lines, vermin, needle stick injury, mud and water, natural and other gas build up, glass fibre, manual handling, building debris
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals, work platforms, asbestos
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Safety equipment	May include: witches hats, flashing lights, trench guards, warning signs and tapes, gas detection equipment
Record and plans	Can include information on: cable plan, cable coding system and identifiers, access location

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Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include: regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Relevant legislation, codes, regulations and standards include:	• Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Environmental Protection Acts • Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of all common copper types in regular use • Jointing must include at least 1-20 pair (or greater) cable • Selection and connection of correct connectors and jointing enclosures

- Work practices which avoid cable and conductor damage, provide protection from the elements, vermin and other relevant hazards
- Safe use of any specialised hand or power tools normally used in jointing copper cables
- Application of all related ohs requirements and work practices associated with jointing copper cables and its surrounding environments (including protective clothing and personal safety items, and awareness of likely hazards)
- Ability to read and interpret drawings related to cable layouts and plans; record information associated with cable coding system and identifiers
- Conduct and interpret test results (including reference testing of instruments), complete relevant documentation and ensure joint test results comply with relevant specifications and standards
- Interpersonal skills related to work associates, supervisors, and clients

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC017D Alter services to existing cable system

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit applies to the jointing of copper telecommunications cable that may occur in underground situations, in pits or in jointing enclosures or above ground customer premises. It applies to all metallic conductor cable types other than coaxial and certified Category 5 or Category 6, 6A, 7 or 7A installations.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

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ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Estimate requirements for alteration	1.1 Identify availability and access to existing cable system
	1.2 Establish building construction type and current/proposed uses
	1.3 Identify existing and proposed cable systems
	1.4 Identify existing and potential site hazards and obstacles
	1.5 Advise customer of services that may be disrupted where appropriate
2 Document specifications and plans for alteration	2.1 Show systems alterations are clearly and accurately on amendment plans and enable suitable comparisons with existing system
	2.2 Specification documents are in accordance with industry standards
	2.3 Specify equipment and materials to meet required industry standards and ensure compatibility with existing system
3 Alter cable system	3.1 Identify existing site conditions and confirm with client where appropriate
	3.2 Alterations cause minimal disruption to ongoing client activity
	3.3 Alterations are carried out in a safe manner and in accordance with industry standards
4 Restore and test cable system	4.1 Confirm compatibility of alterations with existing systems
	4.2 Test new work in isolation and when integrated with existing systems
	4.3 All alterations operate to client system specifications and in accordance with relevant industry standards
5 Update plans and records	5.1 Update plans and documents to show revised systems accurately and clearly
	5.2 Create new plans and installation documentation where pre existing documentation is unavailable

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6 Restore site to required condition	6.1	Return equipment and furniture to original locations after install to minimise disruption to client activity
	6.2	Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
	6.3	Make visual check of conditions and sign off with customer to record satisfaction with conditions
7 Clean and store equipment	7.1	Clean and adjust all tools and equipment and store in an accessible location
	7.2	Remove installation waste and debris from work site and dispose of in accordance with environmental requirements to maintain safe worksite conditions
8 Manage Remote Power Feed	8.1	Identify the risks posed by contact with Remote Power Feeding services
	8.2	Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA200 Cable Installation – General
- CA201 Cable Termination Products: General
- CA202 Cable Conductor Identification Codes
- CA210 Cable Support Systems
- CA220 Cable Types
- CI210 Communication 2
- EL210 AC/DC Basic Theory
- EL220 Earthing Systems
- EL221 Earth Testing
- MA210 Basic Telecommunications Mathematics
- OH210 Occupational Health and Safety 2
- PS212 Read Plans and Specifications – General
- PS213 Cable Record Systems – General

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- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE216 Australian Standards and Regulations
- SW210 Basic Switching Systems
- TE210 Basic Telephony 2
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Application	May cover: copper cable, optical fibre cable, coaxial cable, Category 5 or Category 6, 6A, 7 or 7A
Alterations	May cover the following: moving outlets and/or services, new extensions to services, additions, removals, systems/application upgrades
Factors effecting access	Includes: hours of access, security requirements, type of client activity, activities of tenants and other facility users
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points
Customers specifications	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practices	Includes the safe use and handling of: tools and equipment, materials, chemicals and work platforms, asbestos
Work platforms	May be: ladders, scaffold, scissor lifts (‘cherry pickers’)
Tools may be hand or power (electrical or air) tools	May include: leads, hammers, drills, cutters, terminating tools, crimping tools

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Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Manufacturers specifications	May be found in: printed instruction leaflets or pre printed on materials or on product packaging
'Industry standards'	May include: regulated or industry codes of practice and include appropriate ACMA technical standards
All cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be: ACMA approved
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australia building codes and regulations • Fire regulations • Occupational Health and Safety • Environmental Protection Acts • Noise abatement regulations • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Types of alterations including: moving outlets and/or services, new extensions to services, system/application upgrades, additions and removals
- Ability to read and interpret contract documents, relevant drawings, cable plans and designs, specification schedules
- Application of all related ohs requirements and work practices (including protective clothing and personal safety items)
- Safe use of general hand and power tools and general equipment normally related to these tasks
- Correct interpretation and application of relevant regulations and standards
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors Assessment Location
- Must be undertaken in the workplace environment.

Context of and specific resources for assessment

Assessments must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC018D Install underground enclosures and pipe/conduit

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare site for installation	1.1 Location of proposed installation is checked and is in accordance with the appropriate plans
	1.2 Obtain information on proposed locations and necessary approvals from relevant authorities
	1.3 Local environment is observed before installation commences to ensure that reinstatement may be completed appropriately
	1.4 Site is cleared and prepared to provide unrestricted access for installation works in accordance relevant standards, codes and legislation
	1.5 Cleared vegetation and other materials are segregated to enable ease of reinstatement
	1.6 Appropriate tools and equipment are selected and used safely in accordance with manufacturers specifications

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2 Excavate for installation	2.1 Required tools, equipment, clothing and safety requirements for site excavation are identified
	2.2 Tools and equipment are checked to be in good working order and adjusted to manufacturers specifications
	2.3 Stable excavation is carried out to plan, in accordance with relevant authority guidelines and allows ease of access on completion
	2.4 Excavation site is made safe through erection of necessary barrier in accordance with enterprise requirements
3 Install enclosure and pipe	3.1 Enclosure design and installation requirements are identified
	3.2 Enclosure is constructed or selected and installed from specified materials to required designed specifications
	3.3 Pipe and/or conduit is installed to specifications and manufacturers requirements
	3.4 Pipe or conduit internal surfaces are free from impediments to cable hauling
	3.5 Pipe entry into enclosure is sealed against ingress of foreign matter
	3.6 Cable support structure and access facilities are installed in enclosures to specifications
4 Restore site and complete documentation	4.1 Backfill is completed safely using suitable spoil and materials that ensures pipe/conduit protection
	4.2 Site is reinstated to identified requirements
	4.3 Reports on installation and design amendments are accurately completed and filed promptly in accordance with enterprise requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA280 Soil Types
- CA281 Underground Installation of Enclosures and Pipe/Conduits
- CS210 Customer Relations

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- OH214 Safe Work Practices – Underground
- PS217 Plan Reading, Specifications and Records – Underground
- RE223 ACMA Standards and Regulations – Underground
- RE224 Building Standards, Regulations and Codes – Underground
- TO214 Hand and Power Tools – Underground
- TO215 Mechanical Equipment Operation Skills – Underground

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. **Bold italicised** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Ownership of site and/or trenches	May be public or private
Enclosures	May include: pits, access holes, tunnels
Soil types for installation	Include: sand, rock, clay, soil, combination soil types
Spoil	Is: fill, excavated soil supplied on or off site
Weather conditions	May impact on the performance and techniques utilised
Site plans	May include: street plans, constructions plans, building plans, site layout drawings
Relevant authorities	May include: local government, utility providers (gas, water, electricity, telecommunications), Environment Protection, cable location services (Dial Before you Dig), private owners
Information and approvals from relevant authorities	May cover: proposed route, location of plant and equipment, reinstatement requirements, location of other services, site access requirements
Stable excavations	Include: vertical and secure walls, water diversion and extraction, structural support
Ease of access	May include: location of backfill, egress and access points

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Tools and equipment	May be mechanical or hand tools may include: shovels, timber, hammers, saws, glue, excavators, auger, water washing, ditch witch, backhoe, trenching machine, concrete gutter, borer, mole plough, pick, crowbar
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Safety equipment	May include: witches hats, flashing lights, trench guards, warning signs and tapes
Enclosures	May be purpose built or prefabricated to ACMA requirements May be constructed of: concrete, polyethylene, bricks
Internal surface impediments to hauling cables	Include: construction debris, smooth internal joints, spoil(gravel, rocks, soil, sand)
Reports	May include: plans, job cards, work sheets, Dial Before you Dig specifications
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable	Used must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007

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- AS/NZS IEC 61935.1:2006
- AS/NZS IEC 61935.2:2006
- AS/NZS ISO/IEC 14763.3:2007
- Occupational Health and Safety
- Environmental Protection Acts
- Road and Traffic Control legislation and codes
- Appropriate licences (Winch and/or crane, forklift)
- Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Types of enclosures to include: pipe/conduit, trenches, pits and access holes (including sealing practices where required)
- Soil types must include at least two types: from sand, rock, soil or combination soil types
- Work practices which ensure all relevant authorities have been notified and approvals obtained prior to commencement;
- Safe use of any specialised hand or power tools and/or equipment normally used for excavation, pipe/conduit installation and site restoration
- Application of all related OHS requirements and work practices associated with excavation, pipe/conduit installation and/or site restoration (including protective clothing and personal safety items, adequate warning signs and safety devices)
- Ability to read and interpret drawings: site plans, street plans, construction plans, building plans and site layout drawings
- Correct interpretation and application of regulations and standards related to the installation of the above enclosures
- Interpersonal skills related to work associates, supervisors, team members and clients

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC019D Install underground cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Specialist Unit. May need to be assessed by a nationally registered TITAB assessor.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for underground cable hauling	1.1 Cable installation requirements are identified from plan and constraints recognised
	1.2 Cable installation equipment is set up in accordance with manufacturers requirements and enterprise guidelines
	1.3 Site is made safe and secure for cable installation
	1.4 Pipe/conduit are checked for debris and obstructions and are cleared using suitable methods
	1.5 Suitable protective clothing is selected and required safety devices used
	1.6 Cable ends are sealed to exclude ingress of foreign matter
2 Haul cable	2.1 Hauling feeder is run through pipe/conduit to enable cable hauling
	2.2 Cable is attached to hauling feeder in a manner appropriate to cable type in accordance manufacturers specifications

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	2.3	Cable slippers or rollers are employed to ensure no sheath damage when hauling into and out of enclosures
	2.4	Cable is lubricated and hauled evenly at correct tension to reduce risk of cable damage
	2.5	Cable allowance is sufficient in enclosures for jointing and maintenance requirements
3 Seal and secure cable	3.1	Cable is identified and tagged to enable future identification
	3.2	Cable ends are sealed to prevent ingress of foreign material
	3.3	Cable is placed on supports in enclosures to reduce damage to conductors and enable ease of access for maintenance
	3.4	Over voltage protection devices are fitted to all cables with metallic component where required
	3.5	Reports on installation and design amendments are accurately completed and filed promptly in accordance with customer requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA280 Soil Types
- CA282 Cable Installation and Securing – Underground
- CA283 Cable Termination and Coding – Underground
- CA284 Cable Sealing Techniques – Underground
- CA285 Cable Testing – Underground
- CS210 Customer Relations
- OH214 Safe Work Practices – Underground
- PS217 Plan Reading, Specifications and Records – Underground
- RE223 ACMA Standards and Regulations – Underground
- RE224 Building Standards, Regulations and Codes – Underground
- TO214 Hand and Power Tools – Underground
- TO216 Cable Hauling Equipment Operation Skills – Underground

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Information from plan	May include: cable size, existing cable, pipe size, distance to be hauled
Type of cable	May include – Underground rated and approved copper, optical fibre, coaxial, Category 5 or Category 6, 6A, 7 or 7A
Installation requirements and constraints	May include: site conditions, condition of enclosures and pipe, availability of cable size and type
Cable installation equipment	Include: spools, drums, feeders, slippers, hauling eyes, jinker, forklift, crane
Site safety	May include: dangerous gases, water, soil, guards, barricades, lanterns, removal and placement of enclosure covers, handling of jelly filled cables
Safety equipment	May include: witches hats, flashing lights, trench guards, warning signs and tapes, gas detector
Methods for clearing pipe/conduit	Include: air pressure, hauling brush, mandrill
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Hauling feeders	May include: rod, rope, air pressure
Feeder attachments	May include: stockings(mesh), splicing, hauling eye
Hauling methods	May include: hand, winch (hand and mechanical)
Cable hauling safety devices	Include: guards, lanterns, slippers

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Methods of sealing ends	Include: shrink end caps, pressurisation
Older style lead cables	May require specific safety handling methods and may require air pressurisation to stop ingress of moisture
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable	Used must be compliant with appropriate ACMA technical standard requirements.(eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Relevant legislation, codes, regulations and standards include:	• Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Environmental Protection Acts • Road and Traffic Control legislation and codes • Appropriate licences (Winch and/or crane, forklift) • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of at least one type of cable: either copper, optical fibre, coaxial or Category 5 or Category 6, 6_A, 7 or 7_A
- Work practices associated with feeding devices, hauling methods, cable securing and sealing processes
- Safe use of any specialised hand or power tools and/or equipment normally used in installing underground cable
- Application of all related OHS requirements and work practices associated with installing underground cable (including protective clothing and personal safety items, adequate warning signs and safety devices)
- Correct interpretation and application of regulations and standards related to the installation of underground cable
- Interpersonal skills related to work associates, supervisors, team members and clients

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC020D Construct aerial cable supports

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare site for installation	1.1 Location of proposed installation is checked and is in accordance with the appropriate plans
	1.2 Obtain information on proposed locations and necessary approvals from relevant authorities
	1.3 Site is cleared and prepared to provide unrestricted access for installation works in accordance relevant standards, codes and legislation
	1.4 Appropriate tools and equipment is selected and used safely in accordance with manufacturers specifications
	1.5 Installation constraints and safety hazards are identified and suitable action determined
2 Install aerial support structures	2.1 Required tools, equipment, clothing and safety requirements for site installation are identified
	2.2 Tools and equipments are checked to be in good working order and adjusted to manufacturers specifications

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	2.3 Stable aerial supports are installed to plan in accordance with enterprise guidelines
	2.4 Support installation site is made safe through erection of necessary barrier in accordance with enterprise requirements
	2.5 Support foundations are constructed to specifications and provide for safe and secure operation of support structure
	2.6 Aerial fixing devices are installed securely in accordance with manufacturers specifications
3 Restore site and complete documentation	3.1 Backfill is completed safely using suitable spoil and materials
	3.2 Site is reinstated to identified requirements
	3.3 Reports on installation and design amendments are accurately completed and filed promptly in accordance with enterprise requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA290 Pole Types and Aerial Service Identification
- CA291 Installation of Aerial Supports
- CS210 Customer Relations
- OH215 Safe Work Practices – Aerial
- PS218 Plan Reading, Specifications and Records – Aerial
- RE225 ACMA Standards and Regulations: Aerial
- RE226 Building Standards and Regulations – Aerial
- TO217 Hand and Power Tools and Equipment: Aerial
- TO218 Mechanical Equipment Operation Skills: Aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Ownership of site and/or support structures	May be public or private
Support structures	May be joint use with electrical services
Support structures	May include: tower, pole, wall
Support structures	May include: concrete, wood, steel or a suitable combination, brick
Spoil	Is: fill, excavated soil supplied on or off site
Aerial fixing devices	Include: screw hooks, pig rings, hooks, riser pipes, clamps
Relevant authorities	May include: local government, utility providers (gas, water, electricity, telecommunications), Environment Protection, cable location services (Dial Before you Dig), private owners
Information and approvals from relevant authorities	May cover: proposed route, location of plant and equipment, reinstatement requirements, location of other services, site access requirements
Tools and equipment	May be mechanical or hand tools may include: shovels, timber, concrete mixer, hammers, saws, excavators, auger, pick, crowbar, cherry picker, scissor lifts, ladders, pole erector (mechanical)
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Safety equipment	May include: witches hats, flashing lights, guards, warning signs and tapes, aerial safety belts and lines, traffic signs
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards

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Cable	Used must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Environmental Protection Acts • Road and traffic control legislation and codes • Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • With at least pole and wall supports • Work practices which ensure all relevant authorities have been notified and approvals obtained prior to commencement; • Safe use of any specialised hand or power tools and/or equipment normally used for the installation of aerial cable supports • Application of all related OHS requirements and work practices associated with the installation of aerial cable supports (including protective clothing and personal safety items, adequate warning signs and safety devices)

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- Ability to read and interpret drawings, plans and other relevant documentation
- Correct interpretation and application of regulations and standards related to the installation of aerial cable supports
- Interpersonal skills related to work associates, supervisors, team members and clients

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC021D Install aerial cable

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for aerial cable installation	1.1 Cable installation requirements are identified from plan and constraints recognised
	1.2 Cable installation equipment is set up in accordance with manufacturers requirements and enterprise guidelines
	1.3 Site is made safe and secure for cable installation
	1.4 Suitable protective clothing is selected and required safety devices used
	1.5 Aerial route is checked for obstructions and are made clear using suitable methods
	1.6 Support structure is assessed as safe for normal working conditions

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2 Install aerial cable	2.1	Type of cable bearer is determined to identify need for separate catenary wire installation
	2.2	Catenary wire or bearer wire is secured permanently to support structure and tensioned to meet relevant height and minimum sag requirements to required specifications
	2.3	Cable is secured to catenary wire where required
	2.4	Cable loop on support structure is sufficient for jointing and maintenance, and water drip point requirements
3 Seal and secure aerial cable	3.1	Cable ends are sealed to prevent ingress of foreign material
	3.2	Cable loop is secured on support structure to reduce damage to conductors and enable ease of access for maintenance
	3.3	Building entry points are weather sealed where appropriate
	3.4	Over voltage protection devices are fitted to all cables with metallic component where required
	3.5	Reports on installation and design amendments are accurately completed and filed promptly in accordance with enterprise requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA290 Pole Types and Aerial Service Identification
- CA292 Cable Installation and Securing – Aerial
- CA293 Cable Termination and Coding – Aerial
- CA294 Cable Sealing Techniques – Aerial
- CA295 Cable Testing – Aerial
- CS210 Customer Relations
- OH215 Safe Work Practices – Aerial
- OH250 Pole Top Rescue
- OH251 Working at Heights
- PS218 Plan Reading, Specifications and Records – Aerial
- RE225 ACMA Standards and Regulations: Aerial

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- RE226 Building Standards and Regulations – Aerial
- TO217 Hand and Power Tools and Equipment: Aerial
- TO219 Cable Hauling Equipment Operation Skills: Aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Ownership of site and/or support structures	May be public or private
Aerial fixing devices	Include: screw hooks, pig rings, hooks, riser pipes, clamps
Tools and equipment	May be mechanical or hand tools and may include: hammers, auger, cherry picker, scissor lifts, ladders, drill, spanner, nails, fixing brackets, cable tensioner, height measuring device
Safe support structures	May be identified by: condemned pole status markings, visible signs of decay or stress, suitable testing methods
Protective clothing	May include: protective suits, masks, safety boots, head protection/head protection, safety glasses, knee pads, gloves (plastic, rubber, leather), ear muffs
Safety equipment	May include: witches hats, flashing lights, guards, warning signs and tapes, aerial safety belts and lines, traffic signs
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable Used	Must be compliant with appropriate ACMA technical standard requirements.(eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved

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Over voltage protection	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Environmental Protection Acts • Road and traffic control legislation and codes • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of at least one type of aerial cable: either copper, optical fibre, coaxial or Category 5 or Category 6, 6_A, 7 or 7_A
- Identifying safe support structures from pole status markings, visual inspection or approved testing procedures
- Work practices associated with hauling aerial cable, cable securing and sealing processes
- Safe use of any specialised hand or power tools and/or equipment normally used in installing aerial cable
- Application of all related OHS requirements and work practices associated with installing aerial cable (including protective clothing, personal safety items, adequate warning signs and safety devices)
- Correct interpretation and application of regulations and standards related to the installation of aerial cable
- Interpersonal skills related to work associates, supervisors, team members and clients

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC022D Organise and monitor cabling to ensure compliance with regulatory and industry standards

Unit descriptor

This unit applies to the organisation and monitoring of work within a work team. It applies to all metallic conductor cable types.

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

Assessment by a TITAB registered assessor is recommended.

The six unit competency set ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D that meets the Australian Communications and Media Authority's (ACMA) requirements for Cabling Provider Registration (CPR), is generally used as part of a more specialised customer cabling qualification. This set is usually regarded as more suitable for new entrants where limited industry experience has been obtained and forms the major part of specialised qualifications such as ICT20308 Certificate II in Telecommunications Cabling. When these six units are delivered as a set within state/territory funding approved programs, the two benchmark CPR units (ICTTC136C and ICTTC137C) are not required.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

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ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify work requirements	1.1 Identify requirements by review of work site specifications
	1.2 Identify clients needs and expectations accurately
	1.3 Identify the site characteristics and any special requirements for cable installation
2 Organise equipment and materials	2.1 Estimate and supply cable and hardware requirements in line with past usage
	2.2 Check and ensure equipment is in good working order to manufacturers specifications
	2.3 Ensure availability of equipment and tools to suit work needs
3 Allocate work areas and activities	3.1 Scheduled and allocated work within time available
	3.2 Match work allocation to individuals' known competency and capacity to complete work requirements
	3.3 Work allocation occurs within approved budget levels
4 Communicate work requirements	4.1 Communicate to ensure instructions are clear and understood in a medium suitable to the situation
	4.2 Verify and confirm the understanding of the communication
5 Provide suitable training and assessment opportunities	5.1 Organise on-the-job training for work team members to fill skill gaps and improve performance
	5.2 Provide opportunities for work team members to question and clarify training and performance matters
	5.3 Assist work team members to ensure regulatory compliance
	5.4 Work assessments are undertaken in accordance with industry and enterprise requirements

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6 Monitor work activity to meet specifications	6.1 Monitor work activity systematically to ensure legislative requirements, industry standards and enterprise requirements are met
	6.2 Follow up on difficulties or known problem areas promptly
	6.3 Reallocate work to ensure client and company requirements are met
7 Manage Remote Power Feed	7.1 Identify the risks posed by contact with Remote Power Feeding services
	7.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI210 Communication 2
- CS210 Customer Relations
- EL220 Earthing Systems
- MA210 Basic Telecommunications Mathematics
- OH210 Occupational Health and Safety 2
- PS212 Read Plans and Specifications: General
- PS213 Cable record Systems: General
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE216 Australian Standards and Regulations
- SU221 Cabling installation: Estimating and Quotations
- SU222 Time Management
- SU223 Budgeting
- SU224 Supervision of Licensed Cabling Installations
- SW210 Basic Switching Systems
- TE210 Basic Telephony 2

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Work specifications	May be: copy of contract documentation, derived schedules or checklists, building plans and area charts, client correspondence
Client expectations and needs	May be: verbal or written and usually checked against work specification requirements
The competencies and capacity of existing workers	Is determined from: observations, discussion, training records and demonstrations
Estimates for time duration of work	Is made based on an assessment of condition and past experience with similar methods and sites
Budgets	Are usually provided by: company representatives for the work site and usually define discretionary levels in relations to expenditure areas
Training	May include: on-job instruction, provision of learning opportunities, demonstration, structured feedback, self paced learning packages
Assessment	May include: review to specifications and other documentation within enterprise and industry policy guidelines, competency assessment for recording purposes
Industry standards	May include: regulated or industry codes of practice and include appropriate ACMA technical standards
Cable used	Must be: compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
All cabling products other than cable	Must be ACMA approved
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)

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Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Enterprise operating policy and procedures • Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Check lists, building plans and area charts, client correspondence • Determining competence and capacity of relevant workers. This may include observations, discussions, learning records and demonstrations • Identifying learning needs and organising training requirements. This may include on-job instruction, provision of learning opportunities, demonstrations • Estimation of time duration of work activities • Monitor work activities to ensure compliance with relevant regulations and standards • Monitor all related ohs and work practices • Interpersonal skills related to clients, employer, work associates, team members, individuals, other contractors

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC023D Supervise cabling project

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit should be applied with units dealing with specific cable types and installation environments.

Assessment by a TITAB registered assessor is recommended.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan and organise cabling activities	1.1 Resource requirements are accurately identified 1.2 Time and scheduling requirements are identified from relevant documents/persons 1.3 Constraints on performance are identified from available information 1.4 Plans for cabling project are documented and advised to relevant parties to ensure effective communication
2 Prepare financial budgets	2.1 Cost and expenditure items are identified accurately from scheduling and planning documentation 2.2 Budget documentation is prepared using industry or enterprise specific format to enable effective monitoring

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	2.3	Purchasing and other delegations are identified within budget allocations and advised promptly to relevant personnel
	2.4	Budget projections are within estimated and approved contract pricing
3 Identify and support human resource requirements for cabling	3.1	Number and availability of suitable human resources are identified in accordance with contract requirements and relevant industrial and enterprise policy
	3.2	Necessary competency and licence requirements of project personnel is established prior to recruitment/allocation to project
	3.3	Personnel workloads are scheduled and allocated within industrial and enterprise requirements
	3.4	Requirements for staff training and assessment are identified and implemented
	3.5	Relevant enterprise and industry employment and human resources policies are effectively implemented
4 Monitor cabling works	4.1	Work activity is systematically monitored to ensure legislative requirements, industry standards and enterprise requirements are met
	4.2	Prompt follow up occurs on difficult or known problem areas
	4.3	Work is reallocated as required to ensure client and company requirements are met
	4.4	Costs and time schedules are monitored to identify and resolve any potential problems
5 Identify outcomes of cabling projects	5.1	Cabling projects are reviewed to identify areas where performance has been below client and enterprise expectations
	5.2	Necessary actions and/or recommendations are implemented to ensure effective improvements are implemented
	5.3	Cabling project successes and relevant personnel are acknowledged in an appropriate manner

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice
- IN420 Teamwork 4
- OH410 Occupational Health and Safety 4
- PS410 Plans and Specifications 4
- RE210 ACMA Licensing Standards, Rules and Regulations
- SU410 Planning 4
- SU415 Human Resources 4
- SU460 Finance 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Resources for cabling project	May include: competent staff, finances, facilities and equipment, time availability, consumables and cabling hardware requirements
Work documentation and other requirements	May be found in: work contracts, work plans and schedules, estimations and quotations, enterprise and client policy and procedures, other similar contract documentation, ACMA requirements
Human resources policies	May relate to: EEO, OHS, anti discrimination, employment terms and conditions, training and development, work site conditions, licensing
Client expectations and needs	May be verbal or written and usually checked against work specification requirements

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Competencies and capacity of existing workers	Is determined from observations, discussion, training records and demonstrations
Training	May include: on-job instruction, provision of learning opportunities, demonstration, structured feedback, self paced learning packages
Assessment	May include: review to specifications and other documentation within enterprise and industry policy guidelines, competency assessment for recording purposes
'Industry standards'	May include regulated or industry codes of practice and include appropriate ACMA technical standards
Cable used	Must be compliant with appropriate ACMA technical standard requirements (eg. for underground, aerial, Category 5 or Category 6, 6A, 7 or 7A, UTP etc)
Cabling products other than cable	Must be ACMA approved
Relevant legislation, codes, regulations and standards	Include: • Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Occupational Health and Safety • Enterprise operating policy and procedures • Cabling security codes and regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Identification of resource requirements for at least three applications.
- Completion of all appropriate work documentation for at least three applications.
- Application of all human resource policies including awards and conditions.
- Monitoring of work progress and implementation of alternate plans where necessary to meet work schedules and customer requirements for at least three applications.
- Application of quality management principles.
- Performance reviews and preparation of reports detailing recommendations for improvement for at least three applications.
- Ability to read and interpret contract documents, schedules and check lists, building plans and area charts, client correspondence.
- Monitor work activities to ensure compliance with relevant regulations and standards.
- Monitor and adhere to all related OHS and work practices.
- Communicate effectively with clients, work associates.
- Customer focus and consideration of customer needs

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC024D Provide high level consultancy and technical support in the CPE sector

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Liaise with industry experts	1.1 Industry experts are identified and networks established
	1.2 Industry experts are accessed regularly so as to keep abreast of changes in the CPE sector
	1.3 Sources of data relating to change and innovation are identified and accessed
	1.4 Enquires relating to change and innovation are pursued with vigour
	1.5 Latest data relating to change and innovation in the Customer Premises Equipment sector is evaluated and assessed for company use within an appropriate timeframe
2 Assess customer needs	2.1 A knowledge and understanding of the client's business is built to assist provide an accurate communications solution
	2.2 Communication requirements based on business needs and demands are identified

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	2.3	Client's physical and financial parameters are ascertained
	2.4	Reports and recommendations are presented within clients timeframes and in a format easily understood by the client
3 Provide consultancy and expert advice	3.1	Expert advice is provided to both company staff and clients and is both timely and accurate
	3.2	Communication solutions provided meet clients requirements
	3.3	Alternative solutions are provided for clients where their needs cannot be met precisely
	3.4	Advice/solutions provided match both the physical and financial demands of the client
4 Control and manage product and technical information	4.1	All relevant personnel are provided with the latest product and technical information
	4.2	Regular checks are made to ensure that appropriate personnel have access to the latest data

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI420 Research 4
- CI510 Communication 5
- CS510 Customer Relations 5
- EN540 Enterprise Operations Policy 5
- EN670 Selling 6
- IN430 Negotiation 4
- IN440 Workplace Networking 4
- IN520 Teamwork 5
- IN530 Consulting Methods
- NE410 Network Equipment 4
- SU510 Planning 5
- TE510 Telephony 5

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Product and technical information	Relates to: CPE product, product models and equipment types, peripherals, facilities including network facilities and system features
Network	May be within the company or external to it and maybe in Australia or overseas
Industry	Includes the communications, information technology and multi-media industries
Consultancy	Can be provided direct to a customer or through a third party who is considering provision of consultant's company product
Personnel	Can include sales and technical staff and may be own or partner company staff
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • ACMA Technical Standards • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations

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- Occupational Health and Safety
- Trade Practices Legislation
- Heritage Legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Provision of consultancy advice related to full range of CPE products including: product models and equipment types, peripherals, facilities including network facilities and system features.
- Provision of alternative solutions where customer's needs cannot be met precisely.
- Application of current CPE technological data to customer's business needs.
- Consideration of telecommunications network and its ability to cope with the demands of recommended CPE solutions.
- Preparation of clear and concise reports to customers complete with recommendations and supporting data, including full financial considerations.
- Regular updating of both company personnel and clients as to the latest product and technical information.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety matters and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC025D Develop and deliver training associated with new and/or modified products

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Design training curriculum and agenda	1.1 Training is geared to reflect up to date product and technical data 1.2 Curriculum is delivered in a manner suited to the skills of the recipient 1.3 Curriculum modifications are completed prior to product, equipment, facility changes being introduced by the company 1.4 Training agendas are developed to meet needs and timetables of recipients
2 Deliver training as appropriate to both sales and technical staff	2.1 Training is delivered in a systematic fashion and in a format suitable to recipients needs 2.2 Training programme follows a logical sequence and builds on the existing knowledge of recipients 2.3 Training recipients are fully advised of training schedule – agenda, times and locations

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2.4 Criteria for post training evaluation is established

2.5 Training session is fully evaluated against pre-determined criteria on completion and variations made as appropriate

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA520 Training
- CI510 Communication 5
- EN540 Enterprise Operations Policy 5
- IN520 Teamwork 5
- PE510 Personal Skills 5
- PK510 Product Knowledge 5
- SU410 Planning 4
- SU520 Leadership 5
- TE510 Telephony 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Product and technical information	Relates to: CPE product, product models and equipment types, peripherals, facilities including network facilities and system features
Training	Can be undertaken in a classroom, on-the-job or in a simulated environment. May be formal or informal.
Training sessions	Are conducted for company staff, and for staff from other companies who are working with the company's products

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Training schedules	Include agenda, times and locations
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • ACMA Technical Standards • Australian Standards 3901, 3902 • International Standards 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Heritage legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Development of training package that fully covers all operational and technical knowledge related to new or modified CPE product. • Delivery of training package that delivers as a product staff fully trained and competent in the provision and maintenance of new or modified product. • Establishment of criteria that will measure training program effectiveness. • Assessment of staff against predetermined criteria. • Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation. • Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.

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- All related occupational health and safety matters and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC026D Develop and deliver product technical information to company staff

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Develop product information and technical data	1.1 Information and data gathered is accurate 1.2 Sales brochures include relevant product information and technical data 1.3 Information is presented in a manner which enables easy assimilation by the brochure designer 1.4 Product information and technical data is in a format which can easily be understood by the reader of the brochure 1.5 Brochures are checked for accuracy prior to distribution
2 Develop technical specification manuals	2.1 Specifications included in the manuals are accurate 2.2 Manuals are developed and presented in a manner which enables complete understanding by the reader 2.3 Manuals are distributed consistent with product/ facility release

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3 Develop training manuals and user guides	3.1 Manuals and user guides are both accurate and user friendly
	3.2 Training delivery staff are consulted both prior to and during the manual development
	3.3 Consideration is given to the user, and the environment in which the manual/user guide will be used
	3.4 Feedback is sought on the content and presentation of the manual/user guide
4 Distribute updated data	4.1 Need to distribute updated product/technical data and who should receive such data is determined
	4.2 Amended product/technical data is distributed in an accurate and timely manner
	4.3 Data is provided to all users of current manuals/ guides etc
	4.4 Records relating to users of guides/manuals etc are updated and accurate

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA520 Training
- CI510 Communication 5
- EN540 Enterprise Operations Policy 5
- IN520 Teamwork 5
- PE510 Personal Skills 5
- PK510 Product Knowledge 5
- SU410 Planning 4
- SU520 Leadership 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Information	Is collected on: products, related technical operational data, system features, peripherals, system design, relationship with network and related technologies
Manuals/guides etc	Can be printed external to the industry
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • AS Communications Cabling Manaul (CCM) Volume 1 • Australian Standards 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Heritage legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Provision of sales brochures that are accurate and contain technical data sufficient to highlight the product's advantages without confusing the reader.
- Development of product and training manuals containing all relevant data required by both installation and maintenance staff.
- Manuals in use reflect current information.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety matters and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC027D Develop CPE installation project plans

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate and assess project	1.1 Documentation is checked for completeness and accuracy
	1.2 A site evaluation is undertaken and all barriers to the installation identified
	1.3 Safety aspects of the building are evaluated and necessary precautions noted for inclusion in job specification
	1.4 Equipment quantities are checked and availability assessed
	1.5 Actual needs of the customer are verified
	1.6 Pricing is checked to ensure that company guidelines relating to profit margin are achieved
2 Prepare detailed equipment/system design and configuration	2.1 All data relating to the project is captured
	2.2 System specifications are verified with both the customer and sales staff
	2.3 All additional needs of the customer are identified

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	2.4 Available data is translated into a detailed system design and configuration
	2.5 Programme output is verified with the customer
3 Detail project tasks and associated timelines	3.1 All tasks associated with the project are identified and detailed
	3.2 Resource needs are identified and built into the plan
	3.3 Timeframes associated with each aspect of the project are identified
	3.4 All customers needs in relation to the project and its timing are accounted for
	3.5 Plan is documented in a manner which facilitates ease of management of the project
	3.6 Quality plans incorporating flow process charts are developed as appropriate
	3.7 Plan is verified with all appropriate personnel including the customer
	3.8 Contingency plans are developed to account for delays or other problems experienced during the project
	3.9 Modifications to the plan are recognised and instituted within accepted timeframes

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO520 Planning Software 4
- CO530 Computer Programming 4
- CO630 Planning Software 6
- CS510 Customer Relations 5
- EN660 Enterprise Pricing Policy 6
- EN670 Selling 6
- IN430 Negotiation 4
- IN520 Teamwork 5
- MA510 Mathematics 5
- PK510 Product Knowledge 5

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- PS420 Basic Building Trades 4
- PS510 Plans and Specifications 5
- SU470 Project Management 4
- SU510 Planning 5
- SU520 Leadership 5
- TE470 Communications Industry 4
- TE510 Telephony 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Documentation	May include: sales orders, quotation forms, specification lists
Safety aspects of a building	May include: existence of asbestos, construction type, building/equipment hazards, ceiling access
Equipment	May include: PABX, cordless PABX and business systems, telephone systems, payphones, bandwidth managers, modems, network equipment, peripherals, DSL – Digital Subscriber Line including Asymmetrical (ADSL), Digital Broadcasting and CTI (Computer Telephony Integration) technologies
CPE systems	Could be stand alone or networked
Data collected	Includes: operational configuration, extension relationship, international subscriber dialling and subscriber trunk dialling access details, class of service, applications such as ACD, hotel, auto operator, voice mail, redundancy
System design and configuration	Is undertaken using available software programs

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Customers	May be dealt with directly or through a third party such as communications consultant or contractor to a major supplier. Can include building construction managers and architects.
Project plans	May be developed using techniques such as check lists and Gant charts and may involve development and use of software based programmes
Quality plans	May include: process flow charts identifying all activities including inspection, testing and related procedures, work instructions, technical standards, manufacturer's technical manuals, responsibilities, dependencies and any other requirements to ensure that installation and service activities are performed under controlled conditions
Relevant legislation, codes, regulations and standards	Include: • ACMA Technical Standards • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Noise Abatement • Heritage Legislation • Industrial Awards and conditions

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation. • Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors. • All related occupational health and safety requirements and work practices. • Customer focus and consideration of customer needs.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC028D Organise resources

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Organise for third party supply	1.1 Specifications and company criteria for material supply and purchasing are developed and included in appropriate tender documents
	1.2 Tender documents are prepared in accordance with company policy
	1.3 Likely material suppliers are identified and invited to tender and/or supply
	1.4 Tenders are evaluated and accepted as appropriate
	1.5 Price and conditions of purchase have been negotiated to company guidelines and satisfaction
2 Organise supply of equipment and material	2.1 Specifications detailing types and quantities of equipment and material are developed
	2.2 Equipment and material is delivered to the designated location within the specified timeframe

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3 Organise customer training	3.1	Detail of training required is ascertained from the customer
	3.2	Timeframe for training is established
	3.3	Resources to undertake the level of training required is identified and organised
4 Organise network facilities	4.1	Supply and timeframe for network facilities is confirmed with successful network supplier
	4.2	Provision of network facilities co-ordinates with system cutover/commissioning
	4.3	Arrangements for the regulated supplier to jumper the main frame is organised
	4.4	Jumpering activity is co-ordinated with equipment supply
5 Assess labour resources required	5.1	Standard installation times are used to develop total hours required
	5.2	Identified barriers and difficulties are allowed for in developing installation hours required
	5.3	Allowance for contingencies is catered for
	5.4	Required labour skills are identified
6 Organise labour resources	6.1	A workforce with required numbers and skills is established
	6.2	Workforce is advised fully as to job requirements and timeframe
	6.3	Priorities are organised to ensure timeframe agreed with the customer is met

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO420 Planning Software 4
- CO430 Computer Programming 4
- CS410 Customer Relations 4
- EN460 Enterprise Pricing Policy 4
- IN430 Negotiation 4

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- MA420 Mathematics 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- SU470 Project Management 4
- TE470 Communications Industry 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Equipment	May include: PABX, cordless PABX and business systems, telephone systems, bandwidth managers, modems, network equipment, peripherals, DSL – Digital Subscriber Line including Asymmetrical (ADSL), Digital Broadcasting and CTI (Computer Telephony Integration) technologies
Material suppliers	May be partner companies, preferred/approved suppliers or tenderers
Tenders	Are invited both by letter and through the press
Tender assessment	Can involve consideration of: price, product type, capacity, performance and quality, company performance, delivery times, quality assurance processes
Network facilities	Can include: exchange lines, dedicated network capacity, data facilities, rotary working, peripheral facilities such as easy call
Mainframe jumpering	Can only be undertaken in accordance with ACMA Standards
Labour skills	May be company or contract staff
Customers	May be dealt with directly or through a third party such as communications consultant or contractor to a major supplier. Can include building construction managers and architects.

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Customer training	Can be undertaken by specialist trainers or installation staff
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • Australian Standards as 3901, 3902 • International Standards ISO 9001, 9002 • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Development of tender for CPE products, equipment, peripherals, associated equipment. • Assessment of tenders and provision of a clear report outlining all options and including recommendations with supporting reasons. • Determination of customer training needs. • Identification of labour needs and organisation of such labour to meet installation schedules. • Coordination of both CPE and network facilities to meet customer determined deadlines. • Ability to read and interpret related floor plans, building plans, reflected ceiling plans, schematic drawings. • Correct interpretation and application of relevant regulations and standards. • Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC029D Plan the development and growth of the telecommunications network

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify data related to both existing and projected network usage	1.1 Marketing intelligence is accessed for detail as to customer demand on the network and likely growth in network use
	1.2 Demand data from both carriers and resellers relating to both current and proposed network growth is obtained
	1.3 Information relating to new and emerging technologies, facilities/features and their specific applications is accessed
	1.4 Current data relating to both traffic quantity and flow is gathered
	1.5 Forecasts are obtained in relation to both service and traffic demand
	1.6 Data related to current network capacity is determined
	1.7 Relevant legislation and associated operational codes are studied and impact on planning processes analysed
2 Identify need for network growth	2.1 Capacity of existing network to absorb planned growth is determined
	2.2 Need and likely timing of necessary network increments is determined
	2.3 Use of new or alternate technologies to meet forecast growth is assessed

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	2.4	Impact of not meeting growth forecasts is established
	2.5	Priorities relating to growth needs are determined
	2.6	Barriers relating to planned network extensions are identified
3 Develop network plans	3.1	Overall planning parameters including approved business plan is studied and understood prior to commencement of planning process
	3.2	Specific projects aimed at meeting technology change/improvement and growth are identified
	3.3	Project details including infrastructure development are determined and preliminary costings undertaken
	3.4	Priority related to each project is determined
	3.5	Availability of required technology or technology feature within the specified timeframe is determined in assessing network growth plans
	3.6	Resource requirements are clearly identified
	3.7	Appropriate investment studies including cost/benefit analysis are undertaken where required
	3.8	Plan is circulated for comment and approval in accordance with recognised enterprise procedures

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CI620 Research Skill 6
- CO610 Computer Skills 6
- CO630 Planning Software 6
- CO640 Forecasting Software 6
- CO670 Planning Applications Programming 6
- CS610 Customer Relations 6
- DI640 Digital/Analogue Network Applications 6
- EL530 Power Theory 5
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6

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- IN620 Teamwork 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE640 Network Management Principles and Capabilities 6
- PE610 Personal Skills 6
- PS610 Plans and Specifications 6
- PS620 Design 6
- RA620 Radio Frequency Theory and Hazards 6
- RE660 Australian Electrical Standards 6
- SU610 Planning 6
- SU660 Finance 6
- SU690 Economics and Strategic Thinking 6
- TR650 Traffic Management 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM

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Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Marketing intelligence	May include: customer projections, customer demand, customer specific technology needs, new technology impact, customer feedback
Demand data from resellers	May come direct or via marketing intelligence
Information on new technologies and impact on existing network	Are obtained from vendors, enterprise forward planning groups, marketing groups or specific technology planning groups
Traffic dimensioning information	Is derived from specific traffic dimensioning studies undertaken within network management groups
Timeframes for development or growth planning	Are influenced both by financial capacity as determined by the business plan or via the marketing plan
Barriers to planned network growth	May include: financial constraints, planning approvals, environmental considerations, heritage legislation restrictions, government policy, technology availability, land acquisition problems, building availability, material availability
Planning priorities	Are driven by customer demand, marketing initiatives, revenue projections, legislative requirements
Planning	Can relate to network change, network growth and network reduction and may also cover sites, buildings and structures
Resource arrangements	May be internal or external to the enterprise
Business plan	Is the enterprise vehicle for planning its full resource commitment within a specified period. It covers activities, finance, labour and material
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Occupational Health and Safety • Heritage legislation

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- Industrial awards and conditions
- Australian standards applying to radiation hazards
- State and Federal Environment Acts
- National Parks Act
- Telecommunications Act and relevant codes
- Privacy act
- Spectrum Management Authority

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor:
  - identifying data including: legislative requirements, marketing intelligence, demand data, new and emerging technologies, equipment and features, current traffic data, growth forecasts, existing network capacity
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - interpreting, interrogating and using relevant data bases
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor:
  - interpreting growth patterns and developing options which satisfy customer and enterprise financial goals
  - maintaining customer focus and consideration of customer needs
- Mentor/assessor observes candidate:
  - implementing planning processes including the associated monitoring and control mechanisms
  - merging technological development and product implementation into network development plans
  - developing a clearly documented network plan, both within specification and within specified timeframes
  - identifying and prioritising projects aimed at meeting the development of the network within specified planning timeframe

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- complying with all related occupational health and safety requirements and work practices
- interacting with enterprise personnel, customers and other contractors

- Candidate submits a clearly documented hard copy network development plan.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC030D Forecast service demand

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Generate forecasts	1.1 Data is collated from appropriate organisations involved in planning initiatives and/or amendments
	1.2 Forecasts are generated using information in reference to new developments
	1.3 Appropriate forecasting techniques are used to calculate forecast figures
	1.4 Forecast figures are compiled and reported upon in accordance with enterprise policy
2 Update systems with current forecasts	2.1 Systems are updated after each installation/ amendment activity using reports received from groups involved in installation
3 Review forecasts	3.1 Forecasts are reviewed at regular periods according to enterprise policy
	3.2 Forecast reviews take into consideration new developments in the area and technological changes where appropriate

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO640 Forecasting Software 6
- CO650 Management Information Systems 6
- MA630 Mathematical Modelling 6
- NE670 Forecasting Techniques 6
- PS610 Plans and Specifications 6
- PS660 Topography 6
- PS670 Town Planning Procedures and Practices 6
- SU690 Economics and Strategic Thinking 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite

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Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Data	Is collected in relation to: access transport planning, demographic changes, economic forecasts, industry trends, land developments, local industry, market conditions, marketing programs, marketing requirements, population trends, possible environmental impacts, power, re-zoning, sales forecasts, shire planning, telecommunications history in the area, traffic patterns, influence of technology on traffic demand, changing customer use patterns May be collected from: customers (actual and prospective), internal organisational groups, local, marketing organisations, real estate agents, sales organisations, state and federal governments, statutory bodies, economic planners, traffic management systems
Forecasts	Are in relation to: demand for telecommunications services and traffic
Methods of data collection	May include: interviews, plans, maps, directories, reports, network management tools
New developments include:	domestic, commercial, industrial, other communications activity
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Occupational Health and Safety • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes • Privacy Act

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - collecting data vital to the development of both traffic and service variation
  - generating forecasts in relation to both traffic and service variation using appropriate forecasting techniques including: trend analysis, mathematical modelling
  - interacting with enterprise personnel, customers and other contractors, with a clear customer focus and consideration of customer needs
  - applying legislative and environmental conditions in forecast generation
- Candidate submits a detailed hard copy service demand forecast.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor:
  - providing forecasts relevant to specific planning periods
  - complying with all related occupational health and safety requirements and work practices
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC031D Prepare a project brief

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

Assessment candidates will have a wide range of telecommunications industry skills, knowledge and competency at Diploma level or above before attempting this unit.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify requirements	1.1 Details relating to the project are identified from the approved network plan
	1.2 Current network conditions are assessed
	1.3 Specific customer requirements are sought and analysed
	1.4 Site survey data is analysed where required
	1.5 Geographical information is obtained and/or studies initiated as required
	1.6 Barriers to plan realisation are identified
	1.7 Information relating to new technology or technology features is obtained and studied
	1.8 Relevant legislation and associated operational codes are studied and impact on planning processes analysed
2 Develop project brief	2.1 Planning options are developed and studied, considering present and future needs
	2.2 Both current and new technology, facilities and features are considered when developing options
	2.3 Cost/benefit studies are undertaken as a guide to the decision making process

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	2.4 Project outcomes are determined in keeping with approved planning parameters
	2.5 Project brief is discussed with the customer is required
	2.6 Final option is presented for approval before proceeding with project brief
	2.7 Specifications relating to location, route, area, product and/or platform are established
	2.8 Costing estimates are developed and an operating budget ensuring profit margins in accordance with enterprise policy are established
	2.9 Proposed project timing is determined taking into consideration other related projects where required
	2.10 Brief is prepared and includes broad details of the resources required to complete project, broad scheduling data, relevant maps, sketch plan and broad project description
	2.11 Sketch plan for area in question is drafted in accordance with enterprise practice
3 Assess tenders	3.1 Quotations are sought or tenders are issued for project completion
	3.2 Quotations/tenders are examined against project criteria and any proposed variations assessed as to impact on proposed outcomes
	3.3 Detailed project costings are examined to ensure that budget parameters are attained
	3.4 Competitive tenders are assessed and decision made in accordance with enterprise policy and after consideration of price, product, capacity, performance, quality and ability to meet specified timeframes
4 Monitor contract progress and completion	4.1 Contract is oversighted and monitored with particular attention given to progress against plan, costings, specifications and budget
	4.2 Regular liaison with project manager is established and maintained during the period of the contract
	4.3 Contract problems/difficulties are discussed with both project manager and contractor as required
	4.4 Contract overruns relating to both price and time are negotiated
	4.5 Contract variations are negotiated and implemented

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4.6 Additional funding is sought where required

4.7 Completion advice is completed in conjunction with project manager, installation manager and operational staff and asset declared ready for use

4.8 Quality audit of the project is undertaken and recommendations for improvement are made and submitted in accordance with enterprise procedures

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CI620 Research Skill 6
- CO610 Computer Skills 6
- CO630 Planning Software 6
- CO670 Planning Applications Programming 6
- CS610 Customer Relations 6
- EL530 Power Theory 5
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- PE610 Personal Skills 6
- PS610 Plans and Specifications 6
- RA620 Radio Frequency Theory and Hazards 6
- RE660 Australian Electrical Standards 6
- SU600 Tender Analysis 6
- SU610 Planning 6
- SU630 Quality Management 6
- SU660 Finance 6
- SU690 Economics and Strategic Thinking 6
- TR650 Traffic Management 6

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Network condition information	Is obtained from capacity assessment data, traffic dimensioning data and network performance data which is available through the various network management tools associated with the network
Customer information	Is gathered from both marketing and account management sources. It could be necessary for planning staff to hold direct discussion with customers, but this would be done in conjunction with marketing or account management personnel
Customers may be:	internal or external to the organisation
External customers may include:	other carriers, service providers, communication consultants, enterprises, government bodies

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Site survey data may include:	site availability, site ownership and acquisition data, building availability and/or capacity, power availability, line of sight data, geological/land surveys, regulatory and statutory requirements, earthing requirements environmental impact, weather conditions – SEE UNIT Undertake civil site survey
Barriers to planned network growth may include:	local planning approvals, environmental considerations, heritage legislation restrictions, government policy, community opposition
New technology introduction	Is normally part of long term planning and is part of the overall business and forward planning process
Planning processes	Are enterprise specific and are usually documented within enterprise process manuals
Decision as to whether project will be subject to tender process, preferred supplier arrangement or undertaken by enterprise resources	Is governed by enterprise policy
Tendering process	Could involve both internal organisation groups as well as external organisations Is enterprise specific and usually documented in enterprise process manuals or part of enterprise policy
Quality audit	Is a review of process and methodology
Planning approval mechanisms	Are enterprise specific
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • Australian standards applying to radio frequency hazards • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - identifying all relevant data including: planning requirements, current network conditions, technology, performance and capacity, customer requirements, site survey data, technological innovations and development, barriers to plan realisation
  - applying legislative and environmental conditions to project brief development
  - developing and analysing contract options
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - competently assessing tenders
- Candidate submits hard copy of a clearly documented brief which:
  - meets specification, specified timeframes, enterprise financial systems and policy,
  - applies specified planning processes including associated monitoring and control mechanisms
- Candidate submits a hard copy report outlining all reasons for the final tender decision.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – showing:
  - compliance with all related occupational health and safety requirements and work practices
  - interaction with enterprise personnel, customers and other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC032D Undertake a civil site survey

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. The need for, and extent of, site surveys is determined during the development of project briefs – refer unit ICTTC031D.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for survey	1.1 Detailed requirements are discussed with planning staff
	1.2 Need for specialist studies are determined and organised to co-ordinate with on site visit as required
	1.3 Need for on site discussions with site owner, local staff, community or government representatives is determined and appointments made
	1.4 Site access arrangements are determined and appropriate approvals organised if necessary
2 Undertake survey of land, buildings and facilities both new and existing	2.1 Existing buildings are surveyed as to capability of meeting planned changes
	2.2 Access, security, environmental conditions and power and earthing arrangements and network connections are assessed as to capability of meeting planned growth
	2.3 Assessments are made as to altered building infrastructure requirements in the event that the building is unsuitable
	2.4 Building options are assessed and documented should a new structure be necessary
	2.5 Availability and ownership of land is determined
	2.6 Availability of commercial power is assessed

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	2.7 Title searches are organised as required
	2.8 Special geological/land surveys and/or archaeological studies are organised
	2.9 Soil sample studies are organised and the results analysed
	2.10 Geographical nature of land is assessed and barriers to signalling determined
	2.11 Work is conducted in a manner which is safe to self, fellow workers and the public at large
3 Undertake survey of environmental conditions	3.1 Existence of regulatory/statutory requirements is ascertained
	3.2 Customer/community attitude to development is surveyed
	3.3 Environmental impact of development is ascertained
	3.4 Prevailing weather conditions and impact on planned changes is studied
4 Document and report survey findings	4.1 Detailed report outlining all findings is prepared
	4.2 Various options to meet planned changes along with appropriate cost/benefit data are developed
	4.3 Detailed recommendations are presented as to the most viable option

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO620 Computer Programming 6
- CO630 Planning Software 6
- CS610 Customer Relations 6
- EN660 Enterprise Pricing Policy 4
- EN670 Selling 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6

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- NE640 Network Management Principles and Capabilities 6
- OH610 Occupational Health and Safety 6
- PK610 Product Knowledge 6
- PS610 Plans and Specifications 6
- PS630 Drawing Flowcharts 6
- PS640 Spare Parts Dimensioning 6
- PS680 Basic Building Trades Knowledge 6
- RA620 Radio Frequency Theory and Hazards 6
- RE610 Laws, Policies and Guidelines 6
- SU610 Planning 6
- SU670 Project Management 6
- SU680 Resource Management 6
- TE610 Telephony Principles 6
- TR610 Transmission Theory 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies can be described in broad terms as:	switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium may be:	copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture can be described as:	Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM

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Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Specialist studies	Relate to those activities requiring professionally qualified staff such as archaeologists, surveyors, environmental experts, geologists, heritage experts
Building survey would include:	floor space, ceiling heights, security arrangements, access, existing environmental conditions, floor loading, building design, earthing arrangements, communications options
Site survey data may include:	site availability, site ownership and acquisition data, building availability and/or capacity, power availability, line of sight data, geological/land surveys, regulatory and statutory requirements, earthing requirements environmental impact, weather conditions
Building options may include:	hut, container, new building, portable housing, underground housing
Land	May be crown land, government owned or private
Regulatory/statutory requirements	May be legislated/ordinances or operating codes developed by all levels of government
Weather impact may include:	flooding, fire risk, earthquake, cyclone, wind, fog, snow, rainfall
Environmental impact may include:	disturbance of flora/fauna, visual impact, safety hazards e.g. radio frequency hazards, pollution – air, water, noise
Barriers to signal path may include:	distance, line of sight, weather conditions, land or water, local features
Local environmental imperatives may include:	seasonal changes, habitats, heritage values, environment, legislation, traditional landowners
Local geographical/ topological features may include:	dams, fences, access, survey marks, hazards, potential hazards, location of other services / plant, potential soil erosion areas
Relevant legislation, codes, regulations and standards may include:	• ACMA technical standards • Australian building codes and regulations • International Standards ISO 9000 and 9001 • Environmental Protection • Fire regulations

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- Heritage legislation
- Industrial relations awards and agreements
- ITU recommendations
- Local government
- Telecommunications Act and Telecommunications National Code
- Occupational Health and Safety Act
- Privacy Act
- Spectrum Management Authority
- Trade Practices Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - interacting with enterprise personnel, customers and other contractors
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - negotiating with customers, communities and community representatives including government officials
  - applying all legislative impacts on the network including relevant operational codes
  - complying with all related occupational health and safety requirements and work practices
  - considering both environmental and propagation needs
- Candidate delivers at least one oral report:
  - identifying key stakeholders.
  - considering both existing and proposed technologies and associated building, power needs
  - complying with all related occupational health and safety requirements and work practices
- Mentor/assessor observes candidate's ability to consider both existing and proposed needs and comply with all related work practices.
- Candidate submits a clear oral, and then a hard copy report, outlining all options and including recommendations with supporting reasons.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC033D Develop project management plan

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

Assessment candidates will have a wide range of telecommunications industry skills, knowledge and competency at Diploma level or above before attempting this unit.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate and assess project	1.1 Documentation associated with planning project brief is checked for completeness and accuracy and further briefing from planners arranged where necessary
	1.2 A site evaluation is undertaken or organised and all barriers to the installation identified
	1.3 Safety aspects of the building/area are evaluated and necessary precautions noted for inclusion in job specification
	1.4 Equipment/system needs are identified and availability assessed
	1.5 Actual needs of the customer are verified where appropriate and any changes are further discussed with planners
2 Detail project tasks and associated timelines	2.1 Overall project is broken down into tasks and a work breakdown structure is developed
	2.2 All tasks associated with the project are identified and detailed
	2.3 The relationship between tasks is identified and a logical networking of tasks is developed
	2.4 Critical paths are identified and planned

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	2.5 Need for and extent of network outages and restrictions imposed as a result are identified and allowed for in developing the plan and associated timeframes
	2.6 Timeframes associated with each aspect of the project are identified
	2.7 Resource needs are identified and built into the plan
	2.8 Necessary planning approvals are obtained and/or organised
	2.9 Plan is documented in a manner which facilitates ease of management of the project
	2.10 Quality plans incorporating flow process charts are developed as appropriate
	2.11 Plan is verified with all appropriate personnel including the customer where appropriate
	2.12 Contingency plans are developed to account for delays or other problems experienced during the project
	2.13 Modifications to the plan are recognised and instituted within accepted timeframes
3 Assess resource requirements	3.1 Standard installation times are used to develop total hours required
	3.2 Identified barriers and difficulties are allowed for in developing installation hours required
	3.3 Allowance for contingencies is catered for
	3.4 Required competencies are identified and skill gaps determined
	3.5 Special award conditions are recognised and allowed for in developing business case
	3.6 Possible resource banks are identified
	3.7 Use of contract versus enterprise resources is assessed
	3.8 Project is subjected to tendering process in accordance with enterprise policy where required
	3.9 Material requirements including spare parts are established
	3.10 Test gear and tools necessary for the project are determined
	3.11 Systems including man/machine communication tools are identified

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4 Organise training	4.1	Detail of training required is ascertained given project requirements and identified skill gaps
	4.2	Timeframe for training is established
	4.3	Method of training delivery and location of such training are determined in a manner which gives best return to the enterprise both from a training and economic perspective
	4.4	Resources to undertake the level of training required are identified and organised
5 Organise resources	5.1	A workforce with required numbers and skills is established and fully briefed as to job requirements and timeframe
	5.2	Priorities are organised to ensure timeframe agreed with the customer is met
	5.3	Manuals, specifications, plans and design briefs are organised and delivered to site prior to installation
	5.4	Labour contract is let and contract documents specifying the project detail is agreed with the successful tenderer
	5.5	Material, test gear, tools and systems are ordered and arrangements initiated to ensure delivery to site in accordance with planned timeframes
	5.6	Transport of mechanical aids/special vehicles to the site is organised
6 Determine budgetary requirements	6.1	A detailed financial statement detailing costs associated with each task/phase of the project is prepared in accordance with enterprise policy
	6.2	A project budget is prepared and submitted for approval prior to project commencement
	6.3	Expenditure approval procedures are developed and agreed in accordance with enterprise policy
	6.4	Costings are checked to ensure that company guidelines relating to profit margin are achieved
	6.5	A risk analysis study is undertaken and various financial options developed
7 Document plan	7.1	Tasks are fully documented within the plan along with timeframes and resource requirements
	7.2	Installation processes including test requirements are fully described in the plan

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	7.3	Project verification and monitoring and control processes are developed and detailed in the plan
	7.4	Review processes including quality audits are planned and described within the project plan
	7.5	Plans, drawings, system/equipment specifications, manuals both enterprise and vendor and process flow documents are included with the plan
	7.6	All parties associated with the process are identified and their particular roles fully documented
	7.7	A project management meeting with all parties associated with the project is organised
8 Arrange plan approval	8.1	Plan, outlining tasks, timeframes, resource requirements and financial details are submitted for approval prior to implementation in accordance with enterprise requirements
	8.2	Plan is provided to design staff for detailed design upon approval
	8.3	Plan together with design details are discussed with installation staff prior to project commencement
9 Oversight project completion	9.1	Plan is monitored and controlled in accordance with recognised quality principles
	9.2	Difficulties with plan execution are identified early and contingency plans implemented
	9.3	Project overruns are assessed from both an economic and customer impact perspective and appropriate action initiated to minimise impact
	9.4	Completion advice is completed in conjunction with planners, installation manager and operational staff and asset declared ready for use
	9.5	Quality audit is undertaken on project completion and recommendations made for process improvement where necessary

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO620 Computer Programming 6
- CO630 Planning Software 6
- CS610 Customer Relations 6
- EN660 Enterprise Pricing Policy 6
- EN670 Selling 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE640 Network Management Principles and Capabilities 6
- OH610 Occupational Health and Safety 6
- PK610 Product Knowledge 6
- PS610 Plans and Specifications 6
- PS630 Drawing Flowcharts 6
- PS640 Spare Parts Dimensioning 6
- PS680 Basic Building Trades Knowledge 6
- RA620 Radio Frequency Theory and Hazards 6
- RE610 Laws, Policies and Guidelines 6
- SU610 Planning 6
- SU670 Project Management 6
- SU680 Resource Management 6
- TE610 Telephony Principles 6
- TR610 Transmission Theory 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as; Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Documentation	May include: sales orders, quotation forms, specification lists
Safety aspects of a building	May include: construction type, building/equipment hazards, ceiling access
	System design and configuration
	Is undertaken using available software programmes
Customers	May be dealt with directly or through a third party such as communications consultant or contractor to a major supplier
Project plans	May be developed using techniques such as check lists and Gant charts and may involve development and use of software based programmes
Planning approvals	May be required from: Government planning bodies, local government, Frequency Spectrum Agency

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Quality plans	May include: process flow charts identifying all activities including inspection, testing and related procedures, work instructions, technical standards, manufacturers technical manuals, responsibilities, dependencies and any other requirements to ensure that installation and service activities are performed under controlled conditions
Tenders	Are invited both by letter and through the press. could be for both contracting or sub contracting
Tender assessment	Can involve consideration of: price, product type, capacity, performance and quality, company performance, delivery times, quality assurance processes
Customer training	Can be undertaken by specialist trainers or installation staff
Special award conditions	Can include: weather allowance, site allowance, district allowance
Parties to the project	May include: planners, designers, installers, customer, contractor/sub contractor, operational staff, equipment manufacturer/supplier, site owner/lessee
Quality audit	Is a review of process and methodology
Relevant legislation, codes, regulations and standards	Include: • ACMA Technical Standards • International Standards ISO 9000 and 9001 • ITU recommendations • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Noise Abatement • Heritage Legislation • Industrial Awards and conditions • Telecommunications Act and associated codes

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor:
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - undertaking business planning and business case development including risk analysis
- Mentor/assessor observes candidate:
  - identifying tasks and their relationships
  - applying legislative and environmental conditions and application to project
  - developing a clearly documented plan both within specification and within specified timeframes
  - using project planning and scheduling tools such as flow charts/Gantt charts
  - interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - using project planning and scheduling tools such as flow charts/Gantt charts
  - complying with all related occupational health and safety requirements, enterprise/customer service agreements and work practices
  - reading relevant enterprise policy and completing documentation
- At least one oral report to mentor/assessor, and observation by mentor/assessor, of candidate's successful application of relevant planning processes and the associated monitoring and control mechanisms
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor identifying resource (labour, finance and materials) needs and the source of resources.
- Candidate submits a flowchart/Gantt chart to mentor/assessor for sign-off by mentor/assessor.
- Candidate submits a detailed hard copy project financial analysis to mentor/assessor.
- Candidate submits a clearly documented hard copy plan for sign-off.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC034D Prepare a detailed design brief

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. This could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

Assessment candidates will have a wide range of telecommunications industry skills, knowledge and competency at Diploma level or above before attempting this unit.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate design requirements	1.1 Initial need for enhancement to new or existing telecommunications network is determined from telecommunications project plan and associated project brief
	1.2 Data is collated from other relevant sources and combined/collated with information from project brief where appropriate
	1.3 Specific purpose of network growth and enhancement is determined
	1.4 Type of network growth/enhancement is ascertained
	1.5 Where customer has initiated the need, customer is consulted in accordance with enterprise policy
	1.6 Timeframe for design plan is ascertained
	1.7 Design resource requirements are established and organised

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2 Gather field information	2.1 Smooth conduct of the project is facilitated by consultation with affected property owners where project impacts on private property
	2.2 Physical characteristics of the site are ascertained and any impediments to smooth operations are detected from field inspection, site surveys, building inspections and existing maps/plans
	2.3 Site access and security is ascertained
	2.4 Existing equipment and equipment layouts including racking, power, earthing, lighting, air conditioning, cable access and existing radio frequency hazards are identified
	2.5 Local knowledge is ascertained regarding the location and character of the area/building
	2.6 The impact of relevant heritage/environmental and other governmental legislation is ascertained and action initiated to gain approvals or consultative processes organised according to enterprise policy
	2.7 Field and/or building sketch detailing both existing and proposed layout, route and physical placement of equipment and facilities is prepared in accordance with enterprise requirements
	2.8 Ownership of land to be used is checked and arrangements initiated via approved enterprise procedures to purchase/lease as appropriate
	2.9 Solution to any obvious physical impediment to construction is identified
	2.10 Occupational health and safety practices are fully observed during the inspection process and are catered for in the design process
	2.11 Work is conducted in a manner which is safe to self, fellow workers and the public at large
3 Select design option	3.1 Proposed network needs are analysed taking into account existing network and conditions and planned needs, whilst heeding legislative and other barriers
	3.2 Design options are generated that are realistic, in economic, customer service, timing and network integrity terms
	3.3 Evaluation and selection of preferred option is undertaken in accordance with approved enterprise criteria

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	3.4	Option selected satisfies enterprise business strategy outcomes, enterprise service policy and planned project outcomes
	3.5	Selected option is discussed with customer, where customer has initiated the need
4 Assess system compatibility	4.1	Compatibility of each equipment unit with other installed units and their intended use is determined from the system plans, equipment manuals, installation environment and industry knowledge
	4.2	Modifications are made as appropriate
5 Prepare design plan	5.1	Design plan is prepared to enterprise requirements using appropriate techniques
	5.2	Relevant geographical / topological information is added to design plan
	5.3	Location and specification of works and network equipment are indicated accurately and clearly
	5.4	Material needed to undertake the project is specified
	5.5	Necessary planning approvals are obtained and/or organised if not already available
	5.6	Test requirements are specified
	5.7	Detailed cost estimates are developed in accordance with enterprise policy and procedures
	5.8	Final designs and any variations to plan are discussed with planners and project management and final approval sought in accordance with enterprise policy
6 Prepare documentation	6.1	Final design brief is fully documented and submitted to installation staff
	6.2	Material requirements are detailed and submitted to material supply staff for supply and or purchase
	6.3	Detailed drawings are prepared and attached to design brief
	6.4	All documentation relating to installation/ modification, testing and ongoing operations and maintenance is prepared and attached to brief
	6.5	Labelling for all equipment is developed or organised
	6.6	Need for design changes are co-ordinated with installation staff when required

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6.7 Quality audit process is undertaken of all stages of brief development and presentation and recommendations for process improvement made where appropriate

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CI620 Research Skill 6
- CO610 Computer Skills 6
- CS610 Customer Relations 6
- EL430 Power Theory 4
- EL440 Australian Electrical Standards 4
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- MA620 Mathematics 6
- NE610 Network Equipment 6
- NE620 Network Architecture 6
- NT410 Emerging Network Technologies
- PE610 Personal Skills 6
- PS610 Plans and Specifications 6
- PS620 Design 6
- PS630 Drawing Flowcharts 6
- RA620 Radio Frequency Theory and Hazards 6
- RE610 Laws, Policies and Guidelines 6
- RE630 Land Acquisition 6
- SU450 Estimating Techniques 4
- RE410 Laws, Policies and Guidelines 4
- SU610 Planning 6
- SU660 Finance 6
- TE610 Telephony Principles 6
- TR450 Signalling Principles 4
- TR660 Spectrum Management 6

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite. Services could fall within the general heading of Next Generation Networks delivering services such as Voice over IP, Multimedia, data transfer, video etc.
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM (asynchronous transfer mode)
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Sources from which additional data	May be obtained include: existing enterprise cable designs / plans, abutting enterprise development plans, interviews with field-based colleagues or organisations, enterprise databases
Network growth or enhancement	May be to: switch network, transmission network/path, radio network (fixed or mobile), satellite network
Timeframe for design	Is usually dictated by the project management plan
Resources may include:	design personnel, tools, material, vehicles, finance

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Enterprise information systems	May be text or image based and may be in the form of: hard copy, maps, software database, plans
Enterprise policy with respect to selection of design options	May include: cost, time, resource requirements, customer demand, future maintenance, modification, equipment/system upgrades
Interested parties	May include: local councils, state / federal agencies, local residents / property owners, other service providers
Local environmental imperatives	May include: seasonal changes, habitats, heritage values, environment, legislation, traditional landowners
Local geographical/ topological features	May include: dams, fences, access, survey marks, hazards, potential hazards, location of other services / plant, potential soil erosion areas
Materials and equipment	Are those resources required for the projects completion and may include: cabling and terminating equipment and tools, cable support materials, hand and power tools, frame and superstructure equipment, ducting, power cables/connectors, racking, switching and transmission gear, mechanical aids, antenna/wave guide, structure, tower, radio equipment, test equipment
Need for purchase/ acquisition	May be required and may be regulated by: local council, federal agencies, enterprise policies
Notification	May be in the form of: letter, phone call, personal visit
Design options	Would consider issues relating to: labour, material, time, equipment, technologies
Relevant legislation, codes, regulations and standards may include:	• ACMA technical standards • Australian building codes and regulations • International Standards ISO 9000 and 9001 • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations awards and agreements • ITU recommendations • Local government • Telecommunications Act and Telecommunications National Code

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- Occupational Health and Safety Act
- Privacy Act
- Spectrum Management Authority

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - developing and analysing options for production of a report outlining all reasons for final decision
  - Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor:
  - complying with all related occupational health and safety requirements and work practices within service assurance guidelines
  - collecting all relevant data including: property owner details, site physical characteristics, required resources
  - applying relevant legislative and environmental conditions to project
- Candidate submits hard copy design option report.
- Mentor/assessor observes candidate's:
  - development of a clearly documented brief both within specification and within specified timeframes.
  - notification to – and negotiation where required with – all involved parties including installers, contractors, local councils, government bodies, local residents, environmental groups, property owners
  - customer focus and consideration of customer needs
  - preparation of documentation
- Candidate submits a completed hard copy design plan.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC035D Organise material supply

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Determine material needs	1.1 Design plans are studied as to actual material needs
	1.2 Analysis of needs against existing stocks is undertaken and gaps determined
	1.3 Assess the availability of relevant material from preferred suppliers as appropriate
	1.4 Timeframe for material supply is determined from project management briefs and associated time charts
2 Organise for third party supply where existing stocks not available	2.1 Specifications and company criteria for material supply and purchasing are developed and included in appropriate tender documents
	2.2 Tender documents are prepared in accordance with company policy
	2.3 Likely material suppliers are identified and invited to tender and/or supply
	2.4 Tenders are evaluated and accepted as appropriate
	2.5 Price and conditions of purchase have been negotiated to company guidelines and satisfaction
	2.6 Supplier agreements are developed and negotiated in accordance with agreed tender arrangements

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3	**Organise supply of equipment and material to site**	3.1 Types and quantities of equipment available from existing stocks are identified, picked and packed for distribution
		3.2 Equipment and material is delivered to the designated location within the specified timeframe
		3.3 Third party supply is organised in accordance with agreed timeframe and supply agreements
4	**Undertake administrative tasks**	4.1 Warranty details are recorded and details distributed to relevant parties as required
		4.2 Relevant financial documents are issued in accordance with enterprise policy
		4.3 Material costings are analysed and compared to overall project management forecasts

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CO420 Planning Software 4
- CS410 Customer Relations 4
- EN460 Enterprise Pricing Policy 4
- IN430 Negotiation 4
- MA420 Mathematics 4
- NE470 Forecasting Techniques 4
- RE440 Australian Content 4
- RE450 Tax and Customs 4
- SU410 Planning 4
- SU470 Project Management 4
- SU480 Materials Planning 4
- SU490 Exchange Rates 4
- TE410 Basic Telephony 4
- TE470 Communications Industry 4

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Tendering procedures	Are enterprise specific and are usually documented in enterprise process manuals
Tender evaluation	Includes such criteria as: ability to meet planned timeframe, spares availability, price, product type, capacity, performance and quality, company performance, delivery times, quality assurance processes
Warranty details	Are stored either manually or electronically in enterprise data bases
Warranties may	Be distributed to: installers, maintainers, finance groups, purchasing groups, sales and marketing staff

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Material purchased	May include: network switching, transmission, radio(both fixed and mobile) systems and equipment(including infrastructure) and relevant installation and maintenance tools and test equipment
Material suppliers	Enterprises enter into preferred supplier relationships and these are generally the first point of reference for material needs May be partner companies, preferred/approved suppliers or tenderers
Tenders	Are invited both by letter and through the press
Financial documents	May include: invoices, bills, internal financial information sheets, costing documents
Relevant legislation, codes, regulations and standards include:	• ACMA Standards • International Standards ISO 9000 and 9001 • ITU Recommendations • Occupational Health and Safety Act • Heritage legislation • Industrial awards and conditions • Taxation Act and legislation • Customs Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate's ability to:
  - interpret design plans
  - interpret, interrogate and use relevant databases
  - determine material needs and assessment of requirements beyond current holdings
  - interact with enterprise personnel, customers and other contractors
  - apply enterprise spare parts policy
  - maintain customer focus and consideration of customer needs
  - comply with all related occupational health and safety requirements and work practices
  - apply the tender process in accordance with both enterprise and legislative requirements.

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- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – analysing tenders.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
- Candidate submits a clearly documented hard copy report outlining all options and including recommendations with supporting reasons.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC036D Undertake qualification testing of new or enhanced equipment and systems

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Ensure conformity of international design	1.1 Original design is checked to ensure conformity with Australian electrical and safety standards
	1.2 Customers specific design requirements are considered
	1.3 Negotiations are undertaken with customers in order to fully understand their needs
	1.4 Reconfiguration of design is undertaken where necessary
	1.5 Design specifications are rewritten to cater for configuration amendments
2 Plan and establish test regime	2.1 Type and number of tests is planned to ensure a full trial of new or enhanced design
	2.2 Test environment is chosen and established to ensure total validity of chosen tests
	2.3 Plan is designed to ensure greatest coverage for minimal tests
	2.4 Details of tests required and desired outcome is fully documented
	2.5 Tests are designed to not only test new or changed system but to also test impact on existing systems

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3 Undertake tests	3.1	Test regime is studied and understood and planners questioned where doubts exist as to full requirement
	3.2	Test instruments are checked to ensure they meet required standards
	3.3	Tests are conducted in logical and sequential order and in accordance with planned test regime
	3.4	Difficulties experienced during the test are discussed with system experts and/or designers
	3.5	Trouble reports are prepared and submitted in accordance with enterprise policy where required
	3.6	Test results are documented progressively
4 Analyse test results	4.1	Test results are analysed against design specifications and planned outcomes
	4.2	Major deficiencies are referred back to designers with a full report as to results and with recommendations for design change where appropriate
	4.3	Minor variances are analysed and solutions to problems developed
	4.4	Changes to specifications as a result of minor changes are clearly documented
5 Retest design changes	5.1	Design and specification changes made as a result of original tests are retested
	5.2	Further tests are analysed against specifications and planned outcomes
	5.3	Results of tests are fully documented and recorded in accordance with enterprise policy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO660 Operating Systems 6
- CS610 Customer Relations 6
- DI610 Digital Theory 6
- EN620 Enterprise Information Systems 6

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- MA620 Mathematics 6
- NE610 Network Equipment 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE650 System Protocols 6
- PE320 Remote Work
- PK610 Product Knowledge 6
- PS620 Design 6
- PS650 Telecommunications Equipment and Systems Design 6
- RA610 Antennas 6
- RA620 Radio Frequency Theory and Hazards 6
- RA630 Mobile Equipment 6
- RA640 Mobile Traffic Management Principles 6
- RE660 Australian Electrical Standards 6
- SU630 Quality Management 6
- TF610 Test Equipment 6
- TF690 Advanced Diagnosis 6
- TO610 Use of Tools 6
- TO620 Anti-static Procedures 6
- TR630 Modulation Theory 6
- TR660 Spectrum Management 6

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks, Frame Relay including LAN and WAN
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Reconfiguration of international design	Is necessary to ensure conformity with Australian electrical and safety standards. “Telecommunications equipment and systems are designed to International standards”.
Customised designs	Can be customised to meet the needs of potential customers
Difficulty in prioritisation	Difficulties associated with the test regime are handled in a manner specific to the enterprise, but typically they are prioritised as follows: P1 Blocking – referred to experts or trouble report issued and submitted to designers P2 Customer perception problems – test continues and trouble report sent to designers P3 Identifiable problem – work around problem or make minor changes P4 Minor – usually a specification error – change and document

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Test environment	Usually involves trialling in a model network or alternatively in a laboratory situation
Tests, both type and extent	Are normally detailed in the original specifications but are varied and added to as part of the test regime plan to ensure accuracy of all changes made to original design and to ensure full compatibility with customers existing network
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU Recommendations • Australian Electrical and Safety standards • Telecommunications Act and associated codes • Occupational Health and Safety

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate's
  - application of Australian standards to international designs
  - negotiation with potential customers and identification of specific customer requirements
  - maintenance of customer focus and consideration of customer needs
  - design programs and codes.
- At least one oral report to mentor/assessor, and observation by mentor/assessor, of candidate's demonstrated ability to establish a test regime.
- Mentor/assessor observes candidate:
  - identifying and conducting tests and interpreting results
  - approaching to problem diagnosis systematically – eliminating causes
  - applying all related occupational health and safety requirements and work practices.
- Candidate submits at least one complete hard copy set of test results.

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- Mentor/assessor observes candidate's ability to:
  - prioritise problems identified during tests and apply enterprise procedures covering such priorities within service assurance guidelines
  - interact with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - effectively use design programs and codes.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – demonstrating:
  - retest of design changes
  - reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Candidate submits a clear hard copy report outlining findings and including recommendations with supporting reasons.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC037D Design a telecommunications project

Unit descriptor

This unit applies to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Consider design options	1.1 Project brief is analysed to extract salient data
	1.2 Data is collated from other relevant sources and combined/collated with information from project brief
2 Gather field information	2.1 Smooth conduct of the project is facilitated by consultation with affected property owners
	2.2 Physical characteristics of the site are ascertained and any impediments to smooth operations are detected from field inspection and existing maps/plans
	2.3 Appropriate colleagues are consulted regarding the location and character of the area
	2.4 Land acquisition/purchase is determined from analysis of previously gathered data
	2.5 Field sketch is prepared in accordance with enterprise requirements
	2.6 Solution to any obvious physical impediment to construction is identified
	2.7 Resources available for project implementation are identified

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3 Analyse area and select design option	3.1	Area is analysed in light of physical attributes, possible environmental impacts, and previously collected data
	3.2	Options for the design of area are generated that are viable for the enterprise
	3.3	Evaluation and selection of preferred option produces a result that satisfies enterprise business strategy outcomes and policies
	3.4	Project brief is analysed to extract salient data
4 Notify interested parties	4.1	That works are within the enterprise's schedule is ensured
	4.2	Interested parties are notified of the type, extent and duration of the proposed works in accordance with enterprise policy
	4.3	All required written permission from interested parties is obtained and forwarded to those who will carry out the job
5 Prepare design plan	5.1	Design plan is prepared to enterprise requirements using appropriate techniques
	5.2	Relevant geographical / topological information is added to design plan
	5.3	Location and specification of works and network equipment are indicated accurately and clearly
	5.4	Resources needed to undertake the project are specified
6 Update information systems	6.1	Enterprise information systems are updated in accordance with guidelines
	6.2	Amendments to information systems are in line with enterprise guidelines and industry practice

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- EN520 Enterprise Information Systems 5

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- EN530 Enterprise Operations Policy 5
- MA210 Basic Telecommunications Mathematics
- NE520 Network Architecture 5
- PS510 Plans and Specifications 5
- RE430 Land Acquisition 4
- SU450 Estimating Techniques 4
- TE430 Telecommunications Works Issues 4
- TE510 Telephony 5
- TR460 Spectrum Management 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer expectations	May include: time-lines, standards, priorities
Design plan	May be original or an existing plan and may be edited
Drawings	Are prepared by: ink, computer technology, on paper, on film
Enterprise information systems	May be text or image based and may be in the form of: hard copy, maps, software database, plans
Enterprise policy with respect to selection of design options	May include: cost, time, resource requirements, customer demand, future maintenance and "upgradability" of design
Field map	May not be to scale
Interested parties	May include: local councils, state / federal agencies, local residents / property owners, other service providers
Licences required	May include: state driver's licence
Local environmental imperatives	May include: seasonal changes, habitats, heritage values, environment, legislation, traditional landowners

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Local geographical topological features	May include: dams, fences, access, survey marks, hazards, potential hazards, location of other services / plant, potential soil erosion areas
Materials and equipment	Are those resources required for the project's completion and may include: cable, cable support materials, hand tools, mechanical aids, antenna, structure, tower, radio equipment
Purchase / acquisition regulation	Need for purchase / acquisition may be required and may be regulated by: local council, federal agencies, enterprise policies
Notification	May be in the form of: letter, phone call, personal visit
Options generated	Include options relating to: labour, material, time, equipment, technologies
Organisational imperatives	May include: organisational structure, industrial agreements, peak business loads, seasonal staff shortages, physical and material resource availability
Resources	May include: labour, funding, major equipment and materials, time
Cable route	May need to be negotiated
Data sources	May include: existing enterprise cable designs / plans, abutting enterprise development plans, interviews with field-based colleagues or organisations, enterprise text-based databases, enterprise image-based databases
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International standards

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- Local government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Identifying all relevant data including: planning requirements, current network conditions, technology, performance and capacity, customer requirements, site survey data, technological innovations and development, barriers to plan realisation
  - Applying legislative and environmental conditions to project brief development
  - Developing and analysing contract options
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Competently assessing tenders
- Candidate submits hard copy of a clearly documented brief which:
  - Meets specification, specified timeframes, enterprise financial systems and policy
  - Applies specified planning processes including associated monitoring and control mechanisms
- Candidate submits a hard copy report outlining all reasons for the final tender decision.

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- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – showing:
  - Compliance with all related occupational health and safety requirements and work practices
  - Interaction with enterprise personnel, customers and other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC038D Design an electronic system for a telecommunications network

Unit descriptor

This unit applies to switching, transmission and radio (both fixed and mobile) network and the various transmission paths, i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate system needs	1.1 Initial need for electronic equipment to enhance new or existing telecommunications network is determined from telecommunications project plan
	1.2 Specific purpose of equipment is determined
	1.3 Need for additional network equipment is ascertained
	1.4 Where customer has initiated the need, customer is consulted in accordance with enterprise policy
2 Analyse network and select design option	2.1 Network is analysed in light of service requirements, possible impacts, and other relevant data
	2.2 Options for the system design are generated that are realistic for the enterprise and the network
	2.3 Evaluation and selection of preferred option is based on enterprise criteria
	2.4 Option selected satisfies enterprise business strategy outcomes and enterprise service policy
	2.5 Where customer has initiated the need, selected option is discussed with customer
3 Assess system compatibility	3.1 Compatibility of each equipment unit with the other installed units and their intended use is determined from the system plans, equipment manuals, installation environment and industry knowledge
	3.2 Modifications are made as appropriate

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- CS510 Customer Relations 5
- EL320 Earthing 3
- EL510 AC/DC Theory 5
- EN520 Enterprise Information Systems 5
- IN430 Negotiation 4
- MA210 Basic Telecommunications Mathematics
- OH510 Occupational Health and Safety 5
- PK510 Product Knowledge 5
- PS510 Plans and Specifications 5
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- SU520 Leadership 5
- TE510 Telephony 5
- TF510 Test Equipment 5
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Additional network equipment need	May be determined from: test results, existing infrastr-ucture, customer requirements, network growth forecasts
Customer may be:	the designated customer, a nominated customer representative, an internal organisational customer, a carrier

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Earth protection may take the form of:	screen earth, MDF bonding, barriers, telecommunications reference conductors, telex earth (single function earth), data rack, exposed metal work, equipment earthing, lightning protection
Installation factors may include:	site type, age and construction, building facility location, ownership of installation site, distances between units/installations
Industry standards may include:	enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Information obtained from plan may include:	"A" and "B" end, labour estimates, materials estimates
Inputs to evaluating the design option may include:	reliability and ongoing maintenance costs, forecasts data, rezoning information, technology direction and changes
Line conditioning	May be required where distances between source and destination are great Existing line conditioning may need to be removed
Manufacturer's specifications may be found in/on:	printed instruction leaflets, manufacturer's hand book, enterprise work instruction, or pre-printed on materials or on product packaging
New supports	May need to be constructed
Other parties to co-ordinate with may include:	local government, statutory authorities, customer, equipment/materials suppliers
Reason for installation may be to:	create more services, provide cable relief, economic/cost efficiency, provide new facilities/ infrastructure to a customer or geographic area
Remote access capabilities	May be required for testing and interrogation, and if so, should be provided
Transmission medium	May require testing and/or rearranging prior to, or as part of, the final design

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Relevant legislation, codes, regulations and standards may include:

- AS Communications Cabling Manaul (CCM) Volume 1
- ACIF Standards and Codes
- ACMA technical standards
- Australian building codes and regulations
- Australian Standards Enterprise standards
- Environmental Protection
- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International standards
- Local government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Identifying all relevant data including: planning requirements, current network conditions, technology, performance and capacity, customer requirements, site survey data, technological innovations and development, barriers to plan realisation
  - Applying legislative and environmental conditions to project brief development
  - Developing and analysing contract options

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- Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
- Competently assessing tenders

- Candidate submits hard copy of a clearly documented design which:
  - Meets specification, specified timeframes, enterprise financial systems and policy
  - Applies specified planning processes including associated monitoring and control mechanisms
- Candidate submits a hard copy report outlining all reasons for the final design decisions.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – showing:
  - Compliance with all related occupational health and safety requirements and work practices
  - Interaction with enterprise personnel, customers and other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC039D Prepare project specifications

Unit descriptor

This unit applies to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for project estimate	1.1 Project design is analysed to extract salient data in accordance with enterprise requirements
	1.2 Customers and appropriate colleagues are consulted to verify project requirements
	1.3 Impact of time restraints on estimate is ascertained
	1.4 Transmission mediums are reserved or requested if required
2 Estimate resource requirements	2.1 Availability of all appropriate data and documentation are established to allow for the completion of the work
	2.2 Project site is inspected to verify design details and project context
	2.3 All relevant regulations, legislation and guidelines are interpreted and allowed for where necessary
	2.4 Size, type and quantity of materials and equipment are identified and converted from plans, drawings, and/or text
	2.5 Appropriate plant/machinery and skills needed are identified
	2.6 Sequence of work is prioritised appropriate to enterprise needs
	2.7 Contractor and employee labour hours required are calculated in accordance with project requirements, industrial awards and enterprise policy
	2.8 All estimated materials, equipment and labour hours are recorded in accordance with enterprise guidelines

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3 Cost resources	3.1	All standard costing procedures are strictly followed
	3.2	Estimated costs for materials, equipment and labour are calculated from current information
	3.3	Total material, equipment and labour costs are recorded in accordance with enterprise guidelines
4 Summarise estimate	4.1	Estimate price for project is calculated
	4.2	Calculations are accurately and concisely recorded in accordance with enterprise policy
5 Prepare detailed project plan	5.1	Detailed plan for project is drafted in accordance with enterprise guidelines using appropriate drafting techniques
	5.2	Detailed plan includes specifications for materials, equipment, locations and network routes
	5.3	Detailed plan includes specific/detailed resources required for the project
	5.4	Detailed plan is forwarded to the individual/ organisation who will implement the project

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- CO520 Planning Software 4
- EN660 Enterprise Pricing Policy 6
- MA210 Basic Telecommunications Mathematics
- NE520 Network Architecture 5
- OH510 Occupational Health and Safety 5
- PE510 Personal Skills 5
- PS510 Plans and Specifications 5
- RE235 Regulations for CAN

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Data and documents	To be collected and used may include: plans, drawings, text, project information, tender specifications, size, type, quantity of materials and equipment
Detailed project information	Can refer to: specified items that are allocated by the project document author and are recorded on the project brief
Drawings	Can refer to: schematic, detailed drawings
Information/ specifications	Included on the detailed plan may include: sizes, types, identifications, rearrangement details
Information used for calculations	May include: tender/project specifications, manuals, information sheets, technical data, catalogues, price lists, industrial award/agreement documents
Plant/machinery	May refer to major and minor mechanical aids
Radio frequencies	Must be requested from the appropriate agency (Spectrum management agency)
Sequence of work	Takes into consideration: project, location, available resources
Standard unit measurements	May include: duct kilometres, pair kilometres, sheath kilometres, repeater sections, total 2-megabit stream capacity
Summary	May refer to collation of materials, equipment, labour and preliminary costs and abstract sums
Transmission mediums to be reserved or requested	May include: cables, radio frequencies, capacity on existing infrastructure/multiplex links
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations

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- Australian Standards
- Enterprise standards
- Environmental Protection
- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International standards
- Local government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Identifying all relevant data including: planning requirements, current network conditions, technology, performance and capacity, customer requirements, site survey data, technological innovations and development, barriers to plan realisation
  - Applying legislative and environmental conditions to project brief development
  - Developing and analysing contract options
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Competently assessing tenders

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- Candidate submits hard copy of a clearly documented specification.
- Candidate outlines all reasons for the final tender decision.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – showing:
  - Compliance with all related occupational health and safety requirements and work practices
  - Interaction with enterprise personnel, customers and other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC040D Assign a transmission path

Unit descriptor

This unit refers to the allocation, acceptance or recording of fibre optic, copper, aluminium, and radio channels.

This unit relates to assigning existing transmission mediums to new customers or assigning different or new transmission mediums to existing customers.

Where radio is the transmission medium, a frequency is assigned.

Where optic fibre is the transmission medium, a system channel is assigned.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Collect data	1.1 Service details are determined from service request
	1.2 Customer position is located on transmission medium plans
	1.3 Transmission mediums in proximity of customer are identified
	1.4 Equipment to be used on the service is identified from service request
	1.5 Line interface type that is to be used is determined in accordance with enterprise guidelines
2 Select transmission medium for service	2.1 Appropriate transmission medium to customer's premises is selected for service
	2.2 Transmission medium is recorded between customer's premises and exchange
	2.3 Service delivery point interface at exchange is verified against system required
	2.4 Where new services are to be assigned as a group, assignment may be automated
	2.5 Completed allocation information is sent to appropriate group for further field work

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3 Maintain transmission medium records	3.1	Impending bearer shortages are brought to the attention of the relevant person/group
	3.2	Plans and data bases are updated to record all details

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI410 Communication 4
- CO410 Computer Skills 4
- EN450 Enterprise Policy and Practice
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- RE235 Regulations for CAN
- TO210 Hand and Power Tools
- TR310 Basic Transmission Theory 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Available transmission medium	May be determined from: data bases, maps, local knowledge
Cable mediums	Are generally recorded from cross-connection point to cross-connection point
Channels	Suitable for the new service may include all systems within the transmission quality parameters set by ACMA
Complications that can occur include:	faulty transmission medium, used transmission medium, incorrect address details, duplicated order details

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Enterprise standards	May relate to: using vacant transmission medium first, not using disconnected plant
Group allocation	May involve sub-groups or decentralised distribution points
Customer premises location	Can be determined with information from: address, land titles office plans, shire plans, given name, lot number, nearest neighbour, building permits
Service delivery point interface	May be determined by: type of equipment to be used on the service, distance from the broader network access point (eg: the exchange, repeater, point of interconnect access mode)
Line interface types	May include: coin telephone, business line, standards service
Rearrangements	May be required to cater for new / altered / additional services
Radio medium selection	My be based on: geographic characteristics, topographic characteristics, compatibility, capacity
Service details	May include: name of customer, address and contact, date for required service connection, type of service, number of lines / connections required, security and access arrangements
Service request	May originate from: sales staff, field staff
Signals carried on the service	May be digital or analogue and may be vision, voice or data
Transmission medium	May be: copper, optic fibre, aluminium, coaxial, radio
Transmission status	May be described as: connected, waiting, faulty, vacant, disconnected, assigned
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise standards

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- Environmental Protection
- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International standards
- Local government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Correct identification of customer position, existing and proposed systems and equipment, and line interface type.
- Selection of the most appropriate transmission medium to provide type of service required.
- Identification of existing telecommunications plant and capacity.
- Assignment of transmission medium to meet specified requirement.
- Accurate recording of assignment details on plans, data bases.
- Correct interpretation of legislative and environmental conditions and application to project.
- Application of all related OHS requirements and work practices.

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- Read and interpret drawings related to cable layouts, radio transmission paths, outlet location, cable coding system and identifiers.
- Communication of transmission path information to customers and work associates.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC041D Schedule resources

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Gather data	1.1 Design and estimation documents are collated and analysed for resource needs and deadlines
	1.2 Interested parties are consulted for input to schedule
	1.3 Labour requirements and availability are ascertained to ensure projects can progress as planned
	1.4 Plant, equipment and materials availability are ascertained to ensure projects can progress as planned
	1.5 Additional inputs are collated from available sources where appropriate
2 Schedule project	2.1 Projects are co-ordinated to ensure that available labour matches quantity and type of work required
	2.2 Works are scheduled to suit plant, equipment, material and labour availability and start and finish dates are determined
	2.3 Works are scheduled to suit relevant interested parties
	2.4 Works schedules are documented and clearly communicated to installation / construction labour and the appropriate customer representative

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3 Monitor and co-ordinate project progress	3.1 Progress of projects being undertaken is monitored individually and as a whole and variations to planned progress are identified and reported to the appropriate person in a timely fashion
	3.2 Variations in work environment likely to affect the planned completion of the project are identified and reported to the appropriate person in a timely fashion
	3.3 Labour levels and availability are monitored to ensure projects can progress as planned
	3.4 Plant, equipment and materials availability are monitored to ensure projects can progress as planned
	3.5 Additional inputs are collated from available sources where appropriate
	3.6 Quantity, quality and timing of supply of each input and service is monitored and co-ordinated according to the requirements of the operation and equipment involved
	3.7 Rescheduling is undertaken as required based on urgency/importance of jobs on hand and in accordance with enterprise guidelines and customer requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PE410 Personal Skills 4
- RE310 Working on Non-enterprise Land 3
- SU415 Human Resources 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Interested parties	May include: local, state and federal agencies, property owners/managers/tenants, utilities
Labour	May include both contractor and employee labour
Progress of schedule and completion of works	May be recorded on a management information system
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International standards • Local government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtain information from plans and documents, equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Identification of:
  - Labour
  - Material sources
- Planning and provision to meet key dates and milestones of:
  - Appropriately skilled labour
  - Volume and type of material
- Negotiation to meet installation deadlines with: contractors, suppliers, other service providers.
- Monitoring of work progress and adjustment of resource requirements to meet both customer's needs and costing parameters.
- Safe use of equipment and application of all related OHS requirements and work practices.
- Communication of scheduling details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC042D Undertake system administration

Unit descriptor

This unit covers the maintenance of vendor mediation devices designed to maintain the integrity of network support systems and software.

The unit applies to both system platforms and applications.

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Undertake preventative maintenance	1.1 Platform data base optimisation and administration is undertaken effectively
	1.2 Training is organised or instructions provided to ensure effective data base optimisation and administration
	1.3 System platforms and applications are identified
	1.4 System is interrogated and monitored to identify error logs, aging time on processes, data base checks and system loadings
	1.5 Problems or likely problems are brought to the attention of the appropriate personnel with advice and guidance as to likely solutions
	1.6 Measurements are undertaken from a user perspective on response times and investigations initiated as to likely problem where specifications are not being met
	1.7 Availability of data storage space is assessed and appropriate action is initiated where required
	1.8 Procedures for system back up are initiated, continually reviewed for efficiency of operation and amendments made where required

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2	**Provide application support to system users**	2.1 Procedures for regular formal meetings with users are initiated and reviewed on a regular basis for effectiveness
		2.2 Communication links with system users are regularly maintained and action taken to effect changes as required
		2.3 Assistance is provided to system users in evaluation and resolution of problems
3	**Create/delete user accounts**	3.1 Customer user groups are determined
		3.2 User profiles are created
		3.3 System access levels are determined
		3.4 Users are allocated to specific groups
		3.5 Enterprise policy regarding system access is understood and adhered to on all occasions
		3.6 Security procedures relating to access is established and monitored in accordance with policy
		3.7 Grounds for deletion of user accounts are checked and verified prior to necessary action
4	**Undertake special studies/ investigations**	4.1 Request for study/investigation is analysed and detail of action required is determined
		4.2 Activity including timelines, specific goals and required resources are planned
		4.3 Other parties associated with the investigation are co-opted
		4.4 Study is undertaken methodically and in accordance with plan
		4.5 Results are analysed and reports including recommendations are prepared and forwarded to the requesting authority

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA520 Training
- CI610 Communication 6
- CO610 Computer Skills 6

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- CO660 Operating Systems 6
- CS610 Customer Relations 6
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE610 Network Equipment 6
- NE620 Network Architecture 6
- NE640 Network Management Principles and Capabilities 6
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- PK610 Product Knowledge 6
- PS610 Plans and Specifications 6
- PS620 Design 6
- RE620 Physical Interface Standards 6
- TF620 Test Analysis and Diagnosis 6
- TF630 Fault Finding 6

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including LANs and WANs
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
System platforms	May include: UNIX, HP open view, SUN Operating system, Command post, Windows 98, Windows 2000
System specifications	Are vendor/platform and application specific. Such specifications define speed of response and applications
System support	Could include: features, new equipment, faults, problems
Measurements of the system	Are undertaken in a simulated or live environment and consist of dummy loading of data to measure response in various situations such as adding new customers to an existing data base
Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support

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The level of fault rectification	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are bleary specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Problems	May include: flaky sectors on hard drive, security breaches
Appropriate action in fixing data storage problems	Could include: software and hardware variations, software redesign, storage rearrangements
Software	Covers data base, operating system, and applications
Special studies	Relate to performance of both platform and its application
Data base optimisation	Includes use of system resources such as RAM, CPU, hard drives
Relevant legislation, codes, regulations and standards	Include: • ACMA standards as they apply to carrier operation • International Standards ISO 9000 and 9001 • ITU recommendations – network management series E410 • Occupational Health and Safety Act • Privacy Act • Spectrum Management legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observation of candidate's ability to:
  - Measure system (RAM, CPU, Hard drive) utilisation
  - Start a stop application (including operation system and data base)
  - Make a system back up
  - Measure the platform performance
  - Measure the application responsiveness
  - Undertake a system recovery from back up
  - Identify and resolve system problems
  - Comply with all related occupational health and safety requirements and work practices
  - Read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation
- Candidate submits hard copy of written reports demonstrating competence in:
  - Measurement of platform performance
  - Measurement of application responsiveness
  - Undertaking of a system recovery from back up
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor about interacting with enterprise personnel, customers and other contractors in providing application support to system users.
- Mentor/assessor observes candidate's ability to:
  - Create/delete user accounts
  - Create/modify/delete user profiles
  - Maintain customer focus and consideration of customer needs
- Candidate submits hard copy of a special study or investigation undertaken, containing evidence of: analysis of problem, detail of activity required, consultation with other parties, studies undertaken and their analysis, and recommendations.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC043D Undertake network traffic management

Unit descriptor

This unit relates to the maximisation of all available network capacity in real time.

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Check availability of all installed network capacity	1.1 Network alarms are interrogated to identify any areas of route/circuit unavailability 1.2 Planned and unplanned outages are assessed to determine network unavailability and checks are made as to restoration times
2 Detect network traffic problems	2.1 System is interrogated to identify traffic status 2.2 System alert is analysed to identify traffic problems both real and potential 2.3 Controls are activated either automatically or manually and monitored where applicable 2.4 Traffic measurement data is used to assist identify problems 2.5 Customer complaints are analysed as appropriate 2.6 Semi permanent controls active in the network are activated and deactivated on a regular basis
3 Analyse traffic volumes	3.1 Circuit allocation is measured in real time in accordance with specification 3.2 Routes to be measured and the specific measurements to be undertaken are identified

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	3.3 Traffic measurements are undertaken across all identified routes
	3.4 Measurement results including historical data is collected
	3.5 Results are analysed and conclusions reached
	3.6 Traffic patterns are established or updated as required
4 Develop strategies to overcome network traffic problems	4.1 All relevant data both current and historical is gathered and analysed
	4.2 Predetermined thresholds are established
	4.3 Loading/grading levels are determined
	4.4 Actions necessary to alter traffic flows are determined
	4.5 Funding parameters are sought and amendments to plans initiated to fit budgeted levels
	4.6 Liaison is established with other involved areas both within and without the enterprise
	4.7 Interim traffic controls are determined and allied prior to any action
	4.8 Strategies based on traffic analyses and patterns are developed to control traffic and prevent congestion or other traffic problems
	4.9 Develop strategies for recovery where traffic congestion/problems occur
	4.10 Contingency plans are developed to allow for problems during network changes
5 Apply solutions both short and long term where required	5.1 Software changes are implemented in accordance with planned strategy
	5.2 Network controls are activated and monitored
	5.3 Short term ad hoc solutions are developed and implemented where temporary solution only is required
	5.4 Action is implemented to ensure that reversal action is initiated in the case of temporary solution
	5.5 Contingency plan is implemented where required
	5.6 Monitoring of change is undertaken on a continual basis
	5.7 Measurements are undertaken to assess the outcome of variations

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	5.8 Results of change are analysed and a report prepared for the appropriate authorities with recommendations for further immediate change or for later action
	5.9 Continually review and monitor strategies and initiate corrective action where required
6 Detect and take action on potential traffic congestion	6.1 Traffic loads are measured and analysed
	6.2 Potential congestion problems are identified and possible impact determined
	6.3 Processor overloads are prevented by controlling traffic
	6.4 Potential traffic increases are assessed for impact on the network and contingencies developed to control traffic flow if required
7 Provide traffic indicators for capacity planning	7.1 Relevant data on traffic patterns both current and historical are gathered
	7.2 Data is assessed and conclusions as to necessary action are made
	7.3 Reports complete with appropriate recommendations are completed and forwarded to enterprise planners/account managers

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CO660 Operating Systems 6
- CS610 Customer Relations 6
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6

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- NE640 Network Management Principles and Capabilities 6
- NE660 Network Demographics 6
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- PS610 Plans and Specifications 6
- PS620 Design 6
- SU680 Resource Management 6
- SW620 Packet Data Switching 6
- TE610 Telephony Principles 6
- TR650 Traffic Management 6

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including LANs and WANs
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor

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Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as: backbone, transport, broadband, data, HLS, CLS
Traffic measurements	May include: Quality of load, quality of service, resource availability, access, faults, elements, BIDS, erlang, answer/seizure ratio
Measurements	Are undertaken automatically by the system in majority of cases
System alerts	May include: alarm information, customer identified problems, information relating to marketing campaigns which will introduce traffic flow, major civil works which may impact on network, planned outages
Actions necessary to vary traffic flow	May include: changing capacity levels, blocking routes, applying route and/or traffic restrictions, temporary solutions
Traffic	Is controlled by either protective or expansive actions
Activation/deactivation of semi permanent controls	Is necessary as large restarts or exchange reloads result in Network Terminal Management controls being deactivated
Interim traffic controls	Limit the number of calls to a particular number or route. Such controls can be preset
Relevant legislation, codes, regulations and standards	Include: • ACMA standards as they apply to carrier operation • International Standards ISO 9000 and 9001 • ITU Recommendations – Network Management series E410 • Occupational Health and Safety Act • Privacy Act • Spectrum Management legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Complying with all related occupational health and safety requirements and work practices
  - Displaying interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors
  - Interacting with enterprise personnel, customers and other contractors and carriers keeping a customer focus and consideration of customer needs
  - Applying and measuring impact of network controls such as call gapping and rerouting
  - Applying traffic management principles
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – detailing:
  - Identification and explanation of all blocked trunks in the network
  - Identification and analysis of traffic alarms
- Observation by mentor/assessor, and at least two oral reports by candidate, demonstrating their ability to develop and implement appropriate strategies for performance enhancement.
- Candidate submits a hard copy set of measurement results, and of traffic pattern data, relevant historical data, with analysis and conclusions reached within a specified time.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC044D Co-ordinate fault rectification and restoration of service following network outages

Unit descriptor	This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	This unit contains employability skills.
Prerequisite units	Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Co-ordinate resolution of customer complaints	1.1 Complaint is identified and evaluated 1.2 Dialogue with the customer is undertaken where further information is required 1.3 Details of the fault/problem are determined and priorities established 1.4 Contractual arrangements including timeline agreements with customers are assessed and arrangements made for compliance 1.5 Negotiations with customer and/or account manager re repair arrangements occur where contractual arrangements cannot be met
2 Analyse alarms/indicators	2.1 Notification of outage situations are received and acknowledged 2.2 Alarm conditions are checked and acknowledged when triggered 2.3 Alarm conditions and the appropriate priority are identified 2.4 Extent of the failure is assessed and impact both on network and customers identified 2.5 CCS links affected are identified

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3	**Initiate damage control mechanisms**	3.1 All parties both internal and external are advised of the outage in accordance with enterprise policy
		3.2 Immediate restoration action is initiated in the event of an unplanned outage
		3.3 Appropriate traffic controls are enacted
		3.4 Details of outage are escalated to media through correct enterprise channels where necessary
		3.5 Contingency plans are initiated where appropriate
		3.6 Investigations are conducted as to spare capacity which may enable temporary repair
4	**Implement action**	4.1 Affected alarms are isolated
		4.2 All other alarms are monitored to ensure no other problems
		4.3 Permit to work processes are implemented in accordance with enterprise policy
		4.4 Outage procedures are initiated in accordance with enterprise requirements
		4.5 Restoration timeframe is validated
		4.6 Repair activity is managed and additional expertise is sought as required
		4.7 Resource allocations are monitored and manipulated to ensure quick and effective repair
5	**Monitor outage and restoration of service**	5.1 Customers are kept fully informed of repair progress
		5.2 Escalation of the problem is initiated in accordance with enterprise requirements within a specified timeline
		5.3 Action is initiated to protect the network at all times during the planned/unplanned outage
		5.4 Different control strategies are implemented as and when required
		5.5 Provide focal point for all restoration activity and advice as to action and progress
		5.6 Network components are isolated as necessary
		5.7 Network is reconfigured if necessary

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6 Test/monitor network upon recovery	6.1	Tests as specified in equipment manuals are undertaken to ensure equipment is operating to specification
	6.2	Alarms are reactivated and monitored to ensure normality
	6.3	Continual monitoring of the network is undertaken for a specified period to ensure no ongoing problems
	6.4	Low priority problems or likely perceived problems identified during the repair process are logged for future action
7 Finalise action	7.1	Data base is updated with details as to problem and action taken to repair
	7.2	Problems identified during a planned outage are recorded and noted for future occasions
	7.3	Cause/ effect studies are undertaken and results documented and forwarded to the appropriate area
	7.4	Trending data is analysed, results documented and forwarded with appropriate recommendations to the correct authorities
	7.5	Required administrative action is taken in accordance with enterprise instructions
	7.6	Customers are contacted to ensure complete satisfaction with the outcome

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CS610 Customer Relations 6
- EN620 Enterprise Information Systems 6
- EN640 Enterprise Alarms 6
- EN650 Enterprise Operations Policy 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6

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- NE630 Network Signalling 6
- NE640 Network Management Principles and Capabilities 6
- NE660 Network Demographics 6
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- PK610 Product Knowledge 6
- PS620 Design 6
- RE620 Physical Interface Standards 6
- SU610 Planning 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6
- TF630 Fault Finding 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
The level of fault rectification	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Alarm priorities	Are enterprise specific but generally consist of four (4) levels: • Priority 1 impact – demanding immediate attention • Priority 2 degradation – decision to be made as to attention given and depends on impact on both network and customer • Priority 3 hazardous – attention given as part of normal activities • Priority 4 no action – alarm noted
Escalation	Is usually through the tiers, but can vary again depending on the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Network problems	Could include: faults, capacity, customer complaints, warnings on problems about to occur, security violations
Problem indicator	Could include: alarm, trouble reports, customer complaints Problems may be identified by: alarms, carriers, customers, service providers
Outages	Are classified as minor and major and whilst the definition may vary from carrier to carrier, the difference is usually about 120 customers, 15 minutes for restoration, 140 meg system A further category of outage relates to disaster that involves flood, bushfire, loss of multiple optical fibres

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Reaction time to alarms	Can vary between carriers. Normally response is influenced by time/day of the week and service level agreements with customers
Service level agreements	Dictate priorities
Relevant legislation, codes, regulations and standards	Include: • ACMA standards as they apply to carrier operation • International Standards ISO 9000 and 9001 • ITU recommendations – network management series E410 • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor:
  - Determining service availability
  - Adhering to service level agreements and validate of compliance
  - Maintaining customer focus and consideration of customer needs
  - Complying with all related occupational health and safety requirements and work practices
  - Driving fault logging system
- Mentor/assessor observes candidate:
  - Understanding alarm types and priorities across the whole network
  - Analysing complex faults
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Applying escalation procedures

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- Mentor/assessor observes candidate monitor alarms and co-ordinate rectifying a Tier 3 fault within service assurance guidelines, while applying all related occupational health and safety requirements and work practices, enterprise escalation and outage procedures, all within service assurance guidelines
- Candidate submits at least two hard copy reports of separate installations of varying degrees of complexity demonstrating candidate's ability to monitor and co-ordinate the relevant fault/problem rectification

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC045D Ensure that network changes are implemented as planned with minimal impact to the customer

Unit descriptor

This unit relates to the increasing of network capacity, installation of new network elements and changing of existing network elements.

The unit covers the control of planned activity on the network and thus should be read in conjunction with the following units:

- ICTTC060D Integrate new systems and equipment into the telecommunications network.
- ICTTC061D Cut over new and replacement network equipment.
- ICTTC076D Complete equipment and software upgrades.

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan network changes	1.1 Work order and design details are checked
	1.2 Work order is analysed and discussed as appropriate with both builders and designers
	1.3 Impact of change including the need for outages is evaluated
	1.4 Timing and extent of outage is determined
	1.5 Routes impacted by the outage are identified
	1.6 Impact of change on the network is assessed
	1.7 Impact of change including any outage on the customer is determined and arrangements made for appropriate advice as to timing, impact and extent of impact to be provided to the customer

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	1.8 Specific network management needs are determined and plans for appropriate action are developed in conjunction with network builders
	1.9 Action is taken to ensure that there is no circulatory routing where required
	1.10 Work necessary prior to building is undertaken in accordance with design specifications
	1.11 Alarms affected by the building activity are suppressed as appropriate
	1.12 Final plans for configuration/reconfiguration are presented for approval in accordance with enterprise practice
2 Validate new or amended data	2.1 Data is loaded in a test environment
	2.2 Tests are undertaken in accordance with design specifications
	2.3 Test results are analysed and discussed with designers where problems are detected
	2.4 Problems are rectified where within capability or escalated in accordance with enterprise procedures
3 Conduct acceptance tests of new or amended equipment/system installations	3.1 Customer traffic conditions are simulated in accordance with specification
	3.2 Transmission levels are tested and action initiated to repair where prescribed standards are not being achieved
	3.3 Integration testing is undertaken in accordance with specification
	3.4 Test results are analysed and action initiated to effect variations as required
	3.5 Builders are consulted where tests fail or show results outside specification
	3.6 Reports are prepared and supplied to the appropriate area within the enterprise
	3.7 Quality assurance procedures are initiated in accordance with enterprise policy
	3.8 Liaison with carriers and co providers is undertaken at all stages of the project as appropriate

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4 Implement changes	4.1	Network stability is checked prior to implementation of change and action taken to rectify problems prior to change occurring
	4.2	Data is loaded in accordance with design specification
	4.3	Activities of builders are managed to ensure network integrity at all times
	4.4	Network data bases are updated
	4.5	Appropriate documentation is prepared in accordance with enterprise requirements and forwarded to the appropriate area or filed as required
	4.6	All appropriate alarms are activated, checked and repairs initiated where required
5 Monitor impact of change	5.1	Impact of change is evaluated to ensure that design requirements are fully achieved
	5.2	Network is monitored to ensure continuing stability
	5.3	Contingency plans are initiated in the event of problems
	5.4	Problem rectification is managed to minimise impact both to the network and the customer

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CO660 Operating Systems 6
- CS610 Customer Relations 6
- CS620 Service Agreements 6
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE610 Network Equipment 6

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- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE640 Network Management Principles and Capabilities 6
- NE660 Network Demographics 6
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- PS620 Design 6
- SU610 Planning 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Approval	All planned activity on a carriers network must be approved by network management personnel in accordance with specific enterprise procedures

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Work order	Relates to the activity to be undertaken and includes the authority to proceed with change to the network
Design specifications	Can relate to the system/equipment being installed and are vendor specific and/or to the actual installation design
Alarm management systems	Each component of the network has its own alarm management systems that are self monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR
Data	Relates to the proprietary software provided by the vendor of the new or changed system
Tests required with the software/hardware release	Are specified in the related design pack are undertaken at both the commissioning and integration stage of the installation
Test environment	May be simulated or live and depends on availability of simulated environment, data to be tested, time and location of test
Problems identified	Are processed in accordance with the maintenance regime which is specific to each enterprise. This regime generally consists of four levels viz: first in, specialist, network support, vendor
Escalation procedures	Are specific to enterprise and relate to nature of the problem, impact, particularly to customers, of problem, time taken for rectification of the problem

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Relevant legislation, codes, regulations and standards include:

- ACMA standards as they apply to carrier operation
- International Standards ISO 9000 and 9001
- ITU recommendations – network management series E410
- Occupational Health and Safety Act
- Privacy Act
- Spectrum Management legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Co-ordinating of all work groups associated with network change
  - Ensuring accuracy of all system data bases
  - Implementing escalation procedures within enterprise guidelines
  - Adhering to all related occupational health and safety requirements and work practices
  - Validating all alarms
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor ensuring:
  - Absence of faults on completion of activity
  - Zero loss of both traffic and features during network integration or upgrade
  - Identification and solution of problems experienced during the change

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC046D Undertake network performance analysis

Unit descriptor

This unit deals specifically with the monitoring of network performance.

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Determine service levels	1.1 Quality of service standards levels are established in conjunction with equipment suppliers, taking into account customer opinion and equipment capability
	1.2 Trend analysis data is collected and analysed
	1.3 Statistical data related to customer evidence of network degradation is gathered
	1.4 Comparative data from across the whole network is analysed
	1.5 Mean time between failures is established using historical data, equipment capability records and allowing for process improvement
	1.6 Restoration times in the event of service breakdown are established
	1.7 Resources necessary to monitor service levels is determined, organised and allocated

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2 Check the integrity of the network	2.1 Alarm panels are monitored on an ongoing basis
	2.2 Real time analysis of data/information from all sources, as to network health is undertaken
	2.3 Message retrieval system is checked on a regular basis
3 Monitor the delivery of quality service	3.1 Service levels are continually monitored to ensure that established standards are achieved and/or improved
	3.2 Appropriate tests are undertaken on a regular basis to ensure performance levels are within prescribed specifications
	3.3 Network alarms relating to the overall network and the network elements are continually monitored
	3.4 All network repair and configuration activity on the network is continually monitored and managed
	3.5 Trouble reports are received and analysed on a regular basis
	3.6 Active fault queues are checked and progress reports obtained as to fault status
	3.7 Customer perception surveys are undertaken on a regular basis and information used to manage network health
	3.8 Performance data including customer feedback is used as a regular indicator of network performance
	3.9 Equipment performance is regularly checked against equipment vendor specifications
	3.10 Drive test data is analysed where appropriate as an input to performance and optimisation of the network
	3.11 Regular feedback from marketing personnel is organised as a further barometer to performance
4 Organise quality repair	4.1 Performance results are analysed on a regular basis and investigations initiated as to problem in the event that performance levels are not within specified standards
	4.2 Causes of problems are analysed by testing specific network components
	4.3 Problems are isolated where possible and repair organised or escalated in accordance with enterprise policy

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	4.4 Further testing is undertaken after repair to ensure that the problem is corrected
	4.5 Problems/faults are simulated in a captured environment where necessary
5 Co-ordinate upgrade of software/hardware	5.1 Features or standards lacking as a result of studies and customer feedback are determined and strategies developed to affect change
	5.2 Costs of change proposed are assessed and a cost/benefit study undertaken and submitted for approval
	5.3 Shortcomings in hardware are confirmed and negotiations undertaken with planners/designers for change or improvement
	5.4 Studies are undertaken to ensure that new or modified equipment is compatible with existing equipment
	5.5 Software and hardware changes are initiated with minimum downtime and minimum customer impact
	5.6 Tests are undertaken following upgrade to ensure the level of performance planned as a result of the upgrade is being achieved

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CO660 Operating Systems 6
- CS610 Customer Relations 6
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE640 Network Management Principles and Capabilities 6

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- NE660 Network Demographics 6
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- PK610 Product Knowledge 6
- PS620 Design 6
- RE620 Physical Interface Standards 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

REQUIRED KNOWLEDGE

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including LANs and WANs
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite

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Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	May be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Performance levels	May be affected by blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, high errors, degraded performance, loss of signal, signal quality, loss of optic receiver, laser shutdown/failure,, low errors, power supply failure, transmitter quality, operating environment such as dust, power, air conditioning, switch software and data
Fault escalation procedures	Are defined by the enterprise and usually relate to both the maintenance regime adopted by the enterprise and the associated repair times
Tests	May include: telephone calls, DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements
Call success rate measures	Include: destination success, rate analyser, call analysis
Real time analysis	Can include: switching and transmission statistics, call failure logs, comparative data across the whole network
Analysis	Also includes: trending, degradation impact, statistical data
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer

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Alarm priorities	Are enterprise specific but generally consist of four (4) levels: • Priority 1 – demanding immediate attention • Priority 2 – decision to be made as to attention given and depends on impact on both network and customer • Priority 3 – attention given as part of normal activities • Priority 4 – alarm noted
Conditions that may generate customer complaint	Other than problems described above may be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors
Relevant legislation, codes, regulations and standards	Include: • Australian standards AS 3901, 3902 • ACMA Standards TS 14 • ITU recommendations – network management series E410 • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Mentor/assessor observes candidate: – Interpreting current network performance data – Complying with all related occupational health and safety requirements and work practices – Correctly applying escalation procedures if required within service assurance guidelines – Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs – Liaising with vendors on network component testing and redesign – Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation • Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – on current network performance data, restoration times and resources required.

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- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor on:
  - Adherence to service level agreements and validation of compliance
  - Analysis of current data against specification and the systematic approach to problem identification both real and potential
  - Recognition of potential causes of problems and performance levels
- Candidate submits at least one hard copy report on a proposed change strategy, including: cost/benefit analysis, equipment compatibility study and proposed testing routine.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC047D Undertake management of the common channel signalling (CCS) network

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. Could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Analyse CCS alarms	1.1 Alarm/trouble report is received and acknowledged 1.2 Alarm management system is activated 1.3 Fault/problem is verified 1.4 Cause of alarm/problem is investigated and results analysed 1.5 Appropriate repair action is determined and resources with appropriate skills allocated to repair 1.6 Repair action is supervised and escalation action initiated in accordance with enterprise procedures where timelines will not be met 1.7 Clear alarms on completion of repair 1.8 Monitor subsequent alarms to ensure no re-occurrence of the problem
2 Analyse digital path alarms	2.1 Alarm is received and acknowledged 2.2 Alarm management system is activated if single link/link set is affected 2.3 Alarm is verified and removed if invalid

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	2.4	Cause of alarm is determined and appropriate repair activity initiated
	2.5	Restoration procedures are monitored to ensure commitment to specified timelines and escalation procedures are initiated as appropriate and in accordance with enterprise procedures
3 Check integrity of data received on equipment ports	3.1	Alarm screens are activated and port times are checked on a regular basis
	3.2	Ports are verified to ensure that procedures are running
	3.3	Problems are assessed to verify whether cause is as a result of either planned or unplanned activity
	3.4	Problem is cleared on completion of planned works and logged in appropriate data base
	3.5	Port blockage is unblocked
	3.6	Test messages are activated and checks initiated to ensure receipt
	3.7	Repair outcomes are verified when port or link is reactivated
	3.8	Restoration procedures are monitored to ensure commitment to specified timelines and escalation procedures are initiated as appropriate and in accordance with enterprise procedures
4 Monitor and acceptance test repair	4.1	Details of repair date are received and logged
	4.2	Network stabilisation is verified both prior to and during repair
	4.3	Repair action is supervised to ensure no impact on the overall network
	4.4	Acceptance testing is undertaken in accordance with prescribed operating procedures
	4.5	Network stability is monitored on completion
	4.6	Problems during and post repair are referred to the appropriate area for action
5 Block alarms for circuits out of service	5.1	Alarms are received and acknowledged
	5.2	Alarms are verified and prioritised
	5.3	Alarms are removed if invalid or not affecting service
	5.4	Cause of the alarm is determined

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	5.5 Repair action is determined, initiated and managed
	5.6 Restoration progress is monitored and escalation arranged if problem not repaired within specified timelines
6 Co-ordinate repair of CCS link failure (Bouncing link alarms)	6.1 Link alarm is received and acknowledged
	6.2 Audible alarm is removed if applicable
	6.3 Alarm management system is activated if single link or link set
	6.4 Alarms are verified and prioritised
	6.5 Cause of the alarm is determined
	6.6 Repair action is determined, initiated and managed
	6.7 Restoration progress is monitored and escalation arranged if problem not repaired within specified timelines
7 Co-ordinate CCS relationships	7.1 Receive and log requests for relationship change
	7.2 Data is verified and problems are followed up with appropriate support staff
	7.3 Network stability is checked prior to action
	7.4 Loading of data is initiated and/or managed
	7.5 Data load and network stability are checked on completion
	7.6 Models and enterprise systems are updated
8 Co-ordinate CCS rearrangements	8.1 Requests for rearrangements are received and logged
	8.2 Feasibility of rearrangement is verified
	8.3 Network stability is checked prior to action
	8.4 Details of rearrangement are entered in appropriate system
	8.5 System records are updated as appropriate
	8.6 Completed work is checked for accuracy
	8.7 Network stability is monitored on completion

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CO660 Operating Systems 6
- DI640 Digital/Analogue Network Applications 6
- EN620 Enterprise Information Systems 6
- EN640 Enterprise Alarms 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN630 Negotiation 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE640 Network Management Principles and Capabilities 6
- NE660 Network Demographics 6
- NT410 Emerging Network Technologies
- OH610 Occupational Health and Safety 6
- PE620 Decision Making 6
- SW630 Switch Networks 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6
- TF630 Fault Finding 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Common Channel Signalling (CCS) signalling	Is governed by ITU standards
Analysis and repair processes	Most of the processes associated with the analysis and repair of CCS signalling alarms are automatic, with the manual effort associated with ensuring that the system operates according to specification
Procedures for acceptance testing	Of any equipment/data change is detailed in vendor documents and may be supplemented by enterprise instructions
Both block and bouncing link alarms	May be because of planned or unplanned activity
Systems	May be equipment or enterprise related

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CCS rearrangements	Typical scenarios for CCS rearrangements may include: DIP running errors, link conversions, digital path alarms, CCS7 violations
Regularity of checking port times	May vary from enterprise to enterprise
Relevant legislation, codes, regulations and standards include:	• ACMA standards as they apply to carrier operation • International Standards ISO 9000 and 9001 • ITU recommendations – network management series E410 • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Identifying and implementing repair action within service assurance guidelines
  - Analysing and interpretation of alarms including ccs, digital path
  - Applying enterprise fault management regime, priorities and escalation procedures
  - Checking integrity of data received on equipment ports
  - Resolving problems in a methodical and logical manner
  - Conducting appropriate tests and interpreting results
  - Complying with all related occupational health and safety requirements and work practices
- Candidate submits hard copy test results.
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – demonstrating reading, interpretation and use of equipment/system manuals and specifications and relevant enterprise policy and documentation.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC048D Schedule customer premises equipment installation

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Schedule installation project	1.1 Key dates and milestones are identified
	1.2 Work schedules and installation plans for other services are considered to ensure co-ordination
2 Arrange connection of network facilities	2.1 Provision of required network capacity and facilities is negotiated with network provider
	2.2 Connection of required network capacity and facilities coincides with the cutover of the CPE installation
	2.3 Arrangements including timeframe are made for jumpering of the equipment to the building mainframe
3 Organise supply and delivery of material	3.1 Material types and quantities are established
	3.2 Materials are ordered in advance of needs to avoid work delays
	3.3 Fulfilled orders are accurately checked off against order and customer requirements
	3.4 Material is delivered to site in accordance with the installation timeframe

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4	**Arrange allocation of installation labour resources**	4.1 Installation workloads are calculated so as to complete task within specified timeframe
		4.2 Labour skills necessary to complete the job to customer satisfaction are identified
		4.3 Labour requisitioned for installation have relevant licenses and qualifications to operate within regulations and standards
		4.4 Work priorities are organised so that installation staff are available to meet established timeframes
		4.5 Labour is allocated to the installation and are made fully aware of installation and customer requirements
5	**Monitor and adjust resource allocations**	5.1 Labour resources are adjusted to meet installation needs to enable completion within budget and timeframes
		5.2 Work progress is monitored against project schedules and budgets

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice
- IN420 Teamwork 4
- IN430 Negotiation 4
- NE420 Network Architecture 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- SU410 Planning 4
- SU415 Human Resources 4
- SU470 Project Management 4
- TE410 Basic Telephony 4
- TO330 Installation Practices 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Key dates and milestones	Include: start and finish date, installation of other services
Other services	Include: building and office works, information technology equipment, network connections and facilities
Material	Includes: CPE equipment, cable, miscellaneous parts and tools
Mainframe jumpering	Can only be undertaken by the carrier in accordance with ACMA Regulations
Labour resources	May be enterprise staff or contract/sub contract staff
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Industrial Awards and conditions

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Planning and provision of appropriately skilled labour and volume and type of material to meet key dates and milestones.
- Identification of labour and material sources and negotiation with contractors, suppliers, other service providers to meet installation deadlines.
- Monitoring of work progress and adjustment of resource requirements to meet both customer's needs and costing parameters.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC049D Install customer premises systems and equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Gather data for the installation	1.1 Establish effective customer contact
	1.2 Arrange building access where appropriate
	1.3 Verify installation order with the customer
	1.4 Identify and account for additional needs of the customer
	1.5 Locate equipment and verified with the customer
	1.6 Agree on the pricing of additional work with the customer prior to commencement of work
2 Prepare for installation	2.1 Second hand systems are temporarily installed in company workshop, powered up and tested prior to final installation
	2.2 Establish power availability
	2.3 Identify barriers to installation and develop strategies to overcome them within time and budget restrictions

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	2.4	Test communications cabling to ensure it is working to required specifications and for required capacity
	2.5	Test transmission for signal quality
	2.6	Test existing equipment to be incorporated with the new installation for both functionality and compatibility
	2.7	Develop installation plans to ensure minimal disruption to the workplace
3 Obtain tools and materials	3.1	Check that all tools and equipment are in a safe working order and adjusted to manufacturers specification
	3.2	Locate tools and materials to ensure ready access to the installation
	3.3	Check all material necessary for the installation against order schedules
4 Install equipment	4.1	Install equipment in accordance with plans and specifications
	4.2	Equipment is installed in a manner which is safe to the installer, the customer and the public
	4.3	Service interruption is within limits agreed with the customer
	4.4	Network equipment and facilities are connected as per specification and regulation
	4.5	Mainframe jumpering is completed and is working to specification
	4.6	Extensions are jumpered to the key system
5 Programme system features using key phone facilities	5.1	Install programme in accordance with system specifications
	5.2	System functionality matches the customer requirements
	5.3	Save programme data and record for later use
	5.4	Store job specification on site in a secure location
6 Clean up work site	6.1	Clean and adjust tools and equipment and store in an accessible location
	6.2	Remove installation waste and debris from work site and disposed of in accordance with environmental requirements

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6.3 Recover, package and receipt obsolete equipment in the case of customer owned equipment and return to appropriate point for refurbishment or disposal

6.4 Work is completed in a safe manner

6.5 Restore changes made to the work area during installation to the customer's satisfaction

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- CS310 Customer Relations 3
- EN460 Enterprise Pricing Policy 4
- IN320 Teamwork 3
- MA320 Mathematics 3
- NE420 Network Architecture 4
- OH310 Occupational Health and Safety 3
- PK310 Product Knowledge 3
- PS210 Basic Building Trades 2
- PS310 Plans and Specifications 3
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TO310 Use of Tools 3
- TO330 Installation Practices 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer contact	May be: the designated customer, a nominated representative, builder or architect

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Pricing	Is in accordance with company policy
Factors impacting on installation may include:	building type, age and construction, building facility location e.g. power or building internal layout
System/equipment specifications	Are described in: system manuals, handbooks
Equipment types include:	single line telephones, telephone systems, PABX, payphones, modems, DSL – Digital Subscriber Line including Asymmetrical (ADSL), Digital Broadcasting and CTI (Computer Telephony Integration) technologies
Cabling	May be: internal (building) or external (lead-in)
Tests	Can range from: a simple test for dial tone through to a full test to ensure compliance with regulation and that transmission meets specification
Tools	May include: • Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools • Electrical – power drills, soldering iron, cordless drill, 240v lead lights • Other – ladder, cable identification kit, lap top computer
Material	May include: CPE equipment, cable, miscellaneous parts
Mainframe jumpering	Can only be undertaken by: the carrier in accordance with ACMA Regulations
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Environmental Protection Act • Noise Abatement • Heritage Legislation • Confined Spaces Regulations

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of CPE equipment including single line telephones, telephone systems, PABX, payphone, modem.
- Programming of systems/equipment using key phone facilities.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Ability to read and interpret related floor plans, building plans, reflected ceiling plans, schematic drawings.
- Safe use of general hand and power tools normally related to these tasks.
- Safe use of general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members and other contractors.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC050D Install radio controlled customer premises equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit must be read in conjunction with ICTTC049D Install customer premises systems and equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for installation	1.1 Barriers to possible transmission routes are identified and strategies developed to overcome them
	1.2 Customer's power requirements are assessed
	1.3 Equipment operational parameters are verified with the customer
2 Establish base station locations	2.1 Test units are set up in accordance with specification
	2.2 Signal quality required is assessed from appropriate sources
	2.3 Sufficient tests are undertaken to establish radius of signal quality
	2.4 Base station location is established using data from the signal tests and operational parameters established by the customer

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3 Install equipment	3.1	Equipment is installed as per plans and specifications
	3.2	Equipment is installed in a manner which is safe to the installer, customer and the public
	3.3	Handsets are coded into the system
4 Test equipment operation	4.1	Test equipment to be used is suitable for the tests to be performed and the product being installed to ensure relevance of test data
	4.2	Test equipment is set up in accordance with manufacturer's specifications
	4.3	Measures are taken to ensure operating environment will not prejudice test results
	4.4	Test results are assessed fairly and accurately and are based on verifiable data
	4.5	All test requirements and parameters are considered when evaluating test results

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA370 Cable Installation Practices
- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- MA420 Mathematics 4
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PS320 Basic Building Trades 3
- PS410 Plans and Specifications 4
- TE410 Basic Telephony 4
- TF310 Test Equipment 3
- TO330 Installation Practices 3
- TO410 Use of Tools 4

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer's operational parameters	Can include: range of portability, relationship with other communication/information facilities
Power	Can be provided remotely or by special power plugs
Tests	May typically address the following items: near end cross talk, attenuation, radius, balance, noise levels, frequency levels, reflection, signal loss, expected response times, speed
Test units for establishing base station location	May be specific to the cordless equipment manufacturer/supplier
Manufacturers specifications	May be found in printed instruction leaflets or pre printed on materials or on product packaging
Factors affecting installation	May include: building type, age and construction, building facility location e.g. power or building internal layout, location of internal structures
Equipment types	Include: cordless PABX and business systems including base stations, wireless extensions (CT3)
Tests	Can range from a simple test for dial tone through to a full test to ensure compliance with regulation, transmission meets specification and frequency is accordance with the international digital radio standards
Tools may include:	• Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools • Electrical – power drills, soldering iron, cordless drill, 240v lead lights • Other – ladder, cable identification kit, lap top computer
Material	May include: CPE equipment, cable, miscellaneous parts

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Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards for both quality and frequency standards • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Environmental Protection Act • Noise Abatement Regulations • Heritage Legislation • Confined Spaces Regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification, establishment and testing of base station sites. • Installation of equipment including cordless PABX, business systems including base stations, and wireless extensions (CT3). • Identification of required test – 100%, systematic samples, random, assessment of continuity. • Identification of factors to be addressed via the test including – near end cross talk, attenuation, radius, balance, noise levels, frequency levels, reflection, signal loss, expected response times, speed. • Interpret test results. • Application of all related OHS requirements and work practices (including protective clothing and personal safety items). • Ability to read and interpret related floor plans, building plans, reflected ceiling plans, schematic drawings. • Safe use of general hand and power tools normally related to these tasks. • Safe use of general equipment normally related to these tasks.

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- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC051D Install PC based customer premises equipment system programs

Unit descriptor

This unit applies to the installation of computer programs on customer systems including telecommunications, data communications and information technology systems.

It applies to the installation of Digital Subscriber Line (DSL) technologies.

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Verify the program	1.1 Program details match the functionality required by the customer
	1.2 Additional needs or variations are built into the program prior to installation
	1.3 Any default programming is checked for accuracy
	1.4 Job specification is documented accurately
2 Install the program	2.1 System functionality matches the customer requirements
	2.2 Customer specific data is programmed in accordance with system specifications

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	2.3	Program data is saved and recorded for later use
	2.4	Job specification is left on site in a secure location
3 Provide security arrangements for remote access systems	3.1	System security arrangements and codes are developed and agreed with the customer
	3.2	Security arrangements and codes are programmed into the system
	3.3	Tests are conducted to validate security arrangements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CO430 Computer Programming 4
- CS410 Customer Relations 4
- IN420 Teamwork 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- SU415 Human Resources 4
- TE410 Basic Telephony 4
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TF420 Test Analysis and Diagnosis 4
- TF430 Fault Finding 4
- TO330 Installation Practices 3

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Program	Includes: system facilities, product features, required peripherals associated with product, system functionality such as -station priorities, STD/IDD barring, xDSL facilities (eg ADSL) pickup groups, night service, security, call detail recording
Job specification	Relates the relationship of the equipment and peripherals to each other
Programs	Can be: • installed either on site or remotely • Are saved to disc
Equipment	Includes: business systems, PABXs, payphones, DSL configurations, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
Products	Can be both equipment and network related
System specifications	Are detailed in associated product model documentation
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Privacy Act

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Verification of program and program features including: system facilities, product features, required peripherals associated with the product, system functionality such as – station priorities, STD/IDD barring, pick up groups, night service, security, call detail recording.
- Installation of program into system–PABX, business system, payphone.
- Installation of security programs agreed with customers.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.
- Correct interpretation and application of relevant regulations and standards.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC052D Cut over new customer premises systems and equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan the cutover	1.1 Negotiate dates and timing with the customer
	1.2 Customers are made aware of additional costs that may be associated with after hours activity
2 After hours access is organised where appropriate	2.1 Arrange approval for site access with the customer
	2.2 Identify and comply with security arrangements
3 Organise other parties associated with cutover	3.1 Check that network carrier is informed of cutover dates
	3.2 Connect or arrange connection of network facilities involved in the cutover
	3.3 Negotiate and arrange customer representation at the cutover
	3.4 System supplier backup support is available if required

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4 Organise jumpering from "A" side to the "B" side of the building main frame	4.1	Complete jumpering activity prior to system equipment cutover
	4.2	Check jumpering on the main frame for accuracy
	4.3	Check "B" side of the termination to ensure that the carrier allocated number actually appears
	4.4	Complete record books accurately
5 Cut over the system/equipment into service	5.1	Perform cutover as planned
	5.2	Conduct tests in accordance with technical manuals and specifications
	5.3	Connect network facilities and test they are working accurately
	5.4	Test all equipment and facilities are working as specified by the customer

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CS310 Customer Relations 3
- EN320 Enterprise Information Systems 3
- EN460 Enterprise Pricing Policy 4
- IN320 Teamwork 3
- IN330 Negotiation 3
- NE420 Network Architecture 4
- PK310 Product Knowledge 3
- SU310 Basic Planning 3
- TE310 Basic Telephony 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cutover	Relates to provision of new facilities
Factors affecting after hours access	Include: hours of access, security arrangements, type of client activity, activities of tenants and other facility users, fire and security alarms
Network carriers	Refer to: the customers preferred carrier
Mainframe jumpering	Can only be undertaken by the carrier in accordance with ACMA Standards
System backup:	Would be required either by a company having its own experts available when installing its own product or in a case where another installation company is installing that particular product
Tests undertaken	Are of a functional nature only and cover such aspects as: dial tone, phone ring, ability to make and receive a call, correct number/s, facility checks, programme checks
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Privacy Act

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Development and implementation of cutover plan.
- Identification and organisation of resources necessary to complete the cutover within the specified timeframe.
- Conduct of relevant tests including: dial tone, phone ring, ability to make and receive a call, correct numbers, facility checks, program checks.
- Interpret test results.
- Problem identification and resolution.
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC053D Train customers

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit can be undertaken by CPE installation staff or dedicated customer trainers. (The latter would apply particularly to the very large installations).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify the extent of training required	1.1 Confirm training to be provided with the installation quote
	1.2 Assess customers' expertise and actual training needs
	1.3 Identify and prepare for specialised training needs
	1.4 Provide quotes for any enhanced training and agree with the customer
2 Conduct training	2.1 Explain and demonstrate relevant equipment, functions and network facilities
	2.2 Provide customers with hands on experience in the operation of the equipment
	2.3 Provided feedback to customers on their operational ability
	2.4 Customers demonstrate competence in the use of the system/equipment

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2.5 Provide customers with relevant product literature

2.6 Provide specialised training, if required

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- IN320 Teamwork 3
- PK310 Product Knowledge 3
- TE310 Basic Telephony 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Training provided	May be general or specific to the particular products
Training	Can be: basic as described in product specifications or enhanced with its own specific price structure
Product literature	Includes: explanatory booklets, manuals, training aids, user guides, equipment plans and configuration
Training	May be: given direct to each and every user or to a customers own trainer
Special training	Includes training for the disabled
Relevant legislation, codes, regulations and standards include:	• ACMA Technical Standards • Occupational Health and Safety • Trade Practices Legislation • Privacy Act

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Level of training is identified.
- Training delivery is provided on all aspects of the CPE installation including: system, product, product features and facilities.
- Demonstration includes allowing customer hands-on experience and feedback on performance.
- Correct literature is provided to the customer including: explanatory booklets, manuals, training aids, user guides, equipment plans and configuration.
- Completion of all relevant documentation.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC054D Provide infrastructure for telecommunications network equipment

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for installation	1.1 Installation is verified against design specifications
	1.2 Building plans are checked to ensure physical installation requirements can be met
	1.3 Floor layout is verified against project plans and marked with appropriate material
	1.4 Dimensions of equipment components are checked to ensure that they can be catered for within building limitations
	1.5 A site survey is undertaken to assess barriers to installation and to ensure relevant regulations are complied with
	1.6 Duct and tray way layouts are determined from design specifications
	1.7 Designers are consulted re changes to equipment layout where necessary
	1.8 Material is checked against the design pack and variations arranged as required
	1.9 Tools specified in the documentation are checked for appropriateness for the task
	1.10 Resources provided are checked against needs and negotiations are undertaken for resource variations as required
	1.11 Installation manuals are obtained and studied in detail prior to installation commencement
	1.12 An installation activity plan is developed using appropriate quality tools and processes

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	1.13 Identify possible hazards and issue appropriate hazard advice
	1.14 All parties including customers are advised of planned installation where appropriate
2 Build infrastructure	2.1 Structural deficiencies in supplied equipment are identified and rectified
	2.2 Tasks are assigned to match the skills of the installation crew
	2.3 Tools are obtained and checked for safety
	2.4 Floor layouts are marked in accordance with plans and authorised amendments
	2.5 Distribution frames are installed in accordance with both enterprise and manufacturers specifications and in accordance with plan
	2.6 Ducts and tray ways for signal power and optical cables are built in accordance with plan/specification and after consultation with operational staff as required
	2.7 Ironwork is measured and cut to size where appropriate
	2.8 Superstructure is installed in accordance with manufacturers specifications
	2.9 Earthing is installed as per specification
	2.10 Work is conducted in a manner which is safe to self, fellow workers and the public at large
	2.11 Infrastructure is checked to ensure it meets all safety and electrical requirements
3 Install batteries and rectifiers	3.1 Batteries are handled in a manner which is safe to all parties
	3.2 Batteries/rectifiers are installed and connected in accordance with both manufacturer and enterprise requirements
	3.3 Battery cables are tightened to tension level described in manufacturers specifications
	3.4 Tests are undertaken to monitor battery discharge levels and batteries not meeting specifications are replaced and returned under warranty where required

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4 Install DC power distribution	4.1 Hazardous activity procedures are followed completely
	4.2 Power distribution panel is installed and cables are run in accordance with specification
	4.3 Power cables are terminated in accordance with specification
	4.4 Power cables are connected to equipment infrastructure
	4.5 Electrical cabling is tested in accordance with specification
	4.6 Faults are identified, rectified where possible or escalated in accordance with enterprise policy
	4.7 Work is conducted in a manner which is safe to self, fellow workers and the public at large
	4.8 Work is co-ordinated with external contract/sub contract staff as required
5 Complete installation	5.1 Hazardous activity procedures are followed completely
	5.2 Inspection sheets are completed and located in accordance with enterprise requirements
	5.3 Site is cleaned up and left in a manner which is suitable to operational staff
	5.4 Relevant work documentation and administrative tasks are completed and forwarded to the appropriate area in accordance with enterprise policy
	5.5 Asset is declared ready for next stage of installation
	5.6 Transporting of tools and test equipment in suitable protective casing is organised where appropriate
	5.7 All tools and test equipment are cleaned, adjusted and stored in an accessible location
	5.8 Infrastructure labels and designations are fitted/applied in accordance with enterprise requirements

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- Select from the following list to suit the learning and assessment context
- Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.
- CA310 Cabling Techniques 3
- CI310 Communication 3
- CO310 Computer Skills 3
- EL310 AC/DC Theory 3
- EL320 Earthing 3
- EL430 Power Theory 4
- EN320 Enterprise Information Systems 3
- ET310 Electronics Principles 3
- IN310 Interpersonal Relationships 3
- IN320 Teamwork 3
- NE310 Network Equipment 3
- NE320 Network Architecture 3
- OH310 Occupational Health and Safety 3
- OH320 Safe Handling
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RA310 Radio Frequency Theory and Hazards 3
- SU320 Leadership 3
- TC310 Tower Climbing 3
- TF310 Test Equipment 3
- TF330 Fault Finding 3
- TO310 Use of Tools 3
- TO330 Installation Practices 3
- TO340 Basic Ironwork 3
- TO350 Cutting and Drilling 3
- TR310 Basic Transmission Theory 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Structural deficiencies	Could include: off vertical, not level, not square, bent
Site surveys	Include: fire precautions and hazards, power arrangements, early warning systems, safety hazards, environmental issues, heat loads, power requirements, security arrangements, building dimensions, site access details
Tools	May include: screwdrivers, hammers, spanners, pliers, hammers, wrenches, cutters, wire strippers, wire wrap guns, cable strippers, crimpers, termination tools, splicing tools, cable tie tensioners, tape measures, hacksaws, drills, cut off saws, power tools, angle grinders, jigsaws, tension wrenches, soldering irons, knives, insulation displacement tools, tong meter, mechanical lifts/hoists, volt meters, cable testers, plumb-bob, level, trolleys, multi meters, humidity and temperature testers, anti static testers, load testers, blow torch/oxy acetylene

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Materials	Can include: cable racks, lacing, twine, cable ties, MDF/DDF Blocks, Digital cross connect and laser guide cross connect (DSX/LGX), jumper wire, back shelf cards, frames, cabinets, iron support structures, cable trays, nuts, bolts
Labelling	Is undertaken on: cabinets, racks, power cables, distribution panels Of cables and frames can be manually or PC generated and can be: dymo windows, plastic windows, ready labels, vendor specific labelling
Resources	Can include: people, finance, materials, tools and test equipment, vehicles
Inter equipment cables	May be connected to transmission equipment, main distribution frame, intermediate distribution frame
Termination of cables	May include: wire wrapping, soldering, insulation, displacement system, crimping
Power faults	Relate to voltage and polarity and may be because of faulty termination, faulty power board, overloading of rectifiers
DC power faults	Are repaired by the installer within capability
AC faults	Are escalated to qualified power personnel responsible for either the installation or supply
Likely problems	Can include: light revision cards, faulty cards, equipment missing, wrong procedures, unsuitable location, cards, printed circuit board assemblies
Faults found on testing	May include: faulty cards, faulty cabling, faulty connector, voltage levels on power
Relevant legislation, codes, regulations and standards include:	• International standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU Standards G 703,704,707 -9, 821 • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • ACMA regulations relating to functional earthing

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Identifying potential earthing locations cable routes, cables trays, data cabinets, telecom. Closures, cross connects, distributors (mdf, idf, fdp)
  - Interpreting design specifications, including: circuit diagrams, plans and specifications
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Installing protective earth installations related to: screening, over voltage, surges and spikes
  - Installing termination hardware including: connectors, frames, blocks, sockets, patch panels
  - Installing functional earth installations including equipment potential bonding
  - Installing lightning conductors, link to men (multiple earth neutral)
  - Safely using general hand and power tools and general equipment normally related to these tasks
  - Completing housekeeping including administrative effort, site cleaning, waste and debris removal, hazard identification
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor – demonstrating installation of power equipment including: distribution panel, cables, battery and rectifier types
- Candidate submits hard copy report of conduct and interpretation of test results, complete with relevant documentation, showing compliance with all related occupational health and safety requirements and work practices
- Candidate submits at least two hard copy reports to assessor containing: accurate record keeping and labelling of equipment, manufacturer's certification, warranty and other related documentation requirements

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC055D Install an antenna/wave guide

Unit descriptor

This unit applies to both fixed and mobile radio equipment.

Antenna/wave guide may be installed on a mast/tower/ pole/building.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan for assembly	1.1 All legislative requirements are considered in planning process
	1.2 Resources with the required skills are organised and obtained/contracted to be available when required
	1.3 Other antennae at location are identified and arrangements made for their outage where required
	1.4 Customers and/or other affected parties are notified of works to be undertaken, where appropriate
2 Obtain tools, test equipment and installation materials	2.1 Tools and equipment necessary for the installation are obtained and checked to be in safe working order and adjusted to manufacturers specifications
	2.2 Tools and materials are located to ensure ready access to the installation
3 Assemble antenna/wave guide	3.1 Antenna is assembled on site in sequence and in accordance with plans, specifications and enterprise guidelines
	3.2 Aerial/wave guide is swept prior to installation, problems are identified and replacement parts are arranged as necessary
	3.3 Wave guides are labelled to minimise crossovers
	3.4 Cable connections are made in accordance with plans, specifications and enterprise guidelines
	3.5 Work is conducted in a manner which is safe to self, fellow workers and the public at large

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4	**Mount antenna/ wave guide**	4.1 All personal protective equipment required for the job is worn in accordance with enterprise and occupational health and safety guidelines and manufacturers specifications
		4.2 On site radio frequency hazard folder is obtained, relevant hazard levels assessed and appropriate preventative action taken in accordance with prescribed safety requirements
		4.3 Tools, equipment and machinery to be used complies with all relevant standards and requirements
		4.4 All hazards are identified and action taken to minimise hazards to the installer, fellow operatives and the public at large
		4.5 Pressurisation equipment is installed in accordance with manufacturers specifications where required
		4.6 Wave guides and earth bond/drip point to wave guide are installed in accordance with plans and specifications
		4.7 Antenna is mounted onto installed mounting arrangements in accordance with plans, specifications and enterprise guidelines
		4.8 Wave guides are installed to antenna in a manner described in the specifications
		4.9 Pressure is inserted in accordance with design specifications as necessary
		4.10 Lightning protection systems are installed in accordance with plans and specifications
		4.11 Antenna is earthed in accordance with specification
		4.12 Work is conducted in a manner which is safe to self, fellow workers and the public at large
5	**Connect antenna/ wave guide**	5.1 Wave guide pressure window is mated to appropriate equipment parts in accordance with manufacturers specifications and design requirements
		5.2 Coaxial cable is connected to transceiver where required
		5.3 Feeders are connected, tested as working accurately and repair initiated or escalated in accordance with enterprise policy
		5.4 Work is conducted in a manner which is safe to self, fellow workers and the public at large

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6	**Align/realign antenna**	6.1 Antenna is panned to maximise functional signal strength and considers both elevation and azimuth
		6.2 Polarisation of antenna is undertaken considering both specifications and site/alignment conditions
7	**Test antenna/wave guide operation**	7.1 Appropriate test equipment for antenna/wave guide is set up and used in accordance with manufacturers specifications and enterprise guidelines
		7.2 Tests are conducted in accordance with technical manuals and specifications
		7.3 Test results are interpreted and compared with manufacturers/ design specifications
		7.4 Depressurisation tests are undertaken in accordance with specifications and corrective action initiated where levels are outside specification
		7.5 Earth bonds/drip points on both coaxial cable and wave guides are checked against specification and action initiated where specification limits are not met
8	**Complete administrative tasks**	8.1 All appropriate records are completed and signed in accordance with enterprise policy
		8.2 Test results are recorded and stored in the appropriate data base with copies being left on site as required by enterprise policy
		8.3 All feeders are labelled in accordance with manufacturers specifications and enterprise policy
		8.4 Records are stored in accordance with enterprise guidelines
		8.5 Customer is notified as to work completion as required
		8.6 Relevant enterprise personnel are advised of work completion
		8.7 Transporting of tools and test equipment in suitable protective casing is organised where appropriate
		8.8 All tools and test equipment are cleaned, adjusted and stored in an accessible location

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA360 Coaxial Cabling
- CI310 Communication 3
- CS310 Customer Relations 3
- EL320 Earthing 3
- EN320 Enterprise Information Systems 3
- MA310 Basic Mathematics 3
- NE310 Network Equipment 3
- OH310 Occupational Health and Safety 3
- OH320 Safe Handling
- PE320 Remote Work
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RA310 Radio Frequency Theory and Hazards 3
- RC310 Riggers Certificate 3
- RE310 Working on Non-enterprise Land 3
- TC310 Tower Climbing 3
- TF310 Test Equipment 3
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks

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Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as; Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Customers	May be internal or external to the enterprise and may include the public at large
Legislative requirements	May include: Occupational health and safety, heritage, national parks, telecommunications Act, historical buildings and sites, telecommunications codes of conduct
Resources	May be company staff or contract staff
Outage requirements	Vary from enterprise to enterprise but generally require a permit to work from the relevant network management centre
Initial wave guide sweeps	Are undertaken using dummy loads
Cables in use	May be: copper, optic fibre, coaxial
Installation factors	May include: signal type, frequency, height of installation, ownership of site/support
Hazards	May include: safety, radiation, weather, site, geography, roof top, building
Hazard prevention measures	May include: appropriate warning signs, road closures, equipment turn down, temporary outage, site clearances, roof guards
Licenses	Which may be required include: riggers, winch, crane

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Other antennae	May be operated by: other carriers, civil agencies, defence agencies, government agencies, private enterprise
Personal protective equipment	May include: asbestos precautions, dust protection, gear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers gloves, safety boots, vests, radiation protection clothing
Tools, equipment and machinery	May include: winch, crane, hand and power tools elevated platform level
Test equipment	May include: multimeter, spectrum analyser, return loss measuring equipment, hybrid T
Alignment of antenna	May be influenced by elevation and azimuth
Direction	May be: omnidirectional, diametrically opposite
Polarisation	Can be vertical, horizontal or circular
Bands in use	May be: Narrow, wide, mobile and satellite
Relevant legislation, codes, regulations and standards may include:	• ACMA Standards TS 14 • International Standards ISO 9000 and 9001 • ITU recommendations • Occupational health and safety • Environmental protection acts • Heritage legislation • National Parks • Telecommunications Act and relevant codes • Historical building and site • State legislation relating to road/site closures • Agreements with local and state bodies

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor on planning for separate successful antenna/wave guide assemblies.
- Mentor/assessor observes candidate planning antenna/wave guide installation, including:
  - Assessing hazard levels including site and radio frequency and application of safety precautions for self, fellow workers and the public at large
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Obtaining and checking tools, test equipment and materials, and using relevant test equipment
  - Installing assembly in accordance with plan and specification
  - Accurately labelling of all equipment
  - Mounting, connecting, aligning for pan and sweep at least two antenna/wave guides under instruction, and successfully completing another procedure on at least one previously unfamiliar wave guide and one antenna, in accordance with plan and specification
  - Showing correct interpretation and application of relevant regulations and standards, and all related occupational health and safety requirements and work practices
  - Demonstrating completion and storage of appropriate records including data bases
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – demonstrating successful alignment of an antenna and wave guide installation.
- Candidate submits hard copy reports of separate installations of varying degrees of complexity demonstrating candidate's ability to:
  - Use relevant test equipment
  - Apply specified tests
  - Analyse outcomes against specifications

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC056D Install telecommunications network equipment

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

The unit applies to installation of both new, additional and replacement equipment.

Termination of cables are covered broadly in this standard and thus it should be read in conjunction with Telecommunications Cabling Competency Standards:

- ICTTC008D Terminate metallic conductor cable
- ICTTC010D Place, secure and terminate customer premises optical fibre cable
- ICTTC011D Place, secure and terminate coaxial cable

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Check design specifications	1.1 Equipment listings are checked against the design brief
	1.2 Equipment locations are checked and confirmed
	1.3 A detailed check of the infrastructure is made
	1.4 All manufacturers and enterprise documents are obtained and checked for completeness
	1.5 Installation briefs are studied in detail and problems or perceived problems are discussed with the designers and/or manufacturers
2 Obtain tools, test equipment and installation materials	2.1 All tools and equipment are checked to be in a safe working order and adjusted to manufacturers specification
	2.2 Tools and materials are located to ensure ready access to the installation

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3 Plan installation	3.1	Project management plans are studied for key events and dates
	3.2	Planned resources are checked for appropriateness to the task and difficulties are discussed with project management
	3.3	All affected customers are informed of the installation
	3.4	A site survey is undertaken to assess barriers to installation and to ensure relevant regulations are complied with
	3.5	A detailed installation strategy is developed
	3.6	Hazards and barriers to installation are identified and appropriate enterprise hazard processes are followed
	3.7	All occupational, health and safety implications are identified and action taken where safety of workers and plant is at risk
4 Unpack and check equipment	4.1	Packing list is checked against work order
	4.2	Equipment is unloaded, unpacked and located in a location that is secure, accessible to work site and safe to staff working in that environment
	4.3	Material and equipment is checked for damage
	4.4	Appropriate reports are provided relative to damaged material and replacement material is ordered
	4.5	Damaged material is returned to source of provision
	4.6	Material is checked against packing list
	4.7	Packaging is disposed of in accordance with accepted environmental conditions
	4.8	Variations to material/equipment order are noted and negotiations are conducted with supplier for variations to be rectified within an agreed timeframe
	4.9	Anti-static precautions are observed
5 Mount equipment	5.1	Work specifications are verified against work orders and design drawings
	5.2	Equipment is pre wired prior to mounting if necessary
	5.3	Equipment is positioned and installed in accordance with manufacturers specifications and design detail

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	5.4	Modifications to specifications are discussed with designers prior to implementation
	5.5	Equipment is appropriately labelled in accordance with enterprise policy
	5.6	Work is conducted in a manner which is safe to self, fellow workers and the public at large
6 Cable equipment	6.1	Cable is provided in accordance with manufacturers specifications and enterprise requirements
	6.2	Minimum bending radii, appropriate cable separation and other enterprise requirements are observed to ensure the integrity of cable is observed at all times
	6.3	Work is conducted in a manner which is safe to self, fellow workers and the public at large
	6.4	Cables are secured with appropriate cable ties
	6.5	Cables are audited and labelled in accordance with enterprise requirements
7 Terminate cables	7.1	Cables are stripped using appropriate tools and in accordance with manufacturers specifications
	7.2	Conductors are identified
	7.3	Distribution frames and blocks are labelled as per enterprise requirements
	7.4	Conductors are fanned in accordance with work instructions
	7.5	Spare length is provided where appropriate to enable re-termination if necessary
	7.6	Conductors are terminated in accordance with manufacturers specifications
	7.7	Optical fibre connectors are cleaned using appropriate cleaning techniques
8 Test cables	8.1	Required tests are identified
	8.2	Test equipment appropriate to the tests to be undertaken is selected
	8.3	Test equipment is assessed for effectiveness and to ensure that it meets calibration specifications
	8.4	Terminations are visually inspected to ensure completeness
	8.5	Cabling is tested to ensure that it meets both manufacturers and enterprise specifications

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	8.6	Continuity tests are conducted to ensure cable integrity
	8.7	Test failures are analysed for cause and appropriate action is taken to correct deficiency
	8.8	Cables are plugged into equipment if necessary
9 Power up equipment	9.1	Power is connected following power supplier's and equipment vendor's defined procedures
	9.2	Voltages are checked at user points to identify power faults
	9.3	Power faults are brought to attention and rectification organised within specified time frame
10 Insert equipment cards and modules	10.1	Anti static precautions are observed
	10.2	Equipment card details are recorded on appropriate data base
	10.3	Cards are strapped, switch settings selected and then plugged into equipment as per equipment specification
	10.4	Cards are checked against documentation to ensure that they are correct
	10.5	Software programmes are installed as per specification
11 Install equipment accessories	11.1	Alarms are installed in accordance with instruction manuals and to specification
	11.2	Operations administration and maintenance system is installed in accordance with specification
	11.3	Communication facilities for operational staff are installed in accordance with specification, taking into account any special needs of the site and the operational staff
	11.4	Man/machine communication facilities are installed in accordance with needs and to specification
12 Test equipment	12.1	Configuration of both soft and hardware is undertaken in accordance with installation documentation
	12.2	Project documentation is checked to identify the tests to be undertaken
	12.3	Appropriate test equipment is obtained and checked to ensure accuracy and effectiveness

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	12.4 Specified equipment tests are undertaken in accordance with specified requirements
	12.5 Performance is measured against criteria specified for the equipment being installed
	12.6 Detected faults are identified, analysed and either rectified or escalated in accordance with enterprise policy
	12.7 Faulty circuit boards are replaced and either disposed of or returned to the manufacturer/appropriate repair facility in accordance with enterprise policy
	12.8 Test/inspection sheets are completed and filed in accordance with enterprise policy
13 Clean up work site	13.1 All tools and equipment are cleaned, adjusted and stored in an accessible location
	13.2 Installation waste and debris are removed from work site and disposed of in accordance with environmental requirements
	13.3 Obsolete and excess equipment is recovered, packaged and receipted and returned to an area designated by enterprise policy
	13.4 Work is completed in a safe manner
	13.5 Transporting of tools and test equipment in suitable protective casing is organised where appropriate
14 Complete administrative tasks	14.1 Test results are recorded, test sheets are completed and located in accordance with enterprise requirements
	14.2 Relevant work documentation and administrative tasks are completed and forwarded to the appropriate area in accordance with enterprise policy
	14.3 Material usage is recorded and advised to the appropriate enterprise area
	14.4 Data bases are updated in accordance with prescribed procedures
	14.5 A quality audit of the installation is undertaken and recommendations associated with process improvement made and submitted to appropriate area within the enterprise
	14.6 Asset is declared ready for commissioning/ integration

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA310 Cabling Techniques 3
- CA320 Optical Techniques 3
- CA370 Cable Installation Practices
- CI310 Communication 3
- CO310 Computer Skills 3
- CS310 Customer Relations 3
- DI310 Digital 3
- EL310 AC/DC Theory 3
- EL320 Earthing 3
- EL430 Power Theory 4
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- IN310 Interpersonal Relationships 3
- IN320 Teamwork 3
- MA310 Basic Mathematics 3
- NE310 Network Equipment 3
- NE320 Network Architecture 3
- OH212 Safe Work Practices–Optical Fibre Cable
- OH310 Occupational Health and Safety 3
- OH320 Safe Handling
- PE310 Personal Skills 3
- PE320 Remote Work
- PS214 Plan Reading, Specifications and Records–Structured Cable
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RA310 Radio Frequency Theory and Hazards 3
- SU310 Basic Planning 3
- SU320 Leadership 3
- SU330 Quality Procedures 3
- SW310 Switching Products 3
- TC310 Tower Climbing 3
- TF310 Test Equipment 3

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- TF320 Test Analysis and Diagnosis 3
- TF330 Fault Finding 3
- TF340 Testing Principles 3
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3
- TO340 Basic Ironwork 3
- TO340 Basic Ironwork 3
- TO350 Cutting and Drilling 3
- TR320 Modulation Theory 3
- TR330 Time Division Multiplexing 3
- TR340 Transmission Technologies and Products 3
- TR350 Transmission Software

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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Tools	May include: screwdrivers, hammers, spanners, pliers, cutters, wire strippers, cable strippers, crimpers, termination tools, cable tie tensioners, tape measures, hacksaws, drills, cut off saws, power tools, angle grinders, jigsaws, tension wrenches, soldering irons, knives, insulation displacement tools, mechanical lifts/hoists, volt meters, cable testers, plumb-bob, level, trolleys, multi meters, humidity and temperature testers, anti-static testers, load testers
Test Equipment	May include: multi meters, digital analysers, test leads, adaptors, power meters, optical fibre power meters, microscopes, laser source, OTDR, optical attenuators, analogue transmission measuring sets, oscillator, level meter, spectrum analysers, oscilloscopes, pattern generators, frequency measurer, GSM spectrum frequency synthesizer, R/F band noise measurer, modulator tester, error meter, light meter, lap top computer, video tester, R/F sweep tester, FWR meters, R/F microwave test sets, communication system analysers, sweep test coaxial and wave guide antenna systems, transmitter/receiver filter combiner equipment, microwave link analyser
Tests	Check functionality and range from testing a single element to a loop back situation
Material damage	May include: packing errors, breakage, misshapen equipment, water damage
Anti static protection	Can include: wrist straps that are earthed, ant static mats, anti static flooring, anti static bags for equipment, anti static dust coats, heel straps
Conductors	Could be either copper or optical
Equipment cable	Can be for: signal, power, alarms, miscellaneous, earth
Cable tensions and cable lengths (where critical)	Are determined as part of the manufacturers specifications
Bending ratios on cables	Are determined by manufacturers specifications
Spare length on cable	Is determined locally but should be sufficient to cater for errors
Optical fibre connectors	Are cleaned using alcohol and cleaning swabs

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Test failures	Could include: operator error, open circuits, faulty joints, dry joints, faulty circuit boards or modules, wires and/or cables wrongly terminated, faulty earthing, broken conductors, cross talk in cables, pairs untwisted, incorrect straps/switch settings on printed circuit boards
Voltage and polarity levels	Are predetermined by the manufacturers specifications
Straps	Are associated with equipment cards and set parameters for card operation
Installation waste	May include: excess equipment, off cuts, rubbish
Relevant legislation, codes, regulations and standards include:	• ACMA Standards TS 14 • ITU recommendations • Australian Standards AS 3901, 3902 • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • Australian standards applying to radiation hazards • State and Federal environment Acts • National Parks Act • ACMA regulations relating to functional earthing

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Interpreting design specifications, including: circuit diagrams, plans and specifications
  - Demonstrating installation of cables including: minimum bending radii appropriate cable separation, provision of spare length.
  - Demonstrating termination of cables including: stripping, conductor identification and fanning, cleaning of optical fibres connectors, provision of spare length
  - Verifying cable continuity

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- Conducting and interpreting test results, completing relevant documentation, determining compliance from manufactures' certification, warranty and other related documentation requirements

- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor:
  - Applying DC principles and associated measuring techniques
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs

- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor – demonstrating successful:
  - Safe use of general hand and power tools related to these tasks
  - Installation to plan/specification
  - Installation of earthing and corrosion protection
  - Compliance with all related occupational health and safety requirements and work practices

- Candidate submits a set of hard copy test results and relevant documentation.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC057D Test cable bearers

Unit descriptor

This unit applies to the testing of all cable types – metallic, optical fibre and coaxial.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for test	1.1 Cable route and specifications together with all associated documentation is obtained
	1.2 Purpose of the test and the performance to be measured is identified
	1.3 Need for outage, extent, location and timing is determined and negotiated with network management centre
2 Obtain and set up test equipment	2.1 Equipment selected is suitable for the tests to be performed to ensure relevance of test data
	2.2 Test equipment is set up in accordance with manufacturers specifications
	2.3 Test reading error is set against a known reference where appropriate
	2.4 Equipment calibration certification is current to reduce possibility of unreliable test data and ensure traceability where appropriate
3 Perform tests	3.1 Optical fibre connectors are cleaned prior to testing
	3.2 Tests are conducted as required by both equipment and enterprise specification
	3.3 Cable length, splice location and irregularity details are determined and recorded
	3.4 Measurements are undertaken to determine loss associated with links, insertions, returns and splicing

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4 Interpret test results and determine action	4.1	Test results are read accurately and compared against manufacturers and site specifications for cable performance
	4.2	All test requirements and parameters are considered when evaluating test results
	4.3	Test results are assessed fairly and accurately and are based on verifiable data
	4.4	Problems are identified, location determined and arrangements are instituted for repair or modification
	4.5	Retest faulty fibre after the faults have been rectified
5 Document test results	5.1	Results of tests are documented accurately in accordance with enterprise guidelines and without delay to ensure test results remain current
	5.2	Site and installation files are updated to ensure traceability of information on system performance is maintained
	5.3	Test result details are recorded and archived for the life of the cable

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA410 Optical Techniques 4
- CI410 Communication 4
- EL420 Impedance Matching 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- EN440 Enterprise Operations Policy 4
- MA410 Basic Mathematics 4
- OH212 Safe Work Practices–Optical Fibre Cable
- OH410 Occupational Health and Safety 4
- OH420 Occupational Health and Safety Regulations 4
- PE320 Remote Work
- PS216 Plan Reading, Specifications and Records – Coaxial Cable
- PS217 Plan Reading, Specifications and Records – Underground

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- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE221 ACMA Standards and Regulations – Optical Fibre Cable
- RE222 ACMA Standards and Regulations: Coaxial Cable
- TE410 Basic Telephony 4
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR420 Light/Laser Theory 4
- TR480 Transmission Hierarchy 4
- TR490 Transmission Test Instruments 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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Tests	Are described in manufacturers documentation
Cable performance	Is detailed in the manufacturers specifications
Tests	Are conducted using an Optical Time Domain Reflectometer (OTDR), light source and meter
Link loss	Is loss of fibre without connectors
Insertion loss	Measures fibre with connectors – total end to end
Return loss	Measures signal reflected of an incident or point
Problems identified during testing	May include: loss, faulty splices, manufacturers defect, hum, cross talk
Relevant legislation, codes, regulations and standards include:	• ACMA Technical Standards • International Standards ISO 9000 and 9001 • ITU recommendations • Occupational Health and Safety

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Interacting with enterprise personnel, customers and other contractors, keeping customer focus and consideration of customer needs
  - Complying with all related occupational health and safety requirements and work practices
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Correctly recording and storing test results.

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- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor on:
  - Cleaning of optical fibre, cable balancing, impedance matching
  - Conducting tests and interpreting of results against expected outcomes
  - Interpreting cable plans and calculating splice, cable length and location losses.
- Candidate submits a set of satisfactory hard copy test results.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC058D Acceptance test new systems and equipment

Unit descriptor

This unit may apply to switching, transmission, computer and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Receive installation completion advice	1.1 Certificate relating to job completion is received and checked for completeness
	1.2 Documentation is received and checked
2 Visually inspect new installation	2.1 Physical installation is checked to ensure that it is correctly located and labelled and meets specification and design principles
	2.2 Cabling equipment and distribution frame is checked to ensure it complies with the approved standards and is correctly labelled
	2.3 Power/electrical equipment is checked both for operation and safety
	2.4 The total installation is assessed for both safety and environmental safeguards
	2.5 Ensure the availability and suitability of spare parts for maintenance purposes
3 Undertake performance tests	3.1 Tests are undertaken to assess error performance levels
	3.2 Protection mechanisms are tested to ensure performance criteria meets the specified standard

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3.3 Performance measurements are undertaken to ensure measurements are in accordance with predetermined specifications and meet approved operating margins

3.4 Alarms are checked for satisfactory operation

3.5 Identified problems are brought to the attention of installation staff for repair

3.6 Records, data bases and labelling are checked where appropriate and errors/omissions brought to the attention of installation staff

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- AT310 Acceptance Testing
- CI510 Communication 5
- CO510 Computer Skills 5
- DI510 Digital Theory 5
- DI530 Digital Radio 5
- EN510 Enterprise Escalation Procedures 5
- EN520 Enterprise Information Systems 5
- EN530 Enterprise Organisational Policy 5
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- MA510 Mathematics 5
- NE510 Network Equipment 5
- NE520 Network Architecture 5
- OH510 Occupational Health and Safety 5
- PE320 Remote Work
- PS510 Plans and Specifications 5
- PS510 Plans and Specifications 5
- PS510 Plans and Specifications 5
- RA510 Antennas 5
- RA520 Radio Frequency Theory and Hazards 5
- SC510 Science 5
- SU520 Leadership 5
- SW420 Packet Data Switching 4

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- SW530 Switch Networks 5
- TE510 Telephony 5
- TF510 Test Equipment 5
- TO420 Anti-static Procedures 4
- TO510 Use of Tools 5
- TR510 Transmission Theory 5
- TR540 Narrow and Wideband Principles 5
- TR560 Spectrum Management 5
- TR580 Transmission Hierarchy 5
- TR590 Transmission Test Instruments 5
- VO510 Video Network Techniques 5

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor

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Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite, LANs and WANs
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Documentation	Would include: equipment manuals, operating instructions, design specifications, installation details
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage, incorrect or missing labelling, records and/or straps
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements
Test Equipment	May include: multi meters, digital analysers, test leads, adaptors, power meters, optical fibre power meters, microscopes, laser source, OTDR, optical attenuators, analogue transmission measuring sets, oscillator, level meter, spectrum analysers, oscilloscopes, pattern generators, frequency measurer, GSM spectrum frequency synthesizer, R/F band noise measurer, modulator tester, error meter, light meter, lap top computer, video tester, R/F sweep tester, FWR meters, R/F microwave test sets, communication system analysers, sweep test coaxial and wave guide antenna systems, transmitter/receiver filter combiner equipment, microwave link analyser

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Test failures	Could include: operator error, open circuits, faulty joints, dry joints, faulty circuit boards or modules, wires and/or cables wrongly terminated, faulty earthing, broken conductors, cross talk in cables, pairs untwisted, voltage levels on power, software, incorrect straps or switch settings on circuit board, faulty cables
Alarm management systems	Transmission equipment has its own alarm management systems that are self-monitoring, have built in error counters. Such systems are normally centralised and are physically monitored
Transmission systems	Are governed by international standards set by the ITU
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU Standards G 703,704,707 -9, 821 • Occupational Health and Safety • Privacy Act • Private property law

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor – describing:
  - Making a complete check of installation against installation plans
  - Complying with all related occupational health and safety requirements and work practices
  - Inspecting cabling, cable layout and power requirements as required by different installations

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- Candidate submits at least two sets of hard copy test results for sign-off, and observation by mentor/assessor, of candidate's ability to:
  - Undertake relevant acceptance tests and analysis against specified performance criteria
  - Run a test of network security arrangements

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC059D Commission telecommunications network equipment

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

As commissioning and integration of telecommunications equipment can occur simultaneously, integration is covered in the following and can be undertaken at the same time:

- ICTTC060D Integrate new systems and equipment into the telecommunications network

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan commissioning procedures	1.1 All parties associated with the commissioning are identified
	1.2 Commissioning dates are established and confirmed with all parties
	1.3 Commissioning parameters are established as per specification
	1.4 Required resources are identified and organised
	1.5 Test equipment is obtained and checked for suitability and accuracy
	1.6 Customers affected by the work are informed of impending action and likely timing and impact
	1.7 Frequency spectrum band is identified
	1.8 Receipt of appropriate spectrum management agency licence is checked
2 Organise planned outages if necessary	2.1 Affected systems, traffic and customers are identified
	2.2 Outage duration is determined
	2.3 Outage times are negotiated with appropriate groups

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	2.4	Existence of contingency plans is checked
	2.5	Contingency plans are developed in the event that such a plan does not already exist
	2.6	Emergency communications are provided if appropriate
	2.7	A detailed list is prepared of both the areas impacted and the likely effect of such impact
	2.8	Alarm management centre is notified of action planned
	2.9	Authority to proceed is obtained from the relevant control centre
	2.10	Customers affected by the outage are notified, both as to time and likely duration
3 Install software	3.1	Applications programmes are installed
	3.2	Hardware data is loaded as per instructions
	3.3	Telephony/route and network data is loaded in accordance with predetermined instructions
	3.4	Management data is loaded in accordance with specification
	3.5	Billing/charging data is loaded in accordance with specification
4 Connect transmission bearers	4.1	Distant end connection is verified with other parties
	4.2	Intermediate connections are verified where required
	4.3	Equipment parameters are set as per specification
	4.4	Equipment is connected to the appropriate bearers
	4.5	Alarms associated with the bearer and infrastructure are checked
	4.6	Artificial links are installed where required and dismantled on completion of the commissioning process
	4.7	Work is conducted in a manner which is safe to self, fellow workers and the public at large
5 Test hardware	5.1	Test equipment is obtained and checked for accuracy
	5.2	Both end to end and section measurements are conducted in accordance with specification
	5.3	Protection switching equipment is tested for operation

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	5.4 Order wires and auxiliary data channels are tested
	5.5 Optical fibre cable connectors are cleaned as required
	5.6 All specified performance tests are undertaken to ensure operation meets all prescribed parameters and specifications as detailed in the original design brief
	5.7 Tests are undertaken to ensure that there is compatibility between the hardware and the software
	5.8 Performance defects are corrected or brought to the attention of designers for corrective action
	5.9 Test sheets are completed as per specification and test instrument usage logged as per enterprise requirements
6 Test equipment functionality	6.1 Alarms are tested in conjunction with network management and operational groups
	6.2 Traffic tests are simulated through the new installation
	6.3 Specific equipment features installed are tested
	6.4 Billing/charging arrangements are tested
	6.5 Operations administration maintenance system is tested
	6.6 Faults detected are diagnosed, repaired or escalated to the appropriate area when fault cannot be clearly diagnosed or repaired
	6.7 Vendor related tests are initiated where required
7 Complete administrative tasks	7.1 Test results are recorded as per enterprise instructions
	7.2 Appropriate data bases are updated
	7.3 Alarms triggered as a result of the commissioning process are rectified
	7.4 Correct labelling of all equipment is checked and amendments made where required
	7.5 Details of material usage is recorded and submitted to appropriate area in accordance with enterprise instructions
	7.6 Job orders are completed fully and submitted to appropriate enterprise organisational unit

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7.7 Design specifications are updated and returned to design area as required by enterprise requirements

7.8 Quality control procedures are followed as per enterprise policy

7.9 Installation briefs, documents and equipment manuals are handed over to operational staff in accordance with enterprise requirements

7.10 Operational staff training is undertaken where required

7.11 Transporting of tools and test equipment in suitable protective casing is organised where appropriate

7.12 All tools and test equipment are cleaned, adjusted and stored in an accessible location

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- CS510 Customer Relations 5
- CS520 Service Agreements 5
- DI510 Digital Theory 5
- DI530 Digital Radio 5
- EN510 Enterprise Escalation Procedures 5
- EN520 Enterprise Information Systems 5
- EN530 Enterprise Organisational Policy 5
- EN540 Enterprise Operations Policy 5
- ET420 Amplifiers 4
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- IN530 Consulting Methods
- IN540 Workplace Networking 5
- MA510 Mathematics 5
- NE520 Network Architecture 5
- OH212 Safe Work Practices – Optical Fibre Cable
- OH510 Occupational Health and Safety 5

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- PE320 Remote Work
- PR510 Problem Solving 5
- PS510 Plans and Specifications 5
- PS510 Plans and Specifications 5
- RA510 Antennas 5
- RA520 Radio Frequency Theory and Hazards 5
- SC510 Science 5
- SU520 Leadership 5
- SW530 Switch Networks 5
- TE510 Telephony 5
- TF520 Test Analysis and Diagnosis 5
- TF540 Radio Tests 5
- TO510 Use of Tools 5
- TO620 Anti-static Procedures 6
- TR510 Transmission Theory 5
- TR520 Light/Laser Theory 5
- TR530 Modulation Theory and Techniques 5
- TR540 Narrow and Wideband Principles 5
- TR560 Spectrum Management 5
- TR580 Transmission Hierarchy 5
- VO510 Video Network Techniques 5
- VO520 Video and Sound Principles 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor

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Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Program applications and data loading	Can be completed either on site or remotely
Loading	Can be completed by manual command or per medium of floppy disk, hard disk, magnetic tape, digital tape, optical disk, CD ROM
Routing data	Relates to the dimensions of the route
Network data	Relates to the routing of codes through the network
Data loaded	Is usually site specific
Signalling (CCS 7) data loaded	Is undertaken in accordance with relevant ITU standard
Tests	Are undertaken using man/machine interfaces such as PC, Modem
Distant ends	May be in the same or completely different location
Intermediate connections	Include repeaters and through frames
Alarms	Are equipment specific and may include: power, signal, signal loss, error rate
Disabling of alarms	Can be undertaken either manually or electronically

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Test Equipment	May include: multi meters, digital analysers, test leads, adaptors, power meters, optical fibre power meters, microscopes, laser source, OTDR, optical attenuators, analogue transmission measuring sets, oscillator, level meter, spectrum analysers, oscilloscopes, pattern generators, frequency measurer, GSM spectrum frequency synthesizer, R/F band noise measurer, modulator tester, error meter, light meter, lap top computer, video tester, R/F sweep tester, FWR meters, R/F microwave test sets, communication system analysers, sweep test coaxial and wave guide antenna systems, transmitter/receiver filter combiner equipment, microwave link analyser
Tests	Check functionality and range for testing a single element to a loop back situation
Optical fibre connectors	Are cleaned using alcohol and cleaning swabs depending on enterprise requirements
Test failures	Could include: operator error, open circuits, faulty joints, dry joints, faulty circuit boards or modules, wires and/or cables wrongly terminated, faulty earthing, broken conductors, cross talk in cables, pairs untwisted, signal loss, power failures, incorrect harmonics, spurious signals
Customers	May be internal or external to the organisation
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Industrial awards and conditions • Australian standards applying to radio frequency hazards • State and Federal environment Acts

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Negotiating procedures/activity on the network/timing of commissioning
  - Commissioning equipment to plan/specification
  - Safely using general hand and power tools normally related to these tasks
  - Implementing test plan, and interpreting and analysing results against expected outcomes by candidate.
  - Testing alarms and alarm regime
  - Analysing faults/problems/anomalies and providing solutions
  - Maintaining accurate records and labelling of equipment
  - Completing housekeeping including administrative effort, site cleaning, waste and debris removal, hazard identification
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor:
  - Applying enterprise escalation and outage procedures within service assurance guidelines
  - Maintaining customer focus and consideration of customer needs
  - Running an applications program.
  - Complying with all related occupational health and safety requirements and work practices
- Candidate submits a test plan hard copy for sign-off by assessor/mentor.
- Candidate submits a set of hard copy test results complete with analysis of faults with solutions.
- Candidate submits a quality audit to mentor/assessor.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC060D Integrate new systems and equipment into the telecommunications network

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

As commissioning and integration of telecommunications equipment can occur simultaneously, commissioning is covered in the following and can be undertaken at the same time:

- ICTTC059D Commission telecommunications network equipment

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Organise planned outages if necessary	1.1 Integration plan is developed and documented
	1.2 Affected systems, traffic and customers are identified
	1.3 Outage duration is determined
	1.4 Outage times are negotiated with appropriate groups
	1.5 Existence of contingency plans is checked
	1.6 Contingency plans are developed in the event that such a plan does not already exist
	1.7 Emergency communications are provided if appropriate
	1.8 A detailed list is prepared of all the areas impacted and the likely affect of such impact
	1.9 Alarm management centre is notified of action planned

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	1.10 Authority to proceed is obtained from the relevant control centre
	1.11 Customers affected by the outage are notified, both as to time and likely duration
2 Provide alternate transmission path if possible	2.1 Alternative transmission paths available are examined
	2.2 Alternative paths are discussed with appropriate control centre/design group
	2.3 Time and duration of integration activity is planned
	2.4 Approval to planned action is obtained from relevant authority
	2.5 Alternative transmission paths are implemented
	2.6 Relevant bearers are identified and tested
3 Implement integration	3.1 Near and distant ends and all intermediate points are jumpered as per specification
	3.2 Operational software is loaded in accordance with specification
	3.3 Network ports are connected in accordance with specification
	3.4 Signalling/network synchronisation links are connected in accordance with instructions and standards
	3.5 Data bases are updated in accordance with both manufacturers specification and enterprise policy
	3.6 All trunks and lines/interfaces are enabled in accordance with specification
	3.7 Success of the integration is assessed and contingency plans are implemented where appropriate
	3.8 Work is conducted in a manner which is safe to self, fellow workers and the public at large
	3.9 Alarms are analysed for fault conditions in conjunction with network management centre
	3.10 Detected faults are located, rectified within capability or escalated in accordance with enterprise policy
	3.11 Recorded alarms are cleared and error counters built into the system are reset
	3.12 System administration procedures are established

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	3.13 Operations administrative maintenance system and alarms are connected in accordance with the instruction manual
	3.14 Integration is undertaken as an iterative process – point by point
4 Test integration	4.1 Tests are undertaken by simulating network traffic
	4.2 Specific measurements are undertaken as described in the equipment manuals
	4.3 Tests calls in and out of the new switch are organised with distant parties
	4.4 All test results are analysed to ensure that the parameters established have all been met
	4.5 Problems identified during testing phase are analysed and action taken to correct or escalation procedures activated
5 Complete administrative tasks	5.1 Project completion is notified to relevant authorities
	5.2 All tools and test equipment are cleaned, adjusted and stored in an accessible location
	5.3 Test results are recorded and stored in accordance with enterprise requirements
	5.4 Work documentation is completed and returned to the appropriate area as dictated by enterprise policy
	5.5 Transporting of tools and test equipment in suitable protective casing is organised where appropriate
	5.6 Equipment labelling is checked and amended as required
	5.7 New alarms are activated and old alarms are deactivated

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA410 Optical Techniques 4
- CI510 Communication 5
- CO510 Computer Skills 5
- EL510 AC/DC Theory 5

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- EN520 Enterprise Information Systems 5
- EN530 Enterprise Organisational Policy 5
- EN540 Enterprise Operations Policy 5
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- IN530 Consulting Methods
- IN540 Workplace Networking 5
- MA510 Mathematics 5
- NE520 Network Architecture 5
- NE630 Network Signalling 5
- OH212 Safe Work Practices–Optical Fibre Cable
- OH510 Occupational Health and Safety 5
- PE320 Remote Work
- PK510 Product Knowledge 5
- PS510 Plans and Specifications 5
- RA520 Radio Frequency Theory and Hazards 5
- RE520 Physical Interface Standards 5
- SU510 Planning 5
- SU520 Leadership 5
- SW530 Switch Networks 5
- TC510 Tower Climbing 5
- TF510 Test Equipment 5
- TF520 Test Analysis and Diagnosis 5
- TF530 Fault Finding 5
- TR520 Light/Laser Theory 5
- TR530 Modulation Theory and Techniques 5
- TR550 Time Division Multiplexing 5

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite, LAN, WAN
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as: backbone, transport, broadband, data, HLS, CLS
Distant ends	May be in the same or completely different location to the near end May be jumpered by installation personnel or personnel allocated specifically to the task
Test equipment	Is usually portable and have their own special carrying cases for transportation

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Test Equipment	May include: multi meters, digital analysers, test leads, adaptors, power meters, optical fibre power meters, microscopes, laser source, OTDR, optical attenuators, analogue transmission measuring sets, oscillator, level meter, spectrum analysers, oscilloscopes, pattern generators, frequency measurer, GSM spectrum frequency synthesizer, R/F band noise measurer, modulator tester, error meter, light meter, lap top computer, video tester, PC, protocol analysers, CCS 7 signalling, switch management system, subscriber private meters, phones, load testers, line condition simulation
Tests	Are undertaken at each point and usually involves simulated traffic conditions. Both the equipment and the specific features of the equipment is tested Are unique to the installation and are prescribed in the equipment installation and enterprise manuals Check functionality and range from testing a single element to a loop back situation Can be undertaken either manually following defined procedures using a PC or automatically as part of the equipment programme
Operational parameters	May include: lost calls, billing, errors, alarms
Network ports	May include: voice, digitised, optical fibre, coaxial, radio, microwave links
Measurements	Taken may include: signal loss, call completion, billing, performance, processor loading
Alarms	Are equipment specific and may include: power, signal, signal loss, error rate
Faults likely to occur during integration	Include: jumpering deficiencies, bad terminations, missing links
Customers	May be internal or external to the organisation
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Industrial awards and conditions

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- Australian standards applying to radio frequency hazards
- State and Federal environment Acts
- Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Developing a contingency plan
  - Negotiating procedures/activity on the network/timing of integration
  - Interacting with enterprise personnel, customers and other contractors
  - Keeping a customer focus and consideration of customer needs
  - Applying and using tools and test equipment
  - Complying with all related occupational health and safety requirements and work practices
- Candidate submits a written contingency plan to mentor/assessor for sign-off.
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor:
  - Running an applications program
  - Effecting integration to plan/specification
  - Testing network security arrangements
  - Testing alarms and alarm regime
  - Implementing a contingency plan
  - Applying enterprise escalation and outage procedures

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- Mentor/assessor observes candidate's competency in:
  - Conducting a test plan and analysis of outcomes including interpretation of alarms, error reports and test results
  - Testing systems/equipment and associated features being integrated, and likely impact on the rest of the network
  - Analysing of faults/problems/anomalies and provision of solutions
  - Accurate record keeping and labelling of equipment
  - Completing of housekeeping including administrative effort, site cleaning, waste and debris removal, hazard identification
- Candidate submits a set of hard copy test results complete with fault analysis and solutions.
- Candidate submits hard copy sets of records of at least two separate integrations of varying degrees of complexity, including a quality audit.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC061D Cut over new and replacement network equipment

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan the cutover	1.1 Date and timing of the cutover is determined and agreed with all relevant parties
	1.2 Resource needs are identified
	1.3 Impact of cutover on existing service is estimated
	1.4 All affected customers are notified of the cutover time, duration and likely impact, all critical customers are identified
	1.5 Cutover parameters are established, including contingency plans in the event of problems
	1.6 Special testing required is determined
2 Organise other parties associated with cutover	2.1 All relevant parties to the cutover have been informed of cutover time and date
	2.2 Contingency plans are organised with system experts in the event of problems
	2.3 System supplier backup support is organised to be available at the appointed cutover time if required

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3 Cut over the system/equipment into service	3.1 Cutover is achieved without undue interruption to service
	3.2 Tests identified as part of the cutover plan are conducted in accordance with technical manuals and specifications with attention to critical elements
	3.3 Problems identified during cutover are fixed or escalated according to enterprise procedures
	3.4 Contingency plans are enacted in the event of major problems during cutover
	3.5 Work is conducted in a manner which is safe to self, fellow workers and the public at large
4 Complete administrative tasks	4.1 Test result sheets are completed and handed over to operational personnel accordance with enterprise requirements
	4.2 Site is cleaned up and left in a manner which is suitable to operational staff
	4.3 Relevant work documentation and administrative tasks are completed and forwarded to the appropriate area in accordance with enterprise policy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- CS510 Customer Relations 5
- EN510 Enterprise Escalation Procedures 5
- EN530 Enterprise Organisational Policy 5
- IN520 Teamwork 5
- NE520 Network Architecture 5
- OH510 Occupational Health and Safety 5
- PK510 Product Knowledge 5
- RA520 Radio Frequency Theory and Hazards 5
- SU500 Business 5
- SU510 Planning 5
- SU530 Quality Management 5

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- SU560 Finance 5
- TF520 Test Analysis and Diagnosis 5

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including Local Area Networks (LANs) and Wide Area Networks (WANs)
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: SDH (synchronous digital hierarchy), ATM, LAN, WAN

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Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Parties to the cutover	May include: other organisational groups within the enterprise, operational personnel, other carriers, service providers, resellers, vendors, customers
Tools	May include software for the regeneration of customer data
Tests conducted	Are functional only and are conducted in a systematic manner as described in equipment manuals
Faults likely to occur during cutover	Include: jumpering deficiencies, bad terminations, incorrect customer data
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9001, 9002 • ITU recommendations • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor on:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Complying with all related occupational health and safety requirements and work practices
  - Implementing a cutover plan
  - Applying enterprise escalation and outage procedures
  - Identifying and resolving problems
- Candidate submits hard copy test of knowledge of network security arrangements.

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- Mentor/assessor observes candidate interacting with enterprise personnel, customers and other contractors keeping a customer focus and consideration of customer needs
- Mentor/assessor observes candidate – and candidate submits at least two sets of test sheets and work documentation to mentor/assessor – demonstrating their ability to complete relevant administrative documentation tasks.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC062D Build a telecommunications tower/mast

Unit descriptor

This unit applies to all telecommunication applications including voice, vision and data.

The following competency can be undertaken at the same time:

- ICTTC020B Construct aerial cable supports

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare materials	1.1 Nature and location of construction is ascertained from construction design plans
	1.2 Materials and tools required are ascertained from construction design plans
	1.3 Steel for assembly is checked against construction design plans to ensure no parts are missing
2 Construct foundations	2.1 Land owner / tenant is contacted and introduced to the works representative, and informed of imminent works
	2.2 Other services are located in accordance with industry practice, and arrangements made for relocation as appropriate
	2.3 Foundation excavations are in accordance with engineering specifications
	2.4 Foundations are constructed in accordance with construction design plans
	2.5 Earthing is installed accordance with construction design plans, enterprise occupational health and safety guidelines and industry practice
	2.6 Where concrete foundations are used, samples are taken and analysed in accordance with enterprise guidelines and manufacturer's specifications and relevant standards and regulations

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3	**Lay out tower/mast**	3.1 Environment is assessed for suitable site to lay out tower/mast
		3.2 Tower/mast is laid out on ground adjacent to construction site and without interference to construction
		3.3 Site for hoisting equipment location is chosen to be safe for operator and appropriate for tower/mast construction
4	**Build tower/mast**	4.1 All personal protective equipment required for the job is worn in accordance with enterprise occupational health and safety guidelines and manufacturer's specifications
		4.2 Tools, equipment and machinery to be used complies will all relevant standards and requirements
		4.3 Tower/mast is assembled in sections on ground in accordance with plans, specifications
		4.4 Pre-assembled sections are mounted and secured to tower construction in accordance with plans, specifications and enterprise occupational health and safety guidelines
		4.5 Mounting arrangements are installed in accordance with plans, specifications, enterprise occupational health and safety guidelines and industry practice
		4.6 Where solar power supply is to be used, panels are installed facing true north and at the angle determined by the site's latitude
5	**Provide required mast support**	5.1 Temporary guy anchors are installed as required in accordance with construction design plans, enterprise occupational health and safety guidelines and industry practice
		5.2 Mast is kept vertical and within twist tolerances during construction phase
		5.3 All guy wires are secured and tensioned in accordance with construction design plans, enterprise occupational health and safety guidelines and industry practice

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6 Secure site	6.1	Site is fenced for safety of public and animals at the end of each working period
	6.2	Site is cleaned, tidied and made safe at the end of each working period and at the completion of the construction
	6.3	No hazards remain on tower at the end of each working period and at the completion of the construction
	6.4	Security fence and anti-climbing devices are installed as required at the completion of the construction
7 Complete administration	7.1	Any approved alteration to the original plan is clearly noted on the design using appropriate symbols and design is returned to originator
	7.2	Reports, where required, are completed and signed in accordance with enterprise policy
	7.3	Land owner/tenant is informed of construction completion and the expected next steps in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA286 Bricklaying and Concrete Pouring
- CA200 Cable Installation – General
- CA202 Cable Conductor Identification Codes
- CA215 Cable support systems for CAN
- CA225 Cable Types for CAN
- CA287 Construction Principles – Layout, Drainage etc
- CA290 Pole Types and Aerial Service Identification
- CA291 Installation of Aerial Supports
- CA292 Cable Installation and Securing – Aerial
- CA293 Cable Termination and Coding – Aerial
- CA294 Cable Sealing Techniques – Aerial
- CA295 Cable Testing – Aerial
- CA296 Pole Testing
- CA315 Cabling Techniques for CAN

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- CI310 Communication 3
- EL310 AC/DC Theory 3
- EL320 Earthing 3
- EL440 Australian Electrical Standards 4
- IN320 Teamwork 3
- OH215 Safe Work Practices – Aerial
- OH250 Pole Top rescue
- OH251 Working at heights
- OH310 Occupational Health and Safety 3
- PE310 Personal Skills 3
- PS218 Plan Reading, Specifications and Records – Aerial
- PS320 Basic Building Trades 3
- RE225 ACMA Standards and Regulations: Aerial
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- TC310 Tower climbing 3
- TC510 Tower Climbing 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Concrete samples	May not be analysed by the enterprise
Birds	Devices may be required to deter birds
Height access	Devices to support construction personnel at heights may include: non-metallic ladders, platforms, elevated personnel vehicles
Earth protection	Must be installed
Safety equipment	May include: aerial safety belts and lines, equipment guards, fall arrest systems, flashing lights, guards, helmets, safety cages, traffic signs, trench guards, warning signs and tapes, witches' hats

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External factors	Affecting works may include: terrain, weather conditions, concentration of other services
Fall arrest systems	May be required on structure where no ladder cages are installed
Foundations	May be constructed as: pad, rock anchors, grillage, pier-type
Hoisting equipment	May be: crane, jury and winch, helicopters
Licences	That may be required include: machinery operation, chainsaw operation, rigger, dogman, crane operator, crane chaser, forklift, driver's, winch operator, backhoe operator, borer, heavy vehicle
Other services	May include: gas, sewerage, water, power, telecommunications Relocation of other services may be necessary
Ownership of site and/or support structures	May be public or private
Personal protective equipment	May include: asbestos precautions, dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers' gloves, safety boots, tools to remove enclosure/man hole covers, vests
Safety activities	May include traffic management
Mast relocation site	Must satisfy: maximum sunshine on solar panel, clear signal path for antenna, customer location requirements
Steel for construction	Is delivered for each tower/mast pre-cut, drilled and numbered
Tools and equipment	May include: cable locater, hand tools, power tools, earth testers, survey instruments
Tower/mast	May carry high or low voltage cable and may be in joint use with other services
Unsafe weather conditions to undertake works	May include: severe heat, severe cold, high winds, heavy rains, thunderstorms

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Relevant legislation, codes, regulations and standards may include:

- AS Communications Cabling Manaul (CCM) Volume 1
- ACIF Standards and Codes
- ACMA technical standards
- Australian building codes and regulations
- Australian Standards
- Enterprise Standards
- Environmental Protection
- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Construction of foundations in accordance with engineering specifications
- Installation of functional and protective earthing systems
- Selection of site for hoisting equipment location is safe for the operator and the construction
- Pre construction checks are undertaken to ensure safe working environment, working conditions are suitable, all relevant plant and machinery is available and fully operational, materials and equipment are provided in accordance with specifications

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- Pre assembly is undertaken at ground level where appropriate
- Checks are made to ensure full completion of each assembled component before moving to next stage
- Correct provision of temporary guy anchors is undertaken
- Securing and tensioning of guy wires is in accordance with specification
- Security arrangements including safety and hazard signs are provided
- Documentation including advice to land owner/tenant is completed
- Safe use of general hand and power tools and general equipment normally related to these tasks
- Correct interpretation of legislative and environmental conditions and application to project
- Application of all related OHS requirements and work practices
- Ability to read and interpret drawings related to tower/mast construction
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC064D Haul underground cable

Unit descriptor

This unit applies to both installation and recovery of small size cables, e.g. up to 100 pairs.

The following competency can be undertaken at the same time:

- ICTTC133B Construct underground enclosure

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for underground cable hauling	1.1 Read and interpret plan to ensure that the required result is attainable
	1.2 Check availability of cable in order that work may be programmed
	1.3 Obtain cable as specified in the plan
	1.4 Load cable onto spooling equipment
	1.5 Check air pressure in drum cables before hauling new cable, where required
	1.6 Check air pressure in existing cables before hauling new cable, where required
	1.7 Set up equipment in accordance with enterprise guidelines
2 Undertake safety check / activities	2.1 Handle existing cables in a manner that avoids cable damage
	2.2 Check for dangerous gases in accordance with occupational health and safety and industry practices
	2.3 Place guards around open manholes in accordance with enterprise occupational health and safety regulations
	2.4 Erect / place safety equipment in accordance with industry practices and occupational health and safety guidelines

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3 Haul cable	3.1	Prove conduit (where required) and rod and rope allocated conduit without rope tangling
	3.2	Attach cable to rope/winch appropriately for cable type and location
	3.3	Haul cable into and out of pits and manholes ensuring no sheath damage
	3.4	Cable is lubricated and hauled at correct tension ensuring smooth flow/passage between dispenser and hauler
	3.5	Verify that cable and services separations are maintained in parallel runs and cross overs to meet manufacturer's and regulation requirements
	3.6	Enough cable is left at either end for joint allowance and cable is laid up and bent within bending radius tolerance for cable materials in underground enclosure
	3.7	Cable lengths do not exceed manufacturer's or design specifications to minimise signal loss through hauling related damage
	3.8	Seal and pressurise cable in accordance with enterprise requirements
	3.9	Check air pressure in new and existing cables to ensure that no sheath damage
	3.10	Cable is identified and tagged and ends are sealed
	3.11	Give consideration to likely issues if cable is proposed to be hauled into a conduit containing existing cable/s
4 Complete works on site	4.1	Any approved alteration to the original design is clearly noted on the design using appropriate symbols and design is returned to originator
	4.2	Reports, where required, are completed and signed in accordance with enterprise policy
	4.3	Site is reinstated and left safe, tools and materials are stored in accordance with enterprise guidelines
	4.4	Waste materials and lubricant spills cleaned up as required

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- AH200 Cable Hauling Practices
- AH201 Duct Selection and Preparation
- AH202 Distribution area Plans and Plan Symbols
- AH203 Introduction to the Telstra Customer Access Network
- AH204 Hauling Preparations
- AH205 Lead-in Cable Installation Practices (including wall boxes as appropriate)
- AH206 Setting up Work-site, Approvals and Requirements
- AP201 Dangerous Gases, Detection and Actions
- *Not coded* Joint Closure for lead-in cables

Or use this set of topics for a generic coverage

Codes refer to the Skills and Knowledge Register included in this Training Package

- CA225 Cable Types for CAN
- CA245 Cable Handling and Hauling for CAN
- CI210 Communication 2
- OH210 Occupational Health and Safety 2
- PS212 Read Plans and Specifications – General
- TO210 Hand and Power Tools

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Dangerous gases	May be: combustible, asphyxiating, noxious, natural gas
Information deduced from plan	May include: cable size, distance to be hauled, conductor size, pipe size, cable already accommodated in pipes

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Place guards	Road works and pedestrian guarding action is taken as required
Licences	That may be required: winch, crane
Cable dispensing methods	May include: spinner, jinker / cable trailer, 2 pair cable multi-dispenser, by hand
End sealing	Methods of sealing ends may include: thermo-shrink end caps, lead wipe. Consideration should be given to both materials and their application
Roping	May be carried out using: compressed air, fibreglass rods, PVC rods, Thomas duct rodder, blower-sucker
Safety equipment	May include: aerial safety belts and lines, equipment guards, fall arrest systems, flashing lights, guards, helmets, and other personal safety equipment eg. gloves, ear muffs, safety glasses, safety cages, traffic signs, trench guards, warning signs and tapes, witches' hats
Tools	May be hand, mechanical, power or other and may include: roly winch, winch truck, mesh stockings, hauling eye, mandrill, jinker, forklift, crane, pressure gauge
Cable types	May include: grease filled or air cored copper cable, optic fibre, coaxial (CATV)
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures

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- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Check for gases; open and guard chamber.
- Checking of air pressure in both existing and new cable.
- Hauling of cable including: rod and rope placement, cable attachment to rope/winch, avoidance of sheath damage, lubrication of cable, hauling tension, cable and service separations, leaving of sufficient cable for jointing purposes, cable lengths, cable sealing and pressurisation, cable identification.
- Cable dispensing equipment including spinner, jinker/cable trailer, 2 pair cable dispenser and hand.
- Work practices that ensure all relevant authorities have been notified and approvals obtained prior to commencement.
- Safe use of any specialised hand or power tools and/or equipment normally used for hauling cable.
- Application of all related OHS requirements and work practices associated with hauling cable (including protective clothing and personal safety items, and adequate warning signs and safety devices are installed).
- Ability to read and interpret drawings: site plans, street plans, construction plans, building plans and site layout drawings.
- Correct interpretation and application of regulations and standards related to the hauling of cables.
- Communication skills related to work associates, supervisors, team members and enterprise documentation.

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Context of and specific resources for assessment

Assessment must ensure:

- A mentor or supervisor appropriately experienced in CAN installation, CAN installation infrastructure including site plans, enterprise operating standards and job sheets, cable support systems and related documentation, cable plans, at least one manual and one mechanical hauling device, air pressure gauge, thermo-shrink end caps and equipment, cable lubricant, and cable attachment devices.
- Optional – Mechanical hauling winch with tension fuses for optical cable.

AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC065D Splice carrier/service provider optic fibre cable

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for splicing	1.1 Use safety equipment to protect self and public in accordance with enterprise guidelines and occupational health and safety practices
	1.2 Read and interpret installation plan and physical conditions at site to determine layout of job
	1.3 Copy of records is obtained, where appropriate
	1.4 Locate and identify adjoining services in accordance with enterprise guidelines and occupational health and safety practices
	1.5 Test for presence of dangerous gases in accordance with enterprise guidelines
	1.6 Approved alterations to the design are undertaken in accordance with enterprise guidelines
2 Verify optical fibre cable placement	2.1 Verify that cable installation is in accordance with the installation plan
	2.2 Check cable visually for signs of possible sheath damage

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3	**Secure optical fibre cable**	3.1 Bend ratios are maintained to manufacturer's and regulation requirements
		3.2 Securing method avoids damage to cable and / or sheath
4	**Splice optical fibre cable**	4.1 Check any light source in accordance with guidelines and standards
		4.2 Strip cable end to expose optical fibres in accordance with splicing method in use
		4.3 Optical fibre cable is handled in a safe manner to avoid risk of injury
		4.4 Remove all coatings from exposed optical fibre to remove all possible contaminants
		4.5 Prepare connection ends to a smooth flat surface to ensure no optical path redirection from join
		4.6 Splice fibres using manufacturer's tool in accordance with enterprise guidelines
		4.7 Test joint for signal strength to manufacturer's and design requirements
5	**Install optical fibre termination connectors**	5.1 Check any light source in accordance with guidelines and standards
		5.2 Strip cable end to expose optical fibres in accordance with splicing method in use
		5.3 Optical fibre cable is handled in a safe manner to avoid risk of injury
		5.4 Remove all coatings from exposed optical fibre to remove all possible contaminants
		5.5 Protection boots are used to protect connector and fibre from exposure and contaminants
		5.6 Select connector to match terminating frame to design specifications
		5.7 Fit connector without damage to fibre or thread
		5.8 Fibre is affixed within connector to manufacturer's specifications
		5.9 Connection end is prepared to a smooth flat surface to ensure no optical path redirection after connection is made
		5.10 Test connection for signal strength to manufacturer's and design specifications

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6 Complete splicing operation	6.1 Place cables in enclosure and lay up in accordance with manufacturer's instructions and enterprise guidelines
	6.2 Other cables are tidy and no safety hazards are evident
	6.3 Other services are in place in accordance with enterprise guidelines
	6.4 Waste and debris are removed from worksite and disposed of in accordance with environmental requirements and to maintain safe worksite conditions
	6.5 Site is reinstated and tools and materials are stored in accordance with enterprise guidelines
7 Complete installation administration	7.1 Complete reports in accordance with enterprise policy
	7.2 Note alterations to plans using appropriate symbols

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CA410 Optical Techniques 4
- CI310 Communication 3
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- CA260 Cable Types: Optical Fibre Cable
- TF310 Test Equipment 3
- TO310 Use of Tools 3
- TO330 Installation Practices 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cable	May be mechanically or fusion spliced May be single mode or multi-mode
Fibre fixing	Fibre may be affixed within connector by: epoxy, mechanical pressure
Customers' specifications	May be found in: contract documents, cable plans and designs, specification schedules
Manufacturer's specifications	May be found in printed instruction leaflets or pre-printed on materials or on product packaging
Optical fibre cable	May be: internal/external, loose tube, tight buffered, air blown, armoured May be supplied in various grades as designed for different environments and intended uses
Safe working practices	Include the safe use and handling of: tools and equipment, materials, chemicals, work platforms and fibres
Tools	May be hand tools and may include: oven, cleaver/cutter, fusion splicer, stripper
Work platforms	May be: ladders, scaffold, elevated platform vehicles
Work situation	Could be: in cabinet, in joint enclosure, above ground
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations

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- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtain information from plans and documents.
- Notify relevant authorities and obtain approvals prior to commencement.
- Cable splicing including:
  - Identification of sheath damage
  - Maintenance of bend ratios
  - Cable securing to avoid damage
  - Checking of light source cable stripping
  - Removal of coatings
- Installation of termination connectors including:
  - Selection of connector to match terminating frame
  - Connector fitting
  - Fixing of fibre to connector
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.

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- Conduct of signal strength tests and interpretation of results.
- Communication of splicing details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.
- Access must be provided to appropriate learning and assessment support when required.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC066D Joint and terminate coaxial cable

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

This unit may be applied to domestic, commercial or industrial installations.

The most likely type of coaxial cable used in the CAN environment today is either 'hard line' or 'flexible' coaxial cables used in the delivery of CATV services.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for jointing	1.1 Use safety equipment to protect self and public in accordance with enterprise guidelines and occupational health and safety practices
	1.2 Read and interpret installation plan and physical conditions at site to determine layout of job
	1.3 Copy of records is obtained, where appropriate
	1.4 Locate and identify adjoining services in accordance with enterprise guidelines and occupational health and safety practices
	1.5 Test for presence of dangerous gases in accordance with enterprise guidelines
	1.6 Approved alterations to the design are undertaken in accordance with enterprise guidelines
2 Verify coaxial cable placement	2.1 Cable segregation is maintained to industry standard requirements
	2.2 Protect integrity of the coaxial shield cable to ensure no loss of continuity
	2.3 Minimum bend radius in not exceeded in accordance with manufacturer's specifications

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	2.4	Cable is placed in position with sufficient slack to allow termination
	2.5	Cable placement follows installation designs and specifications accurately
	2.6	Cable is installed in a safe manner without damage to cable or customer's premises
	2.7	Cable lengths do not exceed manufacturer's or design specifications to maintain radio frequency signal strength
3 Secure coaxial cable	3.1	Locate securing hardware to reduce the cumulative effect on cable wave shape properties
	3.2	Cable ties and brackets are flexible and do not damage cable during securing or while in use
4 Joint coaxial cable	4.1	Strip coaxial cable in accordance with specifications to required length using appropriate tool
	4.2	Select appropriate kit to match the type of coaxial cable in use
	4.3	Jointing method is in accordance with manufacturer's recommendations
	4.4	Jointing fitting retains the segregation of conductor and shield
	4.5	All joints are sealed in accordance with manufacturer's specifications
5 Terminate coaxial cable	5.1	Strip coaxial cable in accordance with specifications to required length using appropriate tool
	5.2	Select connectors to match the type of coaxial cable in use
	5.3	Terminating method is in accordance with manufacturer's recommendations
	5.4	Connector fitting retains the segregation of conductor and shield
	5.5	Connectors are terminated to torque as recommended by manufacturer's to ensure no radio frequency leakage can occur
	5.6	Gauge tests are carried out to connector mating specifications

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	5.7 The termination maintains a continuous ground
	5.8 All terminations are waterproof where appropriate to minimise risk of damage to termination and cable function
6 Complete splicing operation	6.1 Place cables in enclosure and lay up in accordance with manufacturer's instructions and enterprise guidelines
	6.2 Other cables are tidy and no safety hazards are evident
	6.3 Other services are in place in accordance with enterprise guidelines
	6.4 Waste and debris are removed from worksite and disposed of in accordance with environmental requirements and to maintain safe worksite conditions
	6.5 Site is reinstated and tools and materials are stored in accordance with enterprise guidelines
7 Complete installation administration	7.1 Complete reports in accordance with enterprise policy
	7.2 Note alterations to plans using appropriate symbols

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA360 Coaxial Cabling
- CI310 Communication 3
- EL310 AC/DC Theory 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- PS320 Basic Building Trades 3
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- TO310 Use of Tools 3
- TO330 Installation Practices 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Coaxial cable	May be supplied in various grades as designed for different environments and intended uses May be: hard line (internal/external), flexible (internal/ external), underground, aerial, powered / unpowered
Connector types	May include: internal/external, pin type, integral pin, separate pin
Customers specifications	May be found in: contract documents, cable plans and designs, specification schedules
Industry standards	May include: enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Manufacturers' specifications	May be found in printed instruction leaflets or pre-printed on materials or on product packaging
Safe working practices	Include the safe use and handling of: tools and equipment, materials, chemicals and work platforms
Tools	May be hand or power tools and include: coring, stripping, torque spanner, stripping and preparation tool, crimping, connector gauges
Work platforms	May be: ladders, elevated platform vehicles
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection

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- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtain information from plans and documents.
- Notify relevant authorities and obtain approvals prior to commencement.
- Jointing of cable including:
  - Placement of cable supports
  - Bending of cable within specified tolerances
  - Kit selection
  - Retention of segregation of conductor and shield
  - Either aerial or underground work
- Termination of cable including:
  - Stripping to specified length
  - Connector selection
  - Retention of segregation of conductor and shield
  - Termination to torque
  - Conduct of gauge tests
  - Maintenance of continuous ground
  - Waterproofing of termination

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- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.
- Conduct of signal strength tests and interpretation of results.
- Communication of jointing details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC067D Rearrange and cut over cable

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for rearrangement	1.1 Plan and cutover sheets are read and interpreted to determine stages and practical implementation method of cutover
	1.2 Relevant bodies are informed of imminent work to be done in accordance with enterprise policy
	1.3 Records/changeover sheets are verified against the actual arrangement of cable on site
	1.4 Sequence of cutover is determined to permit smooth operation in given location with selected materials
	1.5 Customers are notified of any proposed disruption to services in accordance with enterprise policy and appropriate regulations
	1.6 Shut down procedures are carried out according to cable types and enterprise guidelines
2 Prepare cable for cutover	2.1 Alternative air supply is organised where cable is pressurised
	2.2 Alternate routing of signal, where required and possible, is made
	2.3 Additional preparatory non-jointing work is undertaken, as required, in accordance with enterprise guidelines and site conditions

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3 Select resources	3.1	Appropriate materials are selected to suit cable type and location of cutover
	3.2	Labour support is selected, if required, in accordance with cutover tasks and available skills
	3.3	Technical equipment for cutover is selected to suit materials being used, cable type and joint enclosure
4 Rearrange cable	4.1	Cable is jointed appropriate to sequencing plan, materials, joint type, location, and enterprise and manufacturer's guidelines
	4.2	All joints that were opened are sealed in accordance with the cable type, location, and enterprise and manufacturer's guidelines
5 Cut over cable	5.1	Circuits are identified in accordance with enterprise guidelines
	5.2	Appropriate bodies are notified on completion of cutover in accordance with enterprise policy
	5.3	Any faults relating to the cutover are rectified in accordance with location, materials available, and industry practise
	5.4	Records and plans are amended to reflect existing cable layout
	5.5	Decommissioned materials are recovered from site and pits and manholes are left clean and tidy in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA315 Cabling Techniques for CAN
- CA375 Cable Installation Practices for CAN
- CA380 Pressurised Cabling for CAN
- CI310 Communication 3
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3

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- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU210 Basic Supervision
- TO310 Use of Tools 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Joint sealing activities	Activities included in sealing a joint may be to provide a moisture or air-tight seal
Additional non-jointing preparatory work	May include: cable identification, double-jumpering, multiplying pairs / parallel pairs
Special service disruption	Appropriate regulations or standards in relation to special service disruption may include: ACMA, power authorities, emergency services, state/ federal agencies Enterprise policy for informing customers of special service disruption may include: written notification, face to face notification, verbal telephone notification
Bodies to be informed of imminent work	May include: emergency services, power services, security companies, enterprise work assignment centre, outage centre
Enterprise policy for informing of imminent work	May include: verbal notice, written notice, completion of pre-printed form, indication on enterprise database
Cable	May be plastic or lead sheathed and may include: coaxial, copper, aluminium, fibre optic May be required to be labelled and such labelling may include: cable size, conductor weight, cable range, date of most recent cutover, cable number
Joint enclosures	May include: lead wiped sleeve, thermo shrink sleeve

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Technical equipment to undertake cutover	May include: service identifiers, testing equipment, personnel communications
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtain information from plans and documents.
- Correct interpretation and application of regulations and standards related to the cable rearrangement.
- Cutover preparation including:
  - Planning
  - Notification to all relevant parties
  - Verification of cutover sheets
  - Application of shut down procedures
  - Provision of alternative air supply
  - Alternate signal routing
- Cable rearrangement including:
  - Jointing of cable
  - Sealing of openable joints
  - Circuit identification
- Conduct of tests to determine success of cutover, interpretation of results and rectification of faults occurring as a result of cutover.
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.
- Communication of cutover details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC068D Install telecommunications service to a building

Unit descriptor

This unit relates to bringing a telecommunications service from the broader network to a customer's premises.

Installation of cabling within a building and installation of telecommunications connections within a building are dealt with in the Telecommunications Cabling National Competency Standards.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Gather service installation data	1.1 Identify installation requirements from plans and instructions
	1.2 Clarify installation requirements if necessary
	1.3 Identify customer and establish contact
	1.4 Arrange building access with customer
	1.5 Where cable is not already installed, cost and provision of cable is negotiated with customer
2 Organise materials and plant	2.1 Identify network cables to be used from the installation plan and instructions
	2.2 Acquire installation materials for installation and check against order schedules
	2.3 Check and adjust tools and equipment so they are in safe working order and meet manufacturer's specifications
	2.4 Identify and test cable to be used for installation for functionality and compatibility

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3 Supply cable to building	3.1	Where service to building exists, locate, connect, and check cables at entry into network for transmission quality and continuity
	3.2	Where new cable is required, install, joint, joint seal and supply to the building in accordance with service supply specifications
	3.3	Cable entry to the building complies with ACMA standards
4 Install cable	4.1	Cable is installed in accordance with installation plans and specifications
	4.2	Installation work is completed in a manner which is safe to the installer, the public and the customer
	4.3	Interruption to any existing service meets agreement with customer
	4.4	Lightning protection, where required, is installed in accordance with enterprise guidelines and industry practice
5 Clean worksite	5.1	Note alterations to plans using appropriate symbols
	5.2	Complete reports in accordance with enterprise policy
	5.3	Obsolete materials and equipment are recovered, packaged and returned to appropriate point for disposal
	5.4	Site is restored in accordance with the requirements of enterprise or approving authority and to customer satisfaction
	5.5	Tools and materials are stored in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- AA209 Aerial Lead-in to Low Level Box (South Australia and Northern Territory only)
- AA210 Aerial Safety (OH&S Requirement)
- AI200 Building Construction
- AI201 Cabling – Mandatory Separations

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- AI202 Cabling – Pre-wiring (including safety testing)
- AI203 CLP Installation Techniques
- AI204 CLP Materials List
- AI205 Connector Type (MRC) and Jointing Conductors
- AI206 Construction Guidelines for Lead-ins
- AI207 Fixing to wall surfaces
- AI208 General Requirements When Installing Auxiliary Earth Electrodes
- AI209 Guard Wire – Basic Installation
- AI210 Health and Safety (Revision)
- AI211 Installation of Modules and Network Cabling
- AI212 Installation Practices For CLP
- AI213 Installations of Rural Lead-in Cable (HJ)
- AI214 Installing Aerial Lead-in Cable (ALIC)
- AI215 Installing CLP on a Caravan
- AI216 Installing CLP on Distributors
- AI217 Introduction To Customer Lightning Protection
- AI218 Jointing Pit – Installations (Private Property only)
- AI219 Lead-in Cable Installation Practices
- AI220 Lightning Incidents
- AI221 Location of Distributor
- AI222 Maintenance/Alterations at NBP
- AI223 MDF Jumpering
- AI224 Outlet Types and Applications
- AI225 Repair, Raising or Lowering Pits
- AI226 Rotational Pairs – Colour Codes
- AI227 Safety Precautions When Installing Auxiliary Earth Electrode
- AI228 Selecting the Best Bonding Arrangement
- AI229 Special Arrangements for Rural Customers
- AI230 Supply of Distributor Hardware (Responsibilities)
- AI231 Termination of Conductors
- AI232 Testing For Hazardous Voltages
- AI233 Trenching, including Sharing Trenches with Other Utilities
- AI234 Underground Lead-in to Low Level Box (Stobie Pole) South Australia and Northern Territory only
- AI235 Area Lightning Risk Classifications
- AJ200 Cable Housing and Sheath Removal
- AJ201 Cable Joint Enclosures, Types Sizes and Applications – Utilux 2/5 pair. Basic Cable Jointing course for other types and applications of joint closures

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- AJ203 Conduit – Types, Fittings and Applications
- AJ212 Installation of Sealed Heat Shrink Joint Enclosure
- AJ217 L.P.G. Equipment
- AP201 Dangerous Gases, Detection and Actions
- AP205 Public Relations, Dealing with Customers
- AP206 Quality Assurance

Or use this set of topics for a generic coverage

Codes refer to the Skills and Knowledge Register included in this Training Package

- CA315 Cabling Techniques for CAN
- CA325 Cable Jointing and Termination for CAN
- CA375 Cable Installation Practices for CAN
- CI310 Communication 3
- EL210 AC/DC Basic Theory
- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- RA420 Radio Frequency Theory and Hazards 4
- RE215 Legislative Codes, Practices and Access Requirements
- SU210 Basic Supervision
- TE210 Basic Telephony 2
- TO310 Use of Tools 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Access arrangements	May include: date, time, security
Customer contact	May be: the designated customer, a nominated customer representative, an internal organisational customer
Customer details	May include: location of service, number of services, type of services, date requested, name, whether or not telephone line is to be silent

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Provision of cable	Negotiated with customer (network lead-in cable installed in trench provided by owner, carrier provides cable and conduit in urban areas or cable in rural areas)
Origin of request	May be: supervisor, office, enterprise electronic data system
Factors affecting installation	May include: site type, age and construction, building facility location, ownership of installation site
Industry standards	May include: enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Test Cable	Testing at this stage would be limited to identifying dial tone with a buttinski or continuity with a cable identification set
Lightning protection	May include: earth stake, building's own protection, bonding building / cable to power earthing system, isolator, arrester. A complete Customer Lighting Protection (CLP) earthing course is necessary to identify materials, practices and safety related issues
Installation of CLP earthing	Requires some basic use of test equipment to prove no foreign AC voltage exists on earth stakes and therefore causes a hazard
Material	May be supplied from: storage area, supplier, own organisation May include: equipment to be installed, cable, miscellaneous parts
Supports	New supports may need to be constructed
Reinstatement	May be at customer's expense and may be of: brick, concrete, asphalt, grass, gravel
Tools and equipment	May be hand-held, power or mechanical

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Relevant legislation, codes, regulations and standards may include:

- AS Communications Cabling Manaul (CCM) Volume 1
- ACIF Standards and Codes
- ACMA technical standards
- Australian building codes and regulations
- Australian Standards
- Enterprise Standards
- Environmental Protection
- Fire regulations
- Heritage legislation
- Industrial relations agreements including awards and enterprise
- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Negotiation of trench/aerial provision cost with customer.
- Correct interpretation of the installation plan/order.
- Conduct of tests related to transmission quality and continuity of cables at network entry point.
- Provision of cable to the premises including: installation, jointing and sealing, compliance with ACMA, enterprise and local government regulations.

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- Provision of lightning protection devices.
- Work practices that ensure all relevant authorities have been notified and approvals obtained prior to commencement.
- Safe use of any specialised hand or power tools and/or equipment normally used for cable provision.
- Application of all related OHS requirements and work practices associated with cable provision (including protective clothing and personal safety items, and adequate warning signs and safety devices are installed).
- Ability to read and interpret drawings: site plans, street plans, construction plans, building plans and site layout drawings.
- Correct interpretation and application of regulations and standards related to the cable provision.
- Interpersonal skills related to work associates, supervisors, team members and clients.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC069D Install network cable equipment

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare worksite for installation	1.1 All contaminants that may adversely affect termination are removed from worksite
	1.2 Worksite has adequate visibility to minimise errors and reduce eyestrain
	1.3 Arrangements are made to ensure worksite is safe and secure
2 Prepare for installation	2.1 Customers and/or other affected parties are notified of works to be undertaken, where appropriate and queries are answered in accordance with enterprise policy
	2.2 Nature of job and infrastructure hierarchy are ascertained from plan or design and/or customer consultation and key features of installation are noted
	2.3 Other parties required to complete the job are co-ordinated
	2.4 Existing facilities are checked against plans and design changes are authorised where required
	2.5 Specific location of installation is determined based on customer requirements and physical limitations of site
	2.6 Incoming and outgoing cables are segregated to ensure ease of access and to avoid unnecessary overlaying and backtracking of cable

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3	**Obtain tools and materials**	3.1 All tools and equipment are checked to be in a safe working order and adjusted to manufacturer's specification
		3.2 Tools and materials are located to ensure ready access to the installation
		3.3 All material necessary for the installation is checked against order schedules and site specific variations are noted on schedules
		3.4 Any additional material requirements are obtained in accordance with enterprise guidelines
4	**Install required equipment support structure**	4.1 Requirement for an equipment support structure is ascertained from plans and type of system to be installed
		4.2 Infrastructure for equipment support structure and cable runs is installed in accordance with industry practice
		4.3 Equipment support structure is installed in accordance with manufacturer's specifications and industry practice
		4.4 Cable route between rack/subrack and cable entry and / or termination point is determined based on customer requirements, site limitations, equipment specifications and applicable regulations
		4.5 Cabling infrastructure to interface with rack/subrack is installed in accordance with enterprise guidelines and industry standards
		4.6 Equipment support structure is cabled for power, alarm, and interrogation requirements in accordance with manufacturer's specifications and industry practice
		4.7 Rack/subrack is cabled to a distribution frame for network access in accordance with manufacturer's specifications and industry practice
		4.8 Inter-rack cabling is provided and terminated in accordance with specifications
5	**Install equipment**	5.1 Lightning protection equipment is installed, where required, in accordance with manufacturer's specifications and industry practice
		5.2 Earthing protection is installed, where required, in accordance with relevant ACMA, local power company and industry practice

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	5.3	Equipment component is installed into rack/subrack in accordance with manufacturer's specifications and industry practice
	5.4	Connections are completed in accordance with manufacturer's specifications and industry standards
	5.5	Line conditioning where required, is installed in accordance with industry practice
	5.6	Equipment is installed in a manner which is safe to the installer, customer, and public
	5.7	Any warranty requirements are complied with
6 Perform basic tests	6.1	Individual equipment items are power-on tested
	6.2	All connections and interconnections are visually checked to be firm and sound
	6.3	All terminations are electrically tested for continuity in accordance with enterprise guidelines
7 Complete installation	7.1	Equipment items that are surplus to requirements are removed and dealt with in accordance with enterprise policy
	7.2	Labels are prepared and affixed to newly installed equipment in accordance with industry practice
	7.3	Where warning signs for radiation are required, they are installed in accordance with enterprise guidelines
	7.4	Any approved alteration to the original design is clearly noted on the design using appropriate symbols and design is returned to originator
	7.5	Reports, where required, are completed and signed in accordance with enterprise guidelines
	7.6	Site is reinstated and tools and materials are stored in accordance with enterprise and manufacturer's guidelines
8 Restore worksite	8.1	All appropriate records are completed, signed, and stored in accordance with enterprise guidelines
	8.2	Any changes to equipment are clearly noted on the appropriate records and stored in accordance with enterprise guidelines
	8.3	All tools and equipment are cleaned, adjusted and stored in accordance with enterprise guidelines and manufacturer's specifications

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8.4 Waste and debris are removed from worksite and disposed of in accordance with environmental requirements and industry practice

8.5 All parties notified prior to work commencement are notified of service restoration in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA215 Cable Support Systems for CAN
- CA325 Cable Jointing and Termination for CAN
- CA375 Cable Installation Practices for CAN
- CI310 Communication 3
- EL420 Impedance Matching 4
- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PK310 Product Knowledge 3
- PS310 Plans and Specifications 3
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU210 Basic Supervision
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TO210 Hand and Power Tools
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3
- TR310 Basic Transmission Theory 3
- TR340 Transmission Technologies and Products 3

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Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cabling infrastructure	May include: ducting, trays, catenary wire, conduit
Connections	May be made to: mainframe, digital distribution frame, optic fibre frame, cable pair, optic fibre splicing frame, feeder / antennae system
Customer	May be: the designated customer, a nominated customer representative, an internal organisational customer
Earthing system	May take the form of: barriers, data rack, equipment earthing, exposed metal work, MDF bonding, telecommunications reference conductors, telex earth, bonding building to power earthing system, building's own protection, isolator, lightning conductor, link to multiple earth neutral, over voltage, screen earth, screening, earth stake, surge suppressors, surges and spikes
Equipment	Can be connected at: pillar, openable joint, elevated joint, customers' premises, carrier's premises

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Equipment	May be: line conditioning, video processor, radio optical receivers, multiplexer, switching equipment
Factors impacting on installation	May include: site type, age and construction, building facility location, ownership of installation site
Inappropriate line conditioning	May need to be removed and may include: loading coils, amplifiers, multiple joints
Industry standards	May include: enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Information obtained from plan	May include: "A" and "B" side, labour estimates, materials estimates
Mainframe connection	Must be undertaken only by a carrier in accordance with ACMA regulations
Manufacturer's specifications	May be found in/on: printed instruction leaflets, pre-printed on materials, manufacturer's handbook, enterprise work instructions or on product packaging
Material	May be obtained by: collection from storage area, purchase from supplier, ordering from own organisation or supplier May include: equipment to be installed, cable, miscellaneous parts
New supports	May need to be constructed
Other parties to co-ordinate with	May include: local government, statutory authorities, customer/customer, equipment/materials suppliers
Rack infrastructure	May include: timber/steel supports, mesh, frame
Reason for installation	May be to: create more services, increase capacity, provide cable relief, increase economic/cost efficiency, equipment replacement, provide new facilities/ infrastructure to a customer or geographic area
Remote access capabilities for testing and interrogation	May be required, and if so, should be provided

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Line conditioning	May be required where distances between source and destination are great or where installed equipment has reduce d the signal below required capacity
Safety precautions	May include the erection of appropriate warning signs
Tools	May be hand-held, power, or mechanical
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtaining installation information from plans and documents.
- Provision of cable infrastructure including: ducting, trays, catenary wire, conduit.
- Cabling of equipment support structure for power, alarms and interrogation requirements.
- Provision of lightning and earthing protection.
- Provision of line conditioning.
- Installing equipment.
- Testing and interpret test results – see RANGE STATEMENT.
- Labelling of equipment correctly.
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.
- Correct interpretation and application of regulations and standards related to the installation.
- Communication of installation details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC070D Install mobile telecommunications in motor vehicles

Unit descriptor

This unit applies to all types of mobile communications including digital and analogue and includes both voice and data.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify customer's specific requirements	1.1 Location of both the aerial and the handset are confirmed with the customer
	1.2 Customer is made aware of the various efficiency levels associated with the location and type of the mobile equipment
	1.3 Power requirements are established with the customer
	1.4 Type of antenna is confirmed with the customer
	1.5 Use of accessory wiring where equipment permits is checked with the customer
	1.6 Vehicle bodywork, interior and electrical fittings are checked. Defects are brought to the attention of the customer and noted on installation documentation
2 Obtain tools and materials	2.1 All installation packs are checked to ensure that all material necessary for the installation is included
	2.2 Tools and materials are located to ensure ready access during installation
	2.3 All tools and equipment are checked to be in a safe working order and adjusted to manufacturer's specification

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3	**Prepare for installation**	3.1 Barriers to installation are identified and strategies developed to overcome them
		3.2 Vehicle components to be removed to enable installation are identified and removed in accordance with vehicle manufacturer's specifications
		3.3 Any existing equipment is removed and assessments made as to suitability of pre-existing wiring
		3.4 Removed components are stored in an area safe to both the installers and the components
		3.5 Checks are undertaken to ensure that there will be no interference caused to aerial mounting
4	**Install equipment**	4.1 Aerial is mounted securely, true to vertical and in accordance with manufacturer's specifications
		4.2 Cable is laid in a manner which minimises exposure and enables the refitting of vehicle fittings
		4.3 Connectors are terminated on cables
		4.4 Bracket and instrument cradle are affixed securely in a location agreed with the customer and in a manner which minimises damage to the vehicle
		4.5 Power is terminated as specified by the customer within the limits of manufacturer's specifications
		4.6 Power wires are located using appropriate test equipment
		4.7 Hands free microphone is installed in a manner and location which enables clearly audible voice communication but also meets customer wishes within the limits of manufacturer's instructions
		4.8 Speaker is installed in accordance with manufacturer's specifications and where it causes least inconvenience and provides optimum performance
		4.9 System is installed in accordance with manufacturer's specifications
		4.10 Transceiver is mounted in a location where it cannot be damaged, ensures adequate heat dissipation and is not subject to dirt or moisture
5	**Commission and test installation**	5.1 Customer number allocated is checked against customer order where required
		5.2 Customer number is programmed into the system where required

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	5.3	Functional tests are made to assess power availability and whether battery is charging in accordance with specification
	5.4	Test calls both from and to the unit are made to test functionality
	5.5	Tests are conducted to ensure that the installation has not disrupted the operation of vehicles electrical equipment and vice versa
6 Finalise installation	6.1	All exposed wires and cables are tied/lashed in a neat fashion
	6.2	Vehicle components/fittings are restored to original location and condition
	6.3	Any customer items left in the vehicle are returned to original location
	6.4	Damage which may have occurred during installation is noted and documented and reported in accordance with company procedures
	6.5	Waste and debris are removed from the site and disposed of in both a safe and environmentally required manner
7 Hand over to customer	7.1	Work completed is checked with the customer to ensure original requirements are met
	7.2	Functionality tests are conducted in the customers presence
	7.3	Equipment usage is demonstrated to the customer
	7.4	Customers have hands on experience in the operation of the equipment
	7.5	Any damage that occurred during installation is discussed with the customer and arrangements for repair/replacement of damaged components are made
	7.6	All relevant literature is given to and explained to the customer
	7.7	Removed equipment is returned to the customer except in case of trade ins/reused items

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8 Complete contract documentation	8.1	Warranty information is provided to the customer in the format required where work and equipment is subject to warranty
	8.2	Invoices and other financial documentation are prepared where required and presented to the customer
	8.3	Authorised signature(s) are obtained on required documentation to confirm acceptance of completed work

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CS310 Customer Relations 3
- EL310 AC/DC Theory 3
- EN210 Enterprise Policy and Practice 2
- IN320 Teamwork 3
- MA210 Basic Telecommunications Mathematics
- MO310 Mobile Phone Product Knowledge
- MO320 Mobile Phone Operation – Basic
- OH210 Occupational Health and Safety 2
- RA210 Radio Frequency Theory and Hazards 2
- TE210 Basic Telephony 2
- TO210 Hand and Power Tools

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Mobile communication	May include: telephone, facsimile and associated accessories
Power	May be connected to: ignition, battery, fuse panel or manufacturer provided pick up point.
Aerial	May be installed on the window rear or front or on the vehicle roof, gutter grip, side window or other locations using approved mounting devices
Interference to aerial mountings	Can be caused by: infra red sensors, FM wiring, vehicle immobilisers, window tint
Vehicle components that may be removed to enable installation to proceed	Include: weather strips, panels, carpet, seat, console
Other barriers to installation	May include disarming of air bags, in-car entertainment and anti theft security codes, vehicle alarm systems and vehicle computers
Use of pre-existing wiring	May be governed by company policy and by manufacturers specifications
Equipment specifications and documentation	May be found in: contract documents, specification schedules, system configuration diagrams and manuals, Technical bulletins, manufacturers documentation
Customer education	May include demonstration of the equipment, providing the customer with the user handbook, advising the customer of future service contact points/s, warning of possibility of RF interference affecting other electronic devices and action to take
Warranties	Are as specified by the equipment manufacturer/supplier

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Tying/lashing of exposed wires	May be with spiro band, insulated cover, plastic cap
Tools may include:	• Hand – screwdrivers, pliers, terminating tools, crimping tools • Electrical – power drills, soldering iron, cordless drill • Other – ladder, cable identification kit
Test equipment	May include: multimeter, test light, cellular testers, antenna matchbox, aerial tester
Invoices and invoicing procedures	Are company specific
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902, AS 4346, AS 2809.1(requirements for vehicle wiring for specialised vehicles), AS 2772.1 (radio frequency fields for mobile transmitters) • International Standards ISO 9000, 9001 • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Safety regulations for specialised vehicles such as petrol tankers, public service vehicles, fire engines and gas driven vehicles

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of customer requirements including: aerial and handset location, power requirements, type of antenna, accessory wiring use. • Inspection of vehicle including: check of preinstalled wiring, vehicle body and interior defects, preinstalled facilities, vehicle type and most appropriate installation requirements. • Installation of equipment including aerial, cable, connectors, bracket and instrument cradle, power termination, hands-free microphone, speaker, transceiver. • Conduct of functionality tests and interpretation of results.

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- Completion of the task including: tying/lashing of exposed wires, return of vehicle components and fittings to original location and condition, return of customer items to original location, removal of waste and debris.
- Hand over to the customer including: functionality tests in customer's presence, advising and training customer on equipment use, discussion with customer on any damage occurring during installation, provision of all appropriate literature and completion of all financial and other documentation.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Safe use of general hand and power tools normally related to these tasks.
- Safe use of general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC072D Effect changes to existing CPE systems and equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media. Could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

This unit may be applied to domestic, commercial or industrial installations.

This unit applies to all CPE systems, products, equipment and product and system features.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish requirements for alteration	1.1 Facilities and capacity are checked to ensure requirements can be met
	1.2 Availability and access to existing system is identified
	1.3 Building construction type and current/proposed uses are established
	1.4 Existing and proposed systems, equipment and features are identified
	1.5 Existing and potential site hazards and obstacles are identified

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	1.6	Current system data is checked for alignment with system records
	1.7	Planned system outages are negotiated with the customer
	1.8	System outage time is negotiated with the customer when necessary
2 Document specifications and plans for alteration	2.1	Systems alterations are shown clearly and accurately on amendment plans and enable suitable comparisons with existing system
	2.2	Specifications accurately document alteration requirements in accordance with customer requirements
	2.3	Equipment and materials required are accurately identified and are compatible with existing system
3 Confirm site access and conditions	3.1	Approval for site access is arranged with customer prior to site entry
	3.2	Site security requirements are identified and arrangements made for compliance
	3.3	Access times and methods are confirmed to comply with customers requirements
	3.4	Current activities of client and other tenants are established so plans can be made for minimal disruption
	3.5	Existing site conditions are identified and confirmed with client where appropriate
4 Install additional equipment and/or program system feature changes	4.1	Alterations made are compatible with existing systems
	4.2	Alterations cause minimal disruption to ongoing client activity
	4.3	All alterations are carried out in a safe manner in accordance with relevant standards and regulations
5 Restore and test system	5.1	Compatibility of alterations with existing systems is confirmed
	5.2	New work is tested both in isolation and when integrated with existing systems
	5.3	All alterations operate to client system specifications and in accordance with relevant standards and regulations

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6	**Update plans and records**	6.1 All plans and documents are updated to show installed systems accurately and clearly
		6.2 New plans and installed documentation are created where pre existing documentation is unavailable
7	**Restore site to required condition**	7.1 Changes made to the work area during system/equipment modification are restored to the customer's satisfaction
		7.2 Waste and debris are removed from work site and disposed of in accordance with environmental requirements to maintain safe worksite conditions
		7.3 Obsolete equipment is recovered, packaged, receipted where customer owned and returned to appropriate point for refurbishment or disposal
		7.4 Work is completed in a safe manner
		7.5 Changes made to the work area during modification are restored to the customer's satisfaction

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA370 Cable Installation Practices
- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- IN420 Teamwork 4
- NT410 Emerging Network Technologies
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- PS420 Basic Building Trades 4
- RE340 Regulations for CPE
- SU450 Estimating Techniques 4
- TE410 Basic Telephony 4
- TO410 Use of Tools 4

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Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Facilities	Can include hardware, software and compatibility
Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs). Services could fall within the general heading of Next Generation Networks delivering services such as Voice over IP, Multimedia, data transfer, video etc.
Alterations	May cover the following: moving outlets and/or services, new extensions to services, additions, removals, systems/application upgrades Can be effected either manually or by computer programme and can be done on -site or remote from customer premises
Factors affecting access	Include: hours of access, security requirements, type of client activity, activities of tenants and other facility users
Site security systems	May include: registered entry requirements, electronic surveillance, security clearance
Site requirements	May include: noise control, relationships with other customer activities, presentation, access and egress points

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Customer's specifications	May be found in: contract documents, cable plans and designs, specification schedules
Safe working practice	Includes the safe use and handling of: tools and equipment
Tools may include:	• Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools • Electrical – power drills, soldering iron, cordless drill, 240v lead lights • Other – ladder, cable identification kit, lap top computer
Manufacturers' specifications	May be found in printed instruction leaflets or manuals
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Environmental Protection Act • Noise Abatement standards • Heritage Legislation • Confined Spaces Regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Clear identification of customer's needs. • Development of plans and drawings to give effect to planned changes to systems and equipment including: hardware, software and compatibility and involving: moving outlets and/or services new extensions to services, additions, removals, system/application upgrades. • Alteration of system/equipment including both physical and/or programming change. • Identification, conduct and interpretation of tests appropriate to the change.

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- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Ability to read and interpret manuals, specifications, product documentation, related floor plans, building plans, reflected ceiling plans, schematic drawings.
- Safe use of general hand and power tools normally related to these tasks.
- Safe use of general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC073D Cut over CPE additions, moves and changes

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan the cutover	1.1 Dates and timing are negotiated with the customer
	1.2 Customers are made aware of additional costs that may be associated with after hours activity
	1.3 Functional testing of new systems and equipment is completed to the extent possible prior to cutover
	1.4 Customers communications needs are identified and prioritised
	1.5 Order of cutover determined to match customers communication priorities
	1.6 Contingency plans are developed to cater for problems
	1.7 Temporary service is organised if appropriate

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2 After hours access is organised where appropriate	2.1 Approval for site access is arranged with the customer 2.2 Security arrangements are identified and complied with 2.3 Customer representation at the cutover is negotiated and arranged
3 Organise other parties associated with cutover	3.1 Network carrier has been informed of cutover time and date 3.2 All network facilities are connected or arrangements made for connection in conjunction with the cutover 3.3 Mainframe jumpering is either completed or arranged to co-ordinate with the cutover 3.4 Contingency plans are organised with system experts in the event of problems 3.5 System supplier backup support is organised to be available at the appointed cutover time if required
4 Cut over the system/ equipment into service	4.1 Cutover is achieved without undue interruption to the customer's service 4.2 Tests are conducted in accordance with technical manuals and specifications 4.3 Network facilities are connected and tested as working accurately 4.4 All equipment and facilities are tested to be working as specified by the customer 4.5 Customer training in the new or modified system is organised

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CS410 Customer Relations 4
- CS420 Customer Sales 4
- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- IN430 Negotiation 4

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- NE420 Network Architecture 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- SU410 Planning 4
- TE410 Basic Telephony 4

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cutover	May relate to replacement of existing systems, the provision of new or upgraded facilities or removal from one premises to another
Factors affecting after hours access	Include: hours of access, security arrangements, type of client activity, activities of tenants and other facility users
Network carriers	Refer to the customers preferred carrier
Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
System backup	Would be required either by a company having its own experts available when installing its own product, or in a case where another installation company is installing that particular product

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Tests undertaken	Are of a functional nature only and cover such aspects as: dial tone, phone ring, ability to make and receive a call, correct number/s, facility checks, programme checks
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Negotiation with customer as to cutover timeframe. • Development and implementation of cutover plan. • Development of contingency plans. • Identification and organisation of resources including customer resources necessary to complete the cutover within the specified timeframe. • Conduct of relevant tests including: dial tone, phone ring, ability to make and receive a call, correct numbers, facility checks, program checks. • Interpret test results. • Problem identification and resolution. • Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation. • Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors. • Application of all related occupational health and safety requirements and work practices. • Customer focus and consideration of customer needs.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC074D Recover customer premises equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify requirements	1.1 Identify reason for recovery 1.2 Identify location details and details of equipment to be recovered 1.3 Organise building access
2 Organise equipment recovery	2.1 Test system and equipment for operational performance where appropriate 2.2 Save data relating to the system's programme and store with the equipment 2.3 Obtain correct tools 2.4 Assess and confirm charges associated with recovery with the customer
3 Recover equipment	3.1 All equipment is recovered, packaged, labelled, receipted where customer owned and returned to the appropriate area 3.2 Equipment which is the property of the customer is packed and left on site 3.3 Provide a single handset where the lease of the telephone line is not affected

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	3.4	Complete work with minimal disruption to building occupants where relevant
	3.5	Complete work in a safe manner
	3.6	Amend frame records to record the recovery
4 Receive and receipt any outstanding monies	4.1	Check details of outstanding monies prior to recovery
	4.2	Seek payment where monies are outstanding
	4.3	Inform appropriate company staff in the event of failure to receive monies
	4.4	Receipt monies received in accordance with company policy
5 Complete paper work	5.1	Obtain customers signature on relevant document where relevant
	5.2	Complete documents relevant to the recovery fully and accurately and return to the appropriate area promptly
	5.3	Provide customer with a copy of the documentation where relevant
	5.4	Report removal of the equipment prior to the recovery to the appropriate area
6 Clean up work site	6.1	Collect and dispose of waste material and debris in accordance with environmental requirements
	6.2	Clean and adjust all tools and equipment and store in an accessible location
	6.3	Complete work in a safe manner

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- CS310 Customer Relations 3
- EN460 Enterprise Pricing Policy 4
- IN330 Negotiation 3
- OH310 Occupational Health and Safety 3

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- PK310 Product Knowledge 3
- TE310 Basic Telephony 3
- TF320 Test Analysis and Diagnosis 3
- TO310 Use of Tools 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Recovery of equipment	Can be associated with: non payment of account, change of premises by customer or cancellation of service
Equipment recovery	Relates to: key systems, telephones(including payphones) and cable
Systems data	Is saved in cases where the system is to be re-installed and applies to both the disc and the pack
Premises	May be occupied by service holder, new tenant or vacant
Tools	May include: • Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools. • Electrical – power drills, soldering iron, cordless drill, 240v lead lights. • Other – ladder, cable identification kit, lap top computer
Packaging and labelling of equipment	Includes details of equipment within the package and its operational condition
Recovered equipment	Is either scrapped or refurbished. Operational equipment is either sold as used equipment or can be used as a trade in on a new system, dependent on company policy
Documentation is unique to company	Can include: equipment recovered, costs associated with recovery, variations to recovery order and where relevant, customer signature

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Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • AS Communications Cabling Manaul (CCM) Volume 1 • Australian Standards As 3901, 3902 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Trade Practices Legislation • Noise Abatement regulations • Heritage legislation • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Development of a recovery plan. • Conduct of operational tests, including interpretation and documentation of results. • Correct packaging and labelling of recovered equipment. • Collection receipting and documentation of outstanding monies. • Application of all related OHS requirements and work practices (including protective clothing and personal safety items). • Safe use of general hand and power tools normally related to these tasks. • Safe use of general equipment normally related to these tasks. • Correct interpretation and application of relevant regulations and standards. • Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC075D Refurbish customer premises equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations and equipment.

Refurbishment can occur on all types of customer premises equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Conduct initial inspection	1.1 Check external condition of the equipment visually for acceptability
	1.2 Conduct functional tests on all equipment with an unacceptable external condition
	1.3 Salvage, label and store functional equipment for use as spare parts
	1.4 Label and scrap non-functional equipment and parts are in accordance with company procedures
2 Renovate equipment housing	2.1 Remove and discard labels and stickers
	2.2 Remove, check for condition and clean line cord, button and label covers if suitable
	2.3 Remove, disinfect and buff handpiece according to specification
	2.4 Clean and buff instrument body according to specification

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	2.5	Provide a replacement cord where original cord is deemed unsuitable
	2.6	Repair defects detected after cleaning where possible
	2.7	Reassemble base and handpiece in accordance with specification
	2.8	Complete work in a manner safe to the worker and the company
3 Perform an accurate system test	3.1	Connect system in accordance with specification
	3.2	Connect any associated stations to station port
	3.3	Initialise system to default setting by disabling RAM protection when system is off
	3.4	Change hybrid ports to single line telephone operation where applicable
	3.5	Change erasable programmed read only memory to latest release software
	3.6	Obtain and check test equipment for accuracy against manufacturers specifications
	3.7	Perform tests in accordance with prescribed test procedures
	3.8	Note, categorise and record defects
4 Repair defects	4.1	Identify and check defects against defect corrective action list
	4.2	Repair defects in accordance with prescribed procedures where defect is recorded on corrective action list
	4.3	Develop options for repair of previously undetected defects
	4.4	Discuss options with expert repair staff and/or the product manufacturer
	4.5	Repair previously undetected defects in a logical and cost effective manner
	4.6	Modify software and program into the equipment as appropriate
	4.7	Record methodology for repair of newly identified defects on the corrective action list
	4.8	Complete work in a manner safe to the worker and the company

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5 Assemble and pack refurbished product	5.1 Prepare new labels and place on equipment
	5.2 Replace label covers, button covers and line cords
	5.3 Give equipment a final polish
	5.4 Wrap equipment parts as per specification
	5.5 Check component for completeness and pack according to specification
	5.6 Seal and label packaging according to specification
	5.7 Store and assemble completed packages for distribution in accordance with company requirements
	5.8 Complete work in a manner safe to the worker and the company

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CO310 Computer Skills 3
- IN320 Teamwork 3
- OH310 Occupational Health and Safety 3
- PK310 Product Knowledge 3
- PR310 Problem Solving 3
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TF330 Fault Finding 3
- TO310 Use of Tools 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

External condition inspections	May include: physical damage, cracks in plastic, holes in plastic, modifications, texta that won't remove, paint that won't remove, deep scratches or scuff marks that will not buff out, liquid, chemical or insect intrusion, major discolouration
Functional tests	May include: side-tone confirmation, the existence of crackle or noise, dial tone, lamp indication, speaker operation, lamp lights, volume control, intercom buttons, beep and speech, Microphone and microphone lights, two way speech and music
Checks on covers	Include: major discolouration, marking with ink or other substance, scratching, hazing of the clear window, broken or marked
Checks on cords	Include: major discolouration, kinking, marked with ink or other substance, over stretching, exceeding diameter and twisted internal to cable sheath
Buffing	Can be done either by hand or mechanically
Labels and stickers	Are removed either by hand or by using chemicals such as sticker removal fluid
Materials	Used include cleaning fluid, polish
Test procedures	May include: electrical safety (main cord and termination integrity, earthing and leakage), power on LED, speech path, loop circuit, single line telephone feed circuit, ring detection circuit, music on hold source, DTMF sender, paging, power failure transfer
Specifications for refurbishment including packing	May be manufacturer, contractor or refurbishment company
Defects	Are categorised as: critical – do not repair, major – equipment should not be repaired but power supply and casing may be used, and minor – should be repaired

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Test equipment	May include: electrical safety tester, multi-meter, known fit main equipment
Defect corrective action list	Is company specific
Repair procedures	May be defined by manufacturer, contractor or company
Packaging materials	Include plastic bags, cardboard boxes, pallets
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • Occupational Health and Safety • Trade Practices Legislation • Noise Abatement standards • Chemical hazard legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Inspection of reporting on equipment including; physical damage, cracks in plastic, holes in plastic, modifications, texta and paint that cannot be removed, deep scratches, liquid, chemical or insect intrusion, major discolouration.
- Renovation of equipment housing including; removal of labels, disinfecting and buffing of handset, cleaning of line cords, buttons and label covers, buffing of instrument body, replacement of cords, labels etc, reassembly.
- Identification, conduct and documentation of tests including: side-tone confirmation, crackle and noise, dial tone, lamp identification, speaker operation, lamp lights, volume control, intercom buttons, beep and speech, microphone and microphone lights, two way speech and music, electrical safety, power on LED, speech path, loop circuit, single line telephone loop circuit, ring detection circuit, music on hold source, DTMF sender, paging, power failure transfer.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).

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- Ability to read and interpret manuals and documentation.
- Safe use of general hand and power tools normally related to these tasks.
- Safe use of general equipment normally related to these tasks.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC076D Complete equipment and software upgrades

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify detail relating to upgrade	1.1 Work order is checked for accuracy and planners questioned in relation to both detail and clarity of design/specifications
	1.2 Reason for the upgrade is clearly established
	1.3 Test plan associated with upgrade is identified and relevance established
	1.4 All hardware and/or software details are understood
2 Plan upgrade	2.1 Documentation is checked for completeness
	2.2 Duration and timing of the upgrade is determined
	2.3 Impact of the upgrade on network operation is established
	2.4 All parties including customers both involved or affected by the upgrade are notified as to timing and impact of the upgrade
	2.5 Resources necessary to complete the upgrade are identified and organised
	2.6 Training needs are identified and organised
	2.7 Specific tasks are allocated in accordance with the skill mix of staff involved

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	2.8	Pre determined contingency plans are checked for appropriateness and plan amendments are made as required
	2.9	Need for outages are determined and timing agreed and sanctioned by approving authorities
	2.10	Upgrade is scheduled where possible at a time appropriate to all parties
3 Prepare for upgrade	3.1	Software and hardware are checked to ensure they match upgrade requirements and action is taken to cover deficiencies where they occur
	3.2	Tools and test equipment are obtained and checked for accuracy and safety
	3.3	Hardware replacement parts are checked or ordered if not supplied
	3.4	Equipment/network checks are made to identify any known fault situations
	3.5	Maintenance routines are run in accordance with prescribed procedures
	3.6	Test plan is run on current equipment and problems identified and corrected in conjunction with planners
	3.7	Approvals for network downtime/outages are obtained from the appropriate authority prior to work commencement
4 Undertake upgrade	4.1	Upgrade is implemented in accordance with design specification
	4.2	Procedures for upgrade of network are followed in sequential order as defined in instruction manuals
	4.3	Progress of upgrade is checked periodically to ensure that plans in relation to time and duration are being met
	4.4	Problems encountered are brought to the attention of the appropriate authority with detail as to the impact of the problem on the upgrade plan
	4.5	Upgrade is aborted and contingency plans implemented should an upgrade plan not meet the specified criteria
	4.6	System response is monitored during upgrade and action is taken according to instructions provided
	4.7	Work is conducted in a manner which is safe to self, fellow workers and the public at large

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5	**Test upgrade**	5.1 Tests are undertaken in accordance with the predetermined test plan
		5.2 Test results are analysed and checked against specified performance levels
		5.3 Tests are made at each point in the route as required
		5.4 Charging/bill record applications are tested as required
		5.5 Problems encountered are escalated in accordance with enterprise policy
		5.6 Decision to revert to pre-upgrade state is undertaken where required in accordance with enterprise policy
		5.7 Reversion is undertaken as per defined procedures
		5.8 All affected parties including customers are notified of upgrade completion
6	**Accept upgrade**	6.1 Upgrade results/tests are recorded and provided to network management group
		6.2 Post upgrade routines are run in accordance with documented procedures
		6.3 All records, both system and enterprise, are updated
		6.4 Work order documentation is completed, signed and returned to appropriate area
7	**Review upgrade outcomes**	7.1 Ongoing tests are conducted to ensure complete success of upgrade
		7.2 Relevant alarms are monitored to measure impact of upgrade
		7.3 Customer complaints are analysed to assess impact of upgrade on customer satisfaction
8	**Undertake administrative action**	8.1 Test result sheets are completed and located in accordance with enterprise requirements
		8.2 Relevant work documentation and administrative tasks are completed and forwarded to the appropriate area in accordance with enterprise policy
		8.3 Asset is declared ready for use
		8.4 Transporting of tools and test equipment in suitable protective casing is organised where appropriate

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- ET420 Amplifiers 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- IN440 Workplace Networking 4
- MA420 Mathematics 4
- NE420 Network Architecture 4
- NE430 Switch Networks
- OH212 Safe Work Practices–Optical Fibre Cable
- OH410 Occupational Health and Safety 4
- PE320 Remote Work
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- SC410 Science 4
- SU420 Leadership 4
- SW420 Packet Data Switching 4
- TE410 Basic Telephony 4
- TE420 Outage and Hazard Processes 4
- TE490 Blocking Principles 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4

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- TR410 Transmission Theory 4
- TR420 Light/Laser Theory 4
- TR430 Modulation Theory 4
- TR440 Narrow and Wideband Principles 4
- TR460 Spectrum Management 4
- TR470 Transmission Technologies and Products 4
- TR480 Transmission Hierarchy 4
- TR490 Transmission Test Instruments 4
- VO410 Video Network Techniques 4
- VO420 Video and Sound Principles 4

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including Local Area Networks (LANs) and Wide Area Networks (WANs)
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite

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Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM, Local Area Networks (LANs) and Wide Area Networks (WANs)
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
System upgrades	Can include: introduction of a new facility, introduction or variations to both software and hardware, installation of large data packages, improvements to power/battery arrangements
Work orders	Include full details of work to be undertaken including equipment/programme design and/or specification
Test plans	Usually accompany upgrade documentation
Contingency plans	Are developed as part of the upgrade planning and design and usually relate to escalation and reversion procedures given problems with the upgrade
Documentation	Can be vendor, equipment and/or enterprise specific and details implementation and testing procedures including test outcomes and network impact statement
Parties impacted on by the upgrade	Can include: other internal organisational groups, network management, customers, other carriers, service providers public relations
Outage situations	All enterprises have specific policies relating to outage situations and the action to be taken
Maintenance routines	Are described in both equipment and enterprise documentation

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Tests	Are specific to the upgrade and are specified in the upgrade design package May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements, as well as identifying hardware dependencies, checking processor capability and network integration
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer, spectrum analysers, frequency analysers, microwave link analysers
Reversion policy	Is enterprise specific
Training	May be undertaken on the job, or external to the work group by specialist trainers
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Frequency management

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Candidate submits at least two hard copies of plans – and mentor/assessor observes candidate: – Planning and identifying the components of the upgrade process, including application of enterprise procedures, ensuring minimum downtime on the network and meeting customer requirements – Developing a contingency plan

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- Mentor/assessor observes candidate interacting with enterprise personnel, customers and other contractors, keeping a customer focus and consideration of customer needs.
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor describing:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Interpreting alarms and alarm priorities
  - Analysing alarms and alarm conditions and knowledge of interrogation procedures
  - Applying blocking principles.
- Mentor/assessor observes candidate implementing the upgrade process, and a contingency plan:
  - According to plans and specifications and including application of enterprise procedures
  - Ensuring minimum downtime on the network and meeting customer requirements within service assurance guidelines
  - Applying enterprise escalation and outage procedures and all related occupational health and safety requirements and work practices.
- Observation by mentor/assessor, and at least two hard copies of sets of test results to mentor/assessor, demonstrating the candidate's ability to:
  - Use both vendor and enterprise specific monitoring tools
  - Measure the impact of the upgrade on the billing process
  - Conduct tests to measure the impact of the upgrade and interpret outcomes
- Analyse of the implications of hardware/software upgrade on the remainder of the network.
- Mentor/assessor observes candidate – and candidate delivers at least two oral reports describing:
  - Monitoring and analysing alarms and alarm conditions and knowledge of interrogation procedures
  - Conducting tests to measure the impact of the upgrade and interpreting outcomes.
- Candidate submits hard copy sets of documents – and mentor/assessor observes – completion of documentation for at least two separate upgrades.

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Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC077D Commission an electronic unit

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Confirm installation requirements	1.1 Identify installed equipment and its purpose and compare with specifications
	1.2 Installed equipment, purpose and hierarchy is identified and compared with specifications
	1.3 That equipment, cabling and connections are in accordance with specifications is verified
2 Install program	2.1 Any pre-programming is checked for accuracy against manufacturer's specifications
	2.2 Program given in installation specifications is checked against equipment to be used, physical characteristics at site, and function of equipment
	2.3 All non-software parameters are set in accordance with manufacturer's specifications and customer requirements
	2.4 Software parameters are programmed into equipment in accordance with manufacturer's specifications and industry practice and program data is saved and recorded for later use
	2.5 All records are completed in accordance with industry practice and enterprise guidelines

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3 Acceptance test equipment and connections	3.1 Appropriate test equipment is obtained, set up, and used in accordance with manufacturer's specifications and industry practice
	3.2 Network access facilities are connected and tested as working accurately
	3.3 All equipment and facilities are tested to be functional as specified by the manufacturer and customer and all line numbers are correct
	3.4 Transmission path is tested to ensure it passes manufacturers' limits, industry standards, customer's requirements, and enterprise limits and standards
	3.5 Equipment is tested in place for sound operation in accordance with manufacturer's specifications and industry practice
	3.6 Tests are conducted in accordance with technical manuals and specifications
4 Commission equipment	4.1 Coordination occurs with other parties to achieve cutover
	4.2 Where remote alarm / monitoring function is in place, it is checked to be functional via alarm and remote communication transport mechanism
	4.3 Cutover is achieved in accordance with project design and industry practice
	4.4 Relevant data bases are updated in accordance with enterprise and network guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- AT310 Acceptance Testing
- CA325 Cable Jointing and Termination for CAN
- CO310 Computer Skills 3
- DI410 Digital Theory 4
- EL310 AC/DC Theory 3
- EL420 Impedance Matching 4
- EN310 Enterprise Policy and Practice 3

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- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PK310 Product Knowledge 3
- PR310 Problem Solving 3
- PS310 Plans and Specifications 3
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU210 Basic Supervision
- TF310 Test Equipment 3
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TR310 Basic Transmission Theory 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Industry standards	May include: enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Appropriate test equipment	May include: multimeter, optical test equipment, transmission test equipment, personal computer, earth testing device
Configuration of the system	May be undertaken by: keying information into computer/ software, setting hardware switches
Customer	May be: the designated customer, nominated customer representative, an internal organisational customer, (another) carrier
Equipment information and maintenance details	May be communicated to customer by the following means: printed instruction leaflets, pre-printed on materials, on product packaging, manual accompanying equipment, personal discussion

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Factors affecting installation	May include: site type, age and construction, building facility location, ownership of installation site
Function of system	May be clarified with: customer, carrier, customer's agent, design consultant, installer of customer equipment
Line conditioning	May include: amplifiers, repeaters, regenerators, loading coil
Manufacturer's specifications	May be found on: printed instruction leaflets or pre-printed on materials or on product packaging
Network access facilities	May include remote access capabilities for testing and interrogation
Other parties to co-ordinate with	May include: local government, statutory authorities, customer, equipment / materials suppliers, manufacturers
Power for equipment	May be supplied separately or line fed in the case of copper conductor
Program data	May be saved on: disk, paper
Safety precautions	Includes the use of protective equipment to ensure the safety of: self, customers, public, test equipment
System operation parameters	May include: customer service type, phone numbers, system impedances, polarity, balancing network, customer identification details
Tools	May be hand-held, power or mechanical
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise

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- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of program including:
  - Check against manufacturer's specifications
  - Check against equipment to be used
  - Setting of both software and non-software parameters.
- Conduct tests and interpret of test results–see RANGE STATEMENT.
- Cut over to network systems.
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.
- Correct interpretation and application of regulations and standards related to the installation.
- Communication of commissioning details with customers and work associates.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC078D Commission an electronic system

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

This unit may apply either where a service is already working or in a new installation.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Completion of a Certificate III in Telecommunications (CAN) or eqvivalent experience

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Confirm system installation	1.1 Installed equipment, purpose and hierarchy is identified and compared with specifications
	1.2 Equipment, cabling and connections are in accordance with specifications
	1.3 Interrelationships and compatibility of system units is assessed
	1.4 Function and requirements of system are clarified with appropriate parties
2 Install program	2.1 Any pre-programming is checked for accuracy against manufacturer's and enterprise specifications
	2.2 Configuration/s given in installation specifications are checked against equipment to be used, physical characteristics at site, and function of equipment
	2.3 Parameters to be programmed are verified from project design, test results, existing infrastructure, purpose of installation and specific equipment in use
	2.4 Additional needs or variations are assessed from installation requirements
	2.5 Additional needs or variations built into the program prior to configuration

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	2.6	Software parameters are programmed into system in accordance with manufacturer's and enterprise specifications
	2.7	Remainder of configuration activities are completed in accordance with manufacturer's and enterprise specifications
	2.8	Configuration data is saved and recorded for later use
	2.9	All software and paper records in relation to configuration are completed in accordance with enterprise guidelines
3 Prepare to commission	3.1	All non-software configurations are set in accordance with manufacturer's and enterprise specifications and customer requirements
	3.2	All equipment interconnections are re-checked to be in accordance with the specifications
	3.3	Coordination with other parties to achieve cutover occurs
4 Commission system	4.1	Appropriate test equipment for system installed is determined, obtained, set up and used in accordance with manufacturer's and enterprise specifications
	4.2	Tests are conducted in accordance with technical manuals and specifications
	4.3	Network access facilities are connected and tested as working accurately and relevant data bases are updated in accordance with enterprise guidelines
	4.4	Remote alarm / monitoring function is checked for functionality via alarm and remote communication transport mechanism, where required
	4.5	Minor modifications are made as appropriate and followed by further testing for operation
	4.6	System equipment items are tested together for operation in accordance with manufacturer's and enterprise specifications
	4.7	System is tested end-to-end for compatibility
5 Cut over existing services	5.1	Coordination of other parties to achieve cutover occurs
	5.2	Cutover is achieved in accordance with project design and enterprise practice

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI410 Communication 4
- CO410 Computer Skills 4
- CO430 Computer Programming 4
- DI410 Digital Theory 4
- EL420 Impedance Matching 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU415 Human Resources 4
- SU470 Project Management 4
- TF310 Test Equipment 3
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TF430 Fault Finding 4
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3
- TR310 Basic Transmission Theory 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Additional needs or variations	May include: extra/different hardware, different programming, different default settings
Appropriate test equipment	May include: multimeter, optical test equipment, transmission test equipment, personal computer, earth testing device
Compatibilities	Include those of: codes, cabling, interfaces, operating frequencies
Configuration of the system	May be undertaken by: keying information into computer/ software, setting hardware switches
Customer	May be: the designated customer, a nominated customer representative, an internal organisational customer
Equipment information and maintenance details	May be communicated to customer by the following means: printed instruction leaflets, pre-printed on materials, on product packaging, manual accompanying equipment, personal discussion
Equipment to be commissioned	May be that which: has different capacities coming into and out of individual units, has different cable types coming into and out of individual units, is used for a range of transmission types
Factors affecting installation	May include: site type, age and construction, building facility location, ownership of installation site
Function of system	May be clarified with: customer, carrier, customer's agent, design consultant, installer of customer equipment
Installation requirements for program	May be ascertained from: hardware types, customer's requirements, carrier's requirements, transmission types
Manufacturer's specifications	May be found on: printed instruction leaflets, pre-printed on materials or on product packaging
Network access facilities	May include remote access capabilities for testing and interrogation

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Other parties to co-ordinate with	May include: local government, utilities, customer, equipment/materials suppliers
Program data	May be saved on: disk, paper, CD-ROM, magnetic tape
Safety precautions	Includes the use of protective equipment to ensure the safety of: self, customers, public, test equipment
System operation parameters	May include: customer service type, phone numbers, system impedances, polarity, balancing network, customer identification details
Tools	May be hand-held, power or mechanical
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA technical standards • Australian building codes and regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of program including: check against manufacturer's specifications, check against equipment to be used, setting of both software and non-software parameters.
- Integration of unit into the total network.
- Conduct and interpretation of test results including: network facilities, alarms, end to end compatibility.
- Use of test devices including OTDR (Optical Time Domain Reflectometer), multimeter, proprietary devices, transmission test equipment.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Safe use of general hand and power tools and general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members.

Context of and specific resources for assessment

Assessment must ensure

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC079D Schedule CPE maintenance

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media. Could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT Elements describe the essential outcomes of a unit of competency.	PERFORMANCE CRITERIA Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify preventative maintenance program customers	1.1 Details of system and equipment type is checked 1.2 Type and extent of maintenance is identified 1.3 Customer contact point is established 1.4 Customer is contacted and agreement is reached on suitable time for equipment/system maintenance
2 Plan maintenance and fault clearance activity	2.1 Details of warranties and service agreements are verified 2.2 Customers advised of charging details where warranty or agreement does not exist 2.3 Commitments are negotiated and agreed with the customer 2.4 Work priorities are organised so that maintenance staff are available to meet scheduled commitments

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3	**Arrange allocation of labour resources**	3.1 Level of maintenance required is established
		3.2 Product type is identified and knowledge required is matched to knowledge of available staff
		3.3 Labour skills appropriate to the maintenance activity or fault is identified
		3.4 Staff member with the appropriate skills and knowledge is allocated to the task
		3.5 Commitment details are advised to the designated repair officer
		3.6 Details of warranties/service agreements are advised to designated repair officer
		3.7 Full details as to maintenance required or reported fault are provided to repair staff
4	**Organise assistance to fault staff**	4.1 Additional resource is provided if required
		4.2 Delivery of additional materials/parts is arranged
		4.3 Next level of maintenance is organised promptly when fault cannot be rectified in specified timeframe
		4.4 Product manufacturer support organised and arranged as appropriate
		4.5 Fault is passed promptly to concerned area in the event that the fault is found not to be in CPE system

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice
- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- IN430 Negotiation 4
- MT410 Maintenance Routines
- NT410 Emerging Network Technologies
- PE410 Personal Skills 4
- PK410 Product Knowledge 4

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- SU410 Planning 4
- SU470 Project Management 4
- TE410 Basic Telephony 4
- TF330 Fault Finding 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Service agreements	Are agreements reached between a customer and a particular communications company
Charging details for non-agreement maintenance	Varies from company to company
A maintenance hierarchy	Applies to the maintenance and repair activity and is common across the Industry
Materials/parts	Can include replacement equipment, cable and miscellaneous parts
Labour resources	May be company staff or contractors/sub contractors
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Industrial Awards and conditions

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Plan and organise preventive maintenance schedule in accordance with both vendor specified requirements and customer agreements.
- Negotiate fault clearance arrangements with customers including consideration of: warranty arrangements, customer agreements, company fault clearance policy and resource availability.
- Plan and schedule fault clearance activity, including; provision of clear specification to staff as to fault details, fault location, fault history, warranty arrangements, customer requirements, skill needs and availability.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC080D Undertake preventative maintenance of CPE systems and equipment

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Follow preventative maintenance routines	1.1 Customer introductions are made and reason for visit established
	1.2 Familiarisation of customers system and equipment is undertaken
	1.3 System log books are checked and updated
	1.4 Established preventative maintenance routines are followed
	1.5 Need for alterations and/or repairs is determined
2 Organise alterations and repairs	2.1 Warranties and service agreements are checked to establish if any repair/alteration identified during maintenance is covered by such documents
	2.2 Negotiations including the provision of quotes is undertaken with the customer prior to work commencing, in the event repair etc is not covered by warranty/agreement
	2.3 Repair/alteration is undertaken in accordance with established procedures

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	2.4	Assistance is sought or fault elevated to a higher level where repair cannot be effected effectively
	2.5	System/equipment is tested for satisfactory operation on completion of the repair/alteration
	2.6	Customer is consulted to ensure satisfaction with the outcome of the maintenance program
3 Complete administration	3.1	System log books are completed and returned to their allotted location on the customer premises
	3.2	All paperwork is completed correctly and signed by the customer as appropriate
	3.3	Work outside warranty/agreement is priced and costs agreed and signed off by the customer
	3.4	All forms including billing details are forwarded to nominated area in both a correct and timely fashion
	3.5	The work area/customer premises is left in a condition acceptable to the customer
	3.6	Customers are advised as to the availability of new equipment
	3.7	Opportunities for further sales are passed to the relevant sales people
4 Clean up work site	4.1	All tools and equipment are cleaned, adjusted and stored in an accessible location
	4.2	Waste and debris are removed from work site and disposed of in accordance with environmental requirements
	4.3	Obsolete equipment is recovered, packaged, receipted and returned to appropriate point for refurbishment or disposal
	4.4	Work is completed in a safe manner
	4.5	Changes made to the work area during maintenance are restored to the customer's satisfaction

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice
- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- MA420 Mathematics 4
- NT410 Emerging Network Technologies
- OH410 Occupational Health and Safety 4
- PS410 Plans and Specifications 4
- TE410 Basic Telephony 4
- TF320 Test Analysis and Diagnosis 3
- TO410 Use of Tools 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer records	Can be kept on paper records or by computer and include all details relating to the customer, system and equipment installed, features of the system and details relating to warranties and service agreements
Routine maintenance	Is undertaken according to procedures specified for the system and can include: system, equipment and facilities test, test of backup equipment such as batteries, filters, system backup and alarms

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Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Noise Abatement Regulations • Heritage legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of maintenance required. • Conduct and interpretation of tests including: equipment and facilities checks, test of backup equipment such as batteries, filters, system backup and alarms. • Repair of faults/problems in system, equipment and facilities – either hardware or software. • Completion of documentation including: warranty details, system log books, pricing and billing forms. • Safe use of general hand and power tools normally related to these tasks. • Safe use of general equipment normally related to these tasks. • Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation. • Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors. • Application of all related occupational health and safety requirements and work practices. • Customer focus and consideration of customer needs.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC081D Perform tests and fault diagnosis remote from customer premises

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish context and background information	1.1 Availability of remote access to customers CPE system is established 1.2 System, product and product model type and functions are identified accurately 1.3 Existing warranty and maintenance contracts are identified and coverage established 1.4 Customer is advised of likely charges
2 Identify and clarify fault	2.1 Problem is fully discussed with the customer 2.2 Security procedures applying to access are followed 2.3 Assessment, as to whether fault is normal operation for system type or is as a result of miss-operation, is made 2.4 All available information is used to identify the problem where appropriate 2.5 Most probable causes of fault are determined from available data and historical trends where available

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	2.6	Likely causes are ranked in order of probability to ensure a methodical approach to fault identification is used
	2.7	Ranking of causes work from system wide impacts to specific impacts where relevant to fault
	2.8	System programme is verified against customer records
3 Diagnose faults	3.1	Approach to fault identification is methodical and suitable for system and problem type
	3.2	Fault is progressively isolated to remove likely variables from assessment
	3.3	Continued existence of problem is verified regularly
	3.4	Fault is identified without undue interruption to other client activity and in the shortest time possible
4 Rectify fault	4.1	Options to rectify fault are determined and presented to customer for decision
	4.2	Customer is advised of cost of any repair not covered by a service agreement
	4.3	Software programme is varied and amended as required
	4.4	Equipment is reprogrammed as required
	4.5	Unresolved faults are referred to other parties for on site resolution or a second opinion
	4.6	Fault is elevated to a higher level with a degree of urgency
	4.7	Customer is advised of successful fault clearance
	4.8	Customer is satisfied with outcome

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO430 Computer Programming 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice

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- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- IN430 Negotiation 4
- MA420 Mathematics 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- TE410 Basic Telephony 4
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TF430 Fault Finding 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Fault finding	May be done under warranty, as part of a service agreement or on a fee for service basis as agreed with a client. On a remote basis requires a modem in the customer premises to enable access to the system programme.
Security access codes	Apply to all remote customer systems
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions
Customer's specifications and system documentation	May be found in: contract documents, specification schedules, system configuration diagrams and site installation records such as MDF, IDF and FDP log book data and system programme
Warranties	Are as specified by the equipment manufacturer/supplier

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Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
Available data	May include: test data, details of system checks, software programme, equipment/product manuals/guides, customer questioning details
Other likely fault areas	Include: CPE equipment, building cabling (including MDF), external cable, MDF jumpers, carriers network
Methods for fault finding and repair	Include: software redesign and equipment programme repair and/or modification
A maintenance hierarchy	Applies to the maintenance and repair activity and is common across the Industry
Fees for service	Vary from company to company and usually involve charges relating to labour and parts
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Trade Practices Legislation • Noise Abatement Regulations • Heritage legislation • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Adherence to security procedures related to access. • Use of fault history in fault identification. • Identification and ranking of likely causes of faults. • Methodical approach to fault identification. • Conduct of tests appropriate to the type of fault identified. • Interpretation of test results.

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- Application of enterprise escalation and outage procedures.
- Provision of clear and precise instructions to staff engaged in on-site repair.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC082D Locate and rectify CPE faults on site on a first in basis

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media. Could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish context and background information	1.1 Existing warranty and service agreements are identified and coverage established 1.2 Customer is advised of likely charges 1.3 Site variables are determined to enable a full assessment of the fault context 1.4 System, product and product model type and functions are identified accurately

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2	**Identify and clarify fault**	2.1 Problem is fully discussed with the customer
		2.2 All available information is used to identify the problem where appropriate
		2.3 Likelihood of fault being located in the customer premises equipment is assessed
		2.4 Fault is referred to other relevant parties where preliminary assessment is that the fault is not in the CPE
		2.5 Negotiations are successfully undertaken with the carriers in the event of a line or network fault
		2.6 Customer is advised of action taken in the event of a fault outside the CPE
		2.7 Customer is advised of contact point of area where fault has been referred
3	**Determine and rank likely causes of fault**	3.1 Most probable causes of fault are determined from available data and historical trends where available
		3.2 Likely causes are ranked in order of probability to ensure a methodical approach to fault identification is used
		3.3 Ranking of causes work from system wide impacts to specific impacts where relevant to fault
4	**Perform tests**	4.1 Continued existence of problem is confirmed
		4.2 Visual inspection for likely damage is undertaken
		4.3 Suitable tools and test equipment are obtained
		4.4 Tools and test equipment are checked for accuracy, are in safe working order and are modified or reprogrammed as required
		4.5 Simple connections, plugs, leads and alarms are checked for operation
		4.6 Cable terminations are checked for completeness
		4.7 A functional test of basic facilities is undertaken
5	**Diagnose faults**	5.1 Approach to fault identification is methodical and suitable for system and problem type
		5.2 Fault is progressively isolated to remove likely variables from assessment
		5.3 Continued existence of problem is verified regularly

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	5.4	Site installation records and manufacturers documentation is obtained and reviewed to identify likely solutions
	5.5	Fault is identified without undue interruption to other client activity and in the shortest time possible
	5.6	Customer is provided with regular progress reports
	5.7	Fault identification is escalated to a higher level within a specified timeframe
6 Rectify fault	6.1	Options to rectify fault are determined and presented to customer for decision
	6.2	Faulty parts and/or equipment are identified and replaced or repaired as per service agreement
	6.3	Customer is advised of cost of repair in the event that problem is not covered by a service agreement
	6.4	Equipment is reprogrammed if required
	6.5	Work is completed in a manner which is safe both to the repairer and to the customer
	6.6	Unresolved faults are referred to other parties for a second opinion where required
	6.7	Routine checks are undertaken to identify likelihood of further or likely problems
	6.8	Further problems are either attended to or brought to the attention of the customer for decision as to action necessary
7 Provide temporary service to customer where required	7.1	Details of identified problem are explained to the customer
	7.2	Fault is elevated to a higher level with a degree of urgency
	7.3	Customers interim communication needs are identified
	7.4	Service, matching customer needs, is provided in a prompt and timely manner
8 Clean up work site	8.1	All tools and equipment are cleaned, adjusted and stored in an accessible location
	8.2	Waste and debris are removed from work site and disposed of in accordance with environmental requirements

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8.3 Obsolete equipment is recovered, packaged receipted and returned to appropriate point for refurbishment or disposal

8.4 Work is completed in a safe manner

8.5 Changes made to the work area during fault repair are restored to the customer's satisfaction

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO430 Computer Programming 4
- CS410 Customer Relations 4
- EN450 Enterprise Policy and Practice
- EN460 Enterprise Pricing Policy 4
- IN420 Teamwork 4
- IN430 Negotiation 4
- MA420 Mathematics 4
- NT410 Emerging Network Technologies
- OH410 Occupational Health and Safety 4
- PE410 Personal Skills 4
- PK410 Product Knowledge 4
- PS410 Plans and Specifications 4
- TE410 Basic Telephony 4
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TF430 Fault Finding 4
- TO330 Installation Practices 3
- TO410 Use of Tools 4

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2

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- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs). Services could fall within the general heading of Next Generation Networks delivering services such as Voice over IP, Multimedia, data transfer, video etc.
Fault finding	May be done under warranty, as part of a service agreement or on a fee for service basis as agreed with a client
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions
Customer's specifications and system documentation	May be found in: contract documents, specification schedules, system configuration diagrams and site installation records such as MDF, IDF and FDP log book data and system programme
Warranties	Are as specified by the equipment manufacturer/supplier
Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
CPE faults	May include: Incorrect terminations, jumpering, near end cross-talk, bad connections, programme errors, faulty parts, faulty circuit board, equipment failure

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Likely damage	Could include: loose connections, cards not fully plugged in
Available data	May include: test data, log books, customer records, details of system checks, software program, equipment/ product manuals/guides, customer questioning details
Other likely fault areas	Include: building cabling (including MDF), external cable, MDF jumpers, carriers network.
Methods for fault finding and repair	Include: visual inspections, functionality tests, equipment reprogram, replacement repair and/or modification
Fault finding methodology	Is usually described in system/equipment/product manuals and guides.
Tools	May include: • Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools. • Electrical -power drills, soldering iron, cordless drill, 240v lead lights. • Other – ladder, cable identification kit.
Test equipment	May include: multimeter, buttinski, lap top computer
A maintenance hierarchy	Applies to the maintenance and repair activity and is common across the Industry
Fees for service	Vary from company to company and usually involve charges relating to labour and parts
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Noise Abatement Regulations • Heritage legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history in fault identification.
- Identification and ranking of likely causes of faults.
- Methodical approach to fault identification.
- Conduct of tests appropriate to the type of fault identified.
- Interpretation of test results.
- Ability to prioritise, operate in a timely manner and report progress.
- Recognition of potential causes.
- Repair of fault and conduct of tests to verify outcomes.
- Documentation of fault including: nature, location, likely causes, repair methodology.
- Application of enterprise escalation and outage procedures.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC083D Locate and rectify complex CPE system and equipment faults

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish background information	1.1 First in fault repairer is questioned as to action taken and subsequent result identified 1.2 Fault history is obtained and examined in order to establish any fault patterns 1.3 All available data is obtained and used to assist with fault diagnosis 1.4 Problem is discussed with other engineering and technical personnel and strategies developed for identification and repair 1.5 Problem is discussed in detail with the customer
2 Obtain suitable fault testing tools and equipment	2.1 Tools and test equipment relevant to the identified system type and fault are obtained 2.2 Equipment is set up in accordance with manufacturers specifications, checked to be accurate and in safe working order and modified or reprogrammed as required

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3 Diagnose faults	3.1	Approach to fault identification is methodical and suitable for system and problem type and takes into account action taken on a first in basis
	3.2	Fault is progressively isolated to remove likely variables from assessment
	3.3	Continued existence of problem is verified regularly
	3.4	Fault is identified with minimum inconvenience to other client activity, in the shortest time possible
	3.5	Customer is provided with regular progress reports
	3.6	Fault identification is raised to a national support level within a specified timeframe
	3.7	Fault diagnosis is undertaken with national support guidance as required
	3.8	Any necessary system downtime is negotiated with the customer
4 Rectify fault	4.1	Options to rectify fault including any system downtime are determined and presented to customer for decision
	4.2	Fault is rectified totally, partially or temporary solution provided
	4.3	Faulty parts and/or equipment are identified and replaced or repaired as per service agreement
	4.4	Customer is advised of cost of any repair not covered by a service agreement
	4.5	Equipment is reprogrammed as required
	4.6	Work is completed in a manner which is safe both to the repairer and to the customer
	4.7	Temporary service is dismantled and removed in a safe and efficient manner where appropriate
	4.8	Repair is performed under national support guidance as required
	4.9	Routine checks are undertaken to identify likelihood of further or likely problems
	4.10	Further problems are either attended to or brought to the attention of the customer for decision as to action necessary

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5 Clean up work site	5.1	All tools and equipment are cleaned, adjusted and stored in an accessible location
	5.2	Waste and debris are removed from work site and disposed of in accordance with environmental requirements
	5.3	Obsolete equipment is recovered, packaged, receipted and returned to appropriate point for refurbishment or disposal
	5.4	Work is completed in a safe manner
	5.5	Changes made to the work area during fault repair are restored to the customer's satisfaction

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO530 Computer Programming 4
- CS510 Customer Relations 5
- EN440 Enterprise Operations Policy 4
- EN660 Enterprise Pricing Policy 6
- IN430 Negotiation 4
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- MA510 Mathematics 5
- OH510 Occupational Health and Safety 5
- PE510 Personal Skills 5
- PK510 Product Knowledge 5
- PS510 Plans and Specifications 5
- TE510 Telephony 5
- TF510 Test Equipment 5
- TF520 Test Analysis and Diagnosis 5
- TF530 Fault Finding 5
- TO330 Installation Practices 3
- TO510 Use of Tools 5

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Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN510 Advanced Data Communications
- CN520 Advanced Internet
- CN520 Digital Electronics 3
- CN530 Computer Systems Architecture
- CN551 Data Communications Fundamentals
- CN570 Computer Systems Management
- CN590 Internetworking 3
- CN591 Internetworking 4
- CN592 Internetworking Planning
- CN593 Network Layer Fundamentals

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
Faults	Are escalated to this level when they are not detected or capable of repair on a first in basis or within a specified timeframe or are of a recurring or intermittent nature
Fault finding	May be done under warranty, as part of a service agreement or on a fee for service basis as agreed with a client
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions
Customer's specifications and system documentation	May be found in: contract documents, specification schedules, system configuration diagrams and site installation records such as MDF, IDF and FDP log book data and system programme

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Warranties	Are as specified by the equipment manufacturer/supplier
Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
CPE faults	May include: incorrect terminations, jumpering, near end crosstalk, bad connections, program errors, faulty parts, faulty circuit board, equipment failure
Available data	May include: test data, log books, customer records, details of system checks, software programme, equipment/product manuals/guides, customer questioning details
Other likely fault areas	Include: building cabling (including MDF), external cable, MDF jumpers, carriers network
Methods for fault finding and repair	Include: visual inspections, functionality tests, equipment reprogram, replacement, repair and/or modification
Fault finding methodology	Is usually described in system/equipment/product manuals and guides
Tools	May include: • Hand – cutters, screwdrivers, pliers, files, hammers, hacksaw, spanners, terminating tools. • Electrical – power drills, soldering iron, cordless drill, 240v lead lights. • Other – ladder, cable identification kit
Test equipment	May include: multimeter, buttinski, lap top computer
A maintenance hierarchy	Applies to the maintenance and repair activity and is common across the Industry
Fees for service	Vary from company to company and usually involve charges relating to labour and parts
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations

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- Fire Regulations
- Occupational Health and Safety
- Environmental Protection Act
- Trade Practices Legislation
- Noise Abatement Regulations
- Heritage legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history including details of all investigations undertaken on a first-in basis, in fault identification.
- Identification and ranking of likely causes of faults.
- Methodical approach to fault identification.
- Analysis of tests already undertaken and conduct of further tests appropriate to the type of fault identified.
- Interpretation of test results.
- Ability to prioritise, operate in a timely manner and report progress.
- Recognition of potential causes.
- Repair of fault and conduct of tests to verify outcomes.
- Consideration of financial/commercial implications.
- Documentation of fault including: nature, location, likely causes, repair methodology.
- Application of enterprise escalation and outage procedures.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC084D Provide expert advice and support on complex CPE faults

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish background information	1.1 All available data relating to both the fault and previous action taken in the fault diagnosis process is obtained
	1.2 Personnel involved with the fault repair to date are questioned in some detail as to action taken and results achieved
	1.3 Fault history and patterns are ascertained
	1.4 Areas of similarity to likely fault are researched
	1.5 Problem is discussed with industry specialists to determine their experiences with similar faults
	1.6 Problem is discussed in detail with system/equipment manufacturer/supplier for likely solutions
	1.7 Commercial and technical strategies are put in place for identification and repair
	1.8 The problem and strategies developed for overcoming the problem are discussed with the customer

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2	**Undertake fault diagnosis**	2.1 Approach to fault identification is methodical and suitable for system and problem type
		2.2 Fault is progressively isolated to remove likely variables from assessment
		2.3 Fault is identified in the shortest time possible
		2.4 Back up support from the product manufacturer is sought at the appropriate time
		2.5 Instructions to on-site repairer are clear and methodical
3	**Organise fault rectification**	3.1 Options to rectify fault including any downtime are determined and presented to customer for decision
		3.2 Faulty parts and/or equipment are identified and replaced or repaired as per service agreement
		3.3 Customer is advised of cost of any repair not covered by a service agreement
		3.4 Equipment is reprogrammed as required
		3.5 Work is completed in a manner which is safe both to the repairer and to the customer
		3.6 Temporary service is dismantled and removed in a safe and efficient manner where appropriate
		3.7 On-site repair staff are provided with clear and precise instructions on fault rectification where appropriate
4	**Document fault details**	4.1 Details of fault and actions taken to both find and repair are recorded and stored for future reference
		4.2 Product manufacturers are advised of fault and repair details if applicable
		4.3 Changes to product/product model design are recommended where appropriate
		4.4 Problem is passed to manufacturing company where repair has proved either not practical or not commercially viable

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO530 Computer Programming 4
- CP510 CPE Faults 5
- CS510 Customer Relations 5
- EN440 Enterprise Operations Policy 4
- EN660 Enterprise Pricing Policy 6
- IN430 Negotiation 4
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- IN530 Consulting Methods
- PE510 Personal Skills 5
- PK510 Product Knowledge 5
- PR510 Problem Solving 5
- PS510 Plans and Specifications 5
- TE510 Telephony 5
- TF520 Test Analysis and Diagnosis 5
- TF530 Fault Finding 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Faults which escalate to this level	Are of a spurious nature and have failed to be fixed or detected either remotely or on site or are of a recurring nature and previous efforts to repair have failed
Fault diagnosis/analysis	Is most often undertaken remotely from the customer premises using resident fault repairers to undertake the actual work

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Fault finding	May be done under warranty, as part of a service agreement or on a fee for service basis as agreed with a client
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions
Customer's specifications and system documentation	May be found in: contract documents, specification schedules, system configuration diagrams and site installation records such as MDF, IDF and FDP log book data and system program
Warranties	Are as specified by the equipment manufacturer/supplier
Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
CPE faults	May include: incorrect terminations, jumpering, near end crosstalk, bad connections, program errors, faulty parts, faulty circuit board, equipment failure
Available data	May include: test data, log books, customer records, details of system checks, software program, equipment/product manuals/guides, customer and repairer questioning details
Other likely fault areas	Include: building cabling (including MDF), external cable, MDF jumpers, carriers network
Methods for fault finding and repair	Include: visual inspections, functionality tests, software redesign, equipment reprogram, repair, replacement and/or modification, component replacement
Fault finding methodology	Is usually described in system/equipment/product manuals and guides

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A maintenance hierarchy applies to the maintenance and repair activity and is common across the Industry. The hierarchy follows the following pattern:	• Level 1 is first in maintenance and has a time specification for fault identification (approx 1 hour). • Level 2 maintenance/repair usually involves a higher skilled operator. This level of maintenance/repair applies when the fault cannot be located within the specified first in maintenance timeframe or where the fault is intermittent or recurring. • Level 3 usually is located at a national level within a company. The very highest level of skill is required at this level as they work on faults that cannot be located or fixed at the first two levels, the spurious faults. At this level fault location and identification is usually undertaken remote from the site using the on site repair person to actually undertake the work.
Fees for service	Vary from company to company and usually involve charges relating to labour and parts
Relevant legislation, codes, regulations and standards	Include: • ACIF Standards and Codes • Australian Standards AS 3901, 3902 • International Standards ISO 9000, 9001 • Australian Building Codes and Regulations • Fire Regulations • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation • Noise Abatement Regulations • Heritage legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Use of fault history including details of all investigations undertaken on a first-in basis, in fault identification. • Development and application of financial/commercial strategies. • Identification and ranking of likely causes of faults. • Methodical approach to fault identification. • Analysis of tests already undertaken and conduct of further tests appropriate to the type of fault identified.

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- Interpretation of test results.
- Ability to prioritise, operate in a timely manner and report progress.
- Recognition of potential causes.
- Repair of fault and conduct of tests to verify outcomes.
- Involvement of vendor system specialists at commercially appropriate time.
- Preparation of reports including recommendations relating to system redesign/specification complete with justifiable data including financial considerations.
- Documentation of fault including: nature, location, likely causes, repair methodology.
- Application of enterprise escalation and outage procedures.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC085D Monitor, analyse and action telecommunications network alarms

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify alarms	1.1 Alarm presentation is checked and identified
	1.2 Severity and level of alarm is identified
	1.3 Specific network element affected is identified
	1.4 Particular software and/or hardware is identified where possible
	1.5 Likely customer impact is identified
	1.6 Agreements with affected customers are studied and action initiated to avoid breach of the agreement
	1.7 All appropriate areas are notified of both the alarm and the likely impact in accordance with enterprise policy
	1.8 Alarm is acknowledged in accordance with enterprise policy where required
2 Analyse alarm conditions	2.1 Alarm priority is determined and actioned in accordance with enterprise policy
	2.2 Any outage situation, its extent and impact is identified
	2.3 Fault history is gathered and analysed
	2.4 Service level agreements with affected customers are analysed for impact on priority determination
	2.5 Discussions are held with other relevant organisation groups in an attempt to isolate and identify both the problem and the likely cause where applicable

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	2.6	Further reports are gathered and analysed
	2.7	Likely areas of failures are identified and analysed
	2.8	Enterprise policy relating to outages is implemented immediately when required
3 Locate and arrange rectification of problem	3.1	Fault/problem rectification is undertaken where appropriate priority applies, capability exists and time restrictions can be met
	3.2	Remote interrogation is undertaken to further identify the problem where possible
	3.3	Escalation procedures are enacted in accordance with alarm priority and enterprise policy
	3.4	Faults/problems not clearly identified by an alarm or incapable of rectification remotely are allocated to appropriate area
	3.5	Hardware faults/replacement are allocated to appropriate area
	3.6	Instructions given to field staff are clear, concise and delivered in a manner which enables quick and effective repair
	3.7	Fault repair progress is monitored on at regular intervals
	3.8	Alarms requiring no further action are documented and recorded in accordance with enterprise policy
	3.9	Advice is prepared and submitted to appropriate area in the event that further action to address the problem is required
4 Finalise action	4.1	Alarms are either reset or arrangements are made with the relevant authorised group to reset alarms
	4.2	All relevant parties including customers are notified of problem rectification
	4.3	Alarms are monitored to ensure no re-occurrence of the problem
	4.4	Appropriate cause and effect studies are undertaken, results analysed and action taken to prevent re-occurrence
	4.5	Reports are prepared and signed in accordance with enterprise policy

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- CS520 Service Agreements 5
- DI410 Digital Theory 4
- DI420 Digital Switching 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- EN440 Enterprise Operations Policy 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- IN440 Workplace Networking 4
- NE410 Network Equipment 4
- NE420 Network Architecture 4
- OH410 Occupational Health and Safety 4
- PE410 Personal Skills 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- SU420 Leadership 4
- SU430 Quality Procedures 4
- SU440 Conflict Resolution 4
- TE410 Basic Telephony 4
- TE420 Outage and Hazard Processes 4
- TE450 System Security 4
- TF420 Test Analysis and Diagnosis 4
- TR410 Transmission Theory 4
- TR420 Light/Laser Theory 4
- TR450 Signalling Principles 4

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Maintenance	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1- remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification level	The level of fault rectification varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem

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Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Alarm management systems	Each component of the network has its own alarm management systems which are self monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarm details recorded	Are: Colours, codes, node affected, date and time, new or old record
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage, traffic overloads, Customer Premises equipment problems, peak traffic loads
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
No alarm conditions	Conditions which may not generate an alarm may be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors
Alarm priorities	Are enterprise specific but generally consist of four (4) levels: • Priority 1 impact – demanding immediate attention • Priority 2 degradation – decision to be made as to attention given and depends on impact on both network and customer • Priority 3 hazardous – attention given as part of normal activities • Priority 4 no action – alarm noted
Hardware faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage

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Customers	May be internal or external to the organisation and may include other carriers
Outage situation policies	All enterprises have specific policies relating to outage situations and the action to be taken
Escalation procedures	Are enterprise specific and can relate to both alarm type and repair time
Variables that may affect system faults	May include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions
Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
Transmission systems	Are governed by international standards set by the ITU
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Assessment candidates will provide evidence of their performance and underpinning skills and knowledge.
- Candidate submits hard copies of alarm centre fault report, system reports and fault history for at least three faults signed off by the mentor:
  - At least two faults to be actioned to a set program
  - Another to be with no prior demonstration or experience
  - Alarm and maintenance printouts
- Candidate delivers oral report to mentor/assessor explaining three different action plans.

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- Mentor/assessor observes candidate using the test results to confirm existence of three different types of faults by mentor or assessor.
- Mentor/assessor observes candidate's competency in fault diagnosis technique in at least three different types of faults.
- Mentor/assessor observes candidate's ability to adhere to Service Level Agreements.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC086D Undertake routine maintenance of the telecommunications network

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify level of maintenance to be undertaken	1.1 Reason for maintenance is established
	1.2 Equipment to be maintained is identified
	1.3 Documentation relating to the equipment is obtained
	1.4 Routines required are identified
2 Plan/prepare routine maintenance	2.1 Network stability and general condition is assessed prior to routines and details of network health recorded
	2.2 Impact of the routine is assessed and analysed and depending on outcome, decision is made on whether to activate the routine
	2.3 Required resources are identified, obtained and allocated
	2.4 Timing of the routines is established
	2.5 Tools and test equipment are obtained and checked for appropriateness and accuracy
	2.6 Documentation relating to the equipment is obtained
	2.7 Detailed plans for routines are established and discussed with all relevant areas
	2.8 Appointments are made with customers where equipment to be maintained is located on customer premises

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3	**Undertake maintenance**	3.1 Contacts are made and maintained with network management centre during the running of the routines
		3.2 Routines are undertaken in accordance with documented instructions
		3.3 All precautions are taken to protect the network during the routines
		3.4 Data gathered is recorded on the relevant forms
		3.5 All problems are identified for further action
		3.6 Work is completed in a manner which is safe to self, fellow workers and the public at large
4	**Initiate corrective action as required**	4.1 Outcomes/outputs of routines are checked to ensure they are in accordance with specification
		4.2 Checks are made to ensure that pre-programmed software routines did in fact run
		4.3 Problems identified are analysed for immediate or likely impact
		4.4 Problems/faults are diagnosed and repaired within capability
		4.5 Any necessary outages are approved by the appropriate enterprise authority and are undertaken in accordance with prescribed enterprise procedures
		4.6 Repair action is initiated or escalated where problem is causing or likely to cause problems in the immediate future and repair is beyond capability
		4.7 Other problems are identified and logged for future action
		4.8 Alarms are checked to ensure routines did not generate further problems
5	**Generate report**	5.1 Routine logs are completed and stored for future reference
		5.2 Records are completed correctly and signed in accordance with enterprise policy
		5.3 Trending data both in relation to performance and faults is updated

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- DI410 Digital Theory 4
- DI420 Digital Switching 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- NE410 Network Equipment 4
- NE420 Network Architecture 4
- NE430 Switch Networks
- OH410 Occupational Health and Safety 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- SU430 Quality Procedures 4
- TE410 Basic Telephony 4
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR410 Transmission Theory 4
- TR440 Narrow and Wideband Principles 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Maintenance routines	May be undertaken as prescribed by equipment suppliers and for preventative, safety, enterprise requirements. They are usually prescribed in detail in vendor and/or enterprise documents and can be undertaken on daily, weekly, monthly, 6 monthly and annual bases. Routines are usually undertaken, when traffic on the network is at a minimum
Routines	May be conducted manually or are automatically built into the system software and can cover from total system through to and individual pair of wires
Network health	Includes: peak capacity, alarms, current faults, processor load

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Data gathered during routine maintenance	Can include: battery voltages, rectifier problems, rodent damage, occupational health and safety conditions, vandalism, general housekeeping, environmental problems, alarms and alarm systems, calls, call failure rate, blocked circuits, known fault conditions, emergency power plant
Resources	Can include: people, finance, materials, tools and test equipment
Organisational areas involved with routine maintenance	Include both network and element management staff, customers and field personnel. SDH technology places transmission equipment in customers premises, network faults and problems can be identified through alarms, customer complaints, other carriers and service providers, routine maintenance, billing errors
Faults	May occur in either the software and/or hardware components of the equipment. Hardware faults are usually repaired by field personnel under instruction
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements, power and environmental conditions including emergency power plant
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools
Transmission medium	May be: fibre, cable, radio, satellite, microwave, video
Alarms	Are centralised and relate to each single element of the network

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Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Records	May be maintained manually or electronically
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Candidate submits hard copies of:
  - At least three separate written reports showing how candidate identified maintenance required
  - At least three separate written test results from a range of the following: equipment and facilities checks, test of backup equipment such as batteries, filters, system backup and alarms.
- Mentor/assessor observes candidate:
  - Demonstrating safe use of general hand and power tools, and of general equipment normally related to these tasks
  - Applying all related occupational health and safety requirements and work practices.
- Mentor/assessor observes candidate's competency in:
  - Interaction with enterprise personnel, customers and other contractors
  - Customer focus and consideration of customer needs within service assurance guidelines.

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- Candidate delivers oral reports to mentor/assessor explaining at least three separate repairs of faults/problems in system, equipment and facilities–at least one each of hardware and software, signed off by the mentor.
- Candidate submits hard copy of three sets of accurately completed documentation including: warranty details, system log books, pricing and billing forms.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC087D Undertake remote repair of network faults

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish context and background information	1.1 Alarm conditions are identified and type, location and priority noted
	1.2 Customer information is received and analysed
	1.3 Alarm information is analysed and previous alarm history is gathered to assist with fault identification
	1.4 Previous reports are gathered and used in the fault analysis process
	1.5 Impact of environmental factors is assessed
	1.6 Appropriate design drawings are obtained
	1.7 Appropriate procedural documents relevant to the alarm or customer identified condition are gathered
	1.8 Fault history and trending data are accessed
2 Identify/verify fault	2.1 Problem is fully discussed with the customer where applicable
	2.2 Remote interrogation is undertaken to further identify the problem where possible
	2.3 Appropriate tests are conducted and results analysed
	2.4 Other associated alarms are monitored
	2.5 Most probable causes of fault are determined from available data and historical trends where available
	2.6 Likely causes are ranked in order of probability to ensure a methodical approach to fault identification is used

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	2.7	Ranking of causes work from system wide impacts to specific impacts where relevant to fault
	2.8	Level of service degradation is measured
3 Diagnose faults	3.1	Approach to fault identification is methodical and suitable for system and problem type
	3.2	Fault is progressively isolated to remove likely variables from assessment
	3.3	Continued existence of problem is verified regularly
	3.4	Fault is identified without undue interruption to other activity and in the shortest time possible
4 Repair fault	4.1	Options to rectify fault are determined and strategies for repair are established
	4.2	Repair outcomes are determined and strategies developed for achievement
	4.3	Traffic is rerouted during repair if possible
	4.4	Hardware faults are advised to on-site operatives for repair
	4.5	Instructions to on-site personnel for repair are clear and concise and address the problem accurately for repair
	4.6	Software programme is varied and amended as required
	4.7	Data changes are enacted in accordance with specification
	4.8	Equipment is reconfigured and appropriate data reloaded on completion of the repair
	4.9	Customers are fully informed of repair progress where fault is in customer end equipment
	4.10	Unresolved faults are escalated in accordance with established enterprise procedure
5 Document results	5.1	Advice of fault/problem rectification is provided to all relevant parties including customers
	5.2	New or changed network conditions are recorded and notified to all relevant parties
	5.3	Details relating to any outage caused is recorded and advised as per enterprise procedures
	5.4	Equipment faults are noted, recorded and filed in the appropriate data base for future reference

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5.5 Details as to usage of spare parts are recorded and notified to relevant parties in accordance with enterprise procedure

5.6 Fault history records are updated

5.7 Cause and effect studies are undertaken, weaknesses in system or process noted and advised to the relevant body

5.8 Recommendations for change to system or process are prepared and on forwarded as appropriate

5.9 Network normalisation checks are undertaken to assess ongoing network health and the likelihood of further problems

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- EN440 Enterprise Operations Policy 4
- ET420 Amplifiers 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- IN440 Workplace Networking 4
- MA420 Mathematics 4
- NE410 Network Equipment 4
- NE420 Network Architecture 4
- NE430 Switch Networks
- OH212 Safe Work Practices–Optical Fibre Cable
- OH410 Occupational Health and Safety 4

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- PE320 Remote Work
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- SC410 Science 4
- SU420 Leadership 4
- SW420 Packet Data Switching 4
- TE410 Basic Telephony 4
- TE420 Outage and Hazard Processes 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR420 Light/Laser Theory 4
- TR430 Modulation Theory 4
- TR440 Narrow and Wideband Principles 4
- TR450 Signalling Principles 4
- TR460 Spectrum Management 4
- TR480 Transmission Hierarchy 4
- TR490 Transmission Test Instruments 4
- VO410 Video Network Techniques 4
- VO420 Video and Sound Principles 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor

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Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1- remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification	The level of fault rectification varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage, software and data changes
Fault escalation procedures	Are defined by the enterprise and usually relate to appropriate repair times

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Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements, loop back (transmission only)
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools
Transmission medium	May be: fibre, cable, radio, satellite, microwave, video
Alarm management systems	Each component of the network has its own alarm management systems that are self-monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
Non-alarm conditions	May be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors, animal damage
Environmental factors	May include: weather, disasters, safety issues
Transmission systems	Are governed by international standards set by the ITU
Relevant parties	May include: network management centre, vendor, customer, account manager

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Relevant legislation, codes, regulations and standards include:

- International Standards ISO 9000 and 9001
- ACMA Standards TS 14
- ITU recommendations
- Occupational Health and Safety
- Privacy Act
- Private property law
- Environment Legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor – adhering to security procedures related to system access.
- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor – demonstrating a methodical approach to fault identification; including use of fault history and ranking of likely causes.
- Mentor/assessor observes candidate testing, and candidate submits hard copy of three sets of tests results appropriate to the type of fault identified, and ranging from common to more complex.
- Mentor/assessor observes candidate applying enterprise escalation and outage procedures, to include demonstration of all related occupational health and safety requirements and work practices.
- Mentor/assessor observes candidate giving staff engaged in on-site repair of a Tier X fault clear and precise instructions, including specific instructions designed to avoid circular routing.
- Mentor/assessor observes candidate's ability to interact with enterprise personnel, customers and other contractors, including a clear customer focus and consideration of customer needs within service assurance guidelines.
- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor – reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC088D Locate and rectify network faults on a first in basis

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC089D Repair and replace telecommunications network hardware

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish context and background information	1.1 Details of the alarm and likely fault condition are obtained from alarm centre 1.2 Customer information is received and analysed 1.3 Appropriate design drawings are obtained 1.4 Fault history and trending data are accessed
2 Identify and clarify fault	2.1 Problem is fully discussed with either the customer or the alarm centre as appropriate 2.2 All available information is used to identify the problem where appropriate
3 Determine and rank likely causes of fault	3.1 Repair outcomes are determined and strategies developed for achievement 3.2 Most probable causes of fault are determined from available data and historical trends where available 3.3 Likely causes are ranked in order of probability to ensure a methodical approach to fault identification is used 3.4 Ranking of causes work from system wide impacts to specific impacts where relevant to fault 3.5 Strategies for fault repair are established

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4 Perform tests	4.1	Continued existence of problem is confirmed
	4.2	Relevant documentation, tools and test equipment are obtained
	4.3	Tools and test equipment are checked for accuracy, are in safe working order and are modified or reprogrammed as required
	4.4	Cable terminations are checked for completeness
	4.5	A functional test of basic facilities is undertaken
	4.6	Work is conducted in a manner which is safe to self, fellow workers and the public at large
5 Diagnose faults	5.1	Approach to fault identification is methodical and suitable for system and problem type
	5.2	Fault is progressively isolated to remove likely variables from assessment
	5.3	Continued existence of problem is verified regularly
	5.4	Site installation records and manufacturers documentation is obtained and reviewed to identify likely solutions
	5.5	Fault is identified without undue interruption to other network activity and in the shortest time possible
	5.6	Fault identification is escalated to a higher level within a specified timeframe
	5.7	Customer is provided with regular progress reports where appropriate
6 Rectify fault	6.1	Options to rectify fault are determined and discussed with alarm centre as appropriate
	6.2	Faulty parts and/or equipment are identified and replaced or repaired as per service agreement
	6.3	Equipment is reprogrammed if required
	6.4	Work is conducted in a manner which is safe to self, fellow workers and the public at large
	6.5	Unresolved faults are referred to other parties for a second opinion where required
	6.6	Routine checks are undertaken to identify likelihood of further or likely problems

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7 Clean up work site as appropriate	7.1 All tools and equipment are cleaned, adjusted and stored in an accessible location
	7.2 Waste and debris are removed from work site and disposed of in accordance with environmental requirements
	7.3 Work is completed in a safe manner
	7.4 Changes made to the work area during fault repair are restored to original condition
	7.5 Transporting of tools and test equipment in suitable protective casing is organised where appropriate
	7.6 Fault logs are completed in accordance with enterprise policy
	7.7 Fault/alarm centre is notified of fault clearance and checks are made to ensure no active alarms

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- IN320 Teamwork 3
- IN410 Interpersonal Relationships 4
- IN440 Workplace Networking 4
- MA310 Basic Mathematics 3
- NE320 Network Architecture 3
- NE430 Switch Networks
- OH310 Occupational Health and Safety 3
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4

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- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- SW420 Packet Data Switching 4
- TE310 Basic Telephony 3
- TE420 Outage and Hazard Processes 4
- TF410 Test Equipment 4
- TF420 Test Analysis and Diagnosis 4
- TO310 Use of Tools 3
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR430 Modulation Theory 4
- TR480 Transmission Hierarchy 4
- US488 Additional Unit Specific Learning
- VO410 Video Network Techniques 4

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks including Local Area Networks (LANs) and Wide Area Networks (WANs)

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Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite Transmission medium May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	SDH (synchronous digital hierarchy), ATM, LAN, WAN
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification level	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Advice to repairer	All work undertaken on a first in basis is under instruction from the network management/control centre. Advice to repairer is communicated either by phone or ticket of work, dependent on nature of the problem and its priority
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage

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Fault escalation procedures	Are defined by the enterprise and usually relate to appropriate repair times
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements, transposition of equipment
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools
Transmission medium	May be: fibre, cable, radio, satellite, microwave, video
Alarm management systems	Each component of the network has its own alarm management systems that are self-monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
Conditions that may not generate an alarm	May be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors, animal damage
Transmission systems	Are governed by international standards set by the ITU

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Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Alarm centre fault report, system reports and fault history for at least three faults signed off by the mentor. • Alarm and maintenance printouts. • Oral report of three different action plans delivered to mentor and assessor. • Observation of candidate using test results to confirm existence of three different types of faults by mentor or assessor. • Observation by mentor or assessor of fault diagnosis technique in at least three different types of faults. • Observation by mentor or assessor of fault rectification in at least three different types of faults. • Accurate logs and documents.
Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC089D Repair and replace telecommunications network hardware

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

All work undertaken on site is under instruction from the network management/control centre. Responsibility for the fault/problem rests with that centre. This unit covers work at escalation tier 1.

Units ICTTC088C and ICTTC090C cover similar work at escalation tiers 2 and 3.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify and clarify fault	1.1 Problem is fully discussed with alarm centre
	1.2 Location of the problem is clearly identified
	1.3 Nature of repair/replacement is clearly understood
	1.4 Clarity of instruction is sought from alarm centre personnel as required
2 Prepare for fault/ problem repair	2.1 Appropriate parts are obtained and checked for suitability
	2.2 Tools and documentation are obtained and checked to be in good working order
	2.3 Anti static precautions are taken in accordance with recommended practices
	2.4 Hardware replacement arrangements and impact are assessed and discussed with alarm centre
3 Rectify fault	3.1 Faulty parts and or equipment are replaced as instructed
	3.2 Equipment repair is undertaken as directed by alarm centre staff

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	3.3	Problems with repair replacement are discussed with alarm centre staff at all stages through the process
	3.4	Tests are undertaken in accordance with directions to ensure satisfactory repair
	3.5	Further discussions ensue with alarm staff where repair proves unsatisfactory
4 Clean up work site	4.1	All tools and equipment are cleaned, adjusted and stored in an accessible location
	4.2	Waste and debris are removed from work site and disposed of in accordance with environmental requirements
	4.3	Obsolete equipment is recovered, packaged receipted and returned to appropriate point for refurbishment or disposal
	4.4	Work is completed in a safe manner
	4.5	Changes made to the work area during fault repair are restored to the customers satisfaction
5 Complete administrative work	5.1	Documentation relating to work undertaken is prepared and filed in the event of problem escalation
	5.2	All records relating to the job are completed and signed in accordance with enterprise policy
	5.3	Details of parts used are recorded and action taken to provide replacement in accordance with enterprise policy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- CS310 Customer Relations 3
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- IN310 Interpersonal Relationships 3
- IN320 Teamwork 3

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- MA320 Mathematics 3
- NE310 Network Equipment 3
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- RA310 Radio Frequency Theory and Hazards 3
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TF330 Fault Finding 3
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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All faults and problems	Are identified within specified alarm centres. Personnel in these centres diagnose the problem and in the case of hardware problems within a switching centre, personnel are informed of the need for repair and usually guide the appropriate repair personnel through the problem
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools, lap top computers, circuit board puller, multi meter, plug separator
Parts	May consist of: printed circuit boards, batteries, fuses, magnetic media, cables, fan units
Tests	Could include: phone calls, strapping, switch setting, voltage measurement
Variables	That may affect hardware faults may include: recent additions to system, building works, operator error, power supply, software problems, time of fault, atmospheric conditions, weather, vandalism
Hardware faults	May include: blown fuses, connectors, wiring, cards, card components, antennas, feeders, cable, weather damage, lightning damage
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Print out of fault record.
- Interaction with enterprise personnel.
- Observation by mentor/assessor of rectification strategy development.
- Work in accordance with enterprise procedures.
- Observation by mentor/assessor of rectification of Tier 1 fault within service assurance guidelines.
- Observation by mentor/assessor of demonstrated good physical housekeeping.
- A fault rectification report including enterprise common fault code, time taken for service restoration.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC090D Analyse and organise repair of complex telecommunications network faults

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish background information	1.1 Information provided by first in fault repairer as to action taken and subsequent result identified is analysed
	1.2 Fault history is obtained and examined in order to establish any fault patterns
	1.3 All available data is obtained and used to assist with fault diagnosis
	1.4 Problem is discussed with other engineering and technical personnel and strategies developed for identification and repair
	1.5 Problem is discussed in detail with the customer as required
2 Obtain suitable fault testing tools and equipment	2.1 Tools and test equipment relevant to the identified system type and fault are obtained
	2.2 Equipment is set up in accordance with manufacturers specifications, checked to be accurate and in safe working order and modified or reprogrammed as required
3 Diagnose faults	3.1 Approach to fault identification is methodical and suitable for system and problem type and takes into account action taken on a first in basis
	3.2 Fault is progressively isolated to remove likely variables from assessment
	3.3 Continued existence of problem is verified regularly

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	3.4	Fault is identified with minimum inconvenience to other network activity, in the shortest time possible
	3.5	Customer/network management centre is provided with regular progress reports where required
	3.6	Fault identification is escalated in accordance with enterprise policy
	3.7	Any necessary system downtime is negotiated with network management centre
4 Rectify fault	4.1	Options to rectify fault including any system downtime are determined and presented to network management centre
	4.2	Repair outcomes are determined and strategies developed for achievement
	4.3	Fault is rectified totally, partially or temporary solution provided
	4.4	Faulty parts and/or equipment are identified and arrangements made for replacement or repair
	4.5	Equipment is reprogrammed as required
	4.6	Work is conducted in a manner which is safe to self, fellow workers and the public at large
	4.7	Repair is performed under network management guidance as required
	4.8	Escalation processes are activated where required in accordance with enterprise procedure
	4.9	Routine checks are undertaken to identify likelihood of further or likely problems
	4.10	Further problems are either attended to or brought to attention of relevant enterprise personnel for decision as to action necessary
	4.11	All parties including customers are notified of fault/problem rectification
5 Document fault details	5.1	Details of fault and actions taken are recorded and stored for future reference
	5.2	Trending data is captured and recorded in appropriate data base
	5.3	Cause and effect studies are undertaken and results forwarded to the appropriate area for necessary action
	5.4	Fault details and details of repair action are provided to all areas associated with fault/problem action
	5.5	Final tests are undertaken to ensure ongoing repair and to check other likely faults in the system

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI510 Communication 5
- CO510 Computer Skills 5
- CS510 Customer Relations 5
- CS520 Service Agreements 5
- DI510 Digital Theory 5
- DI530 Digital Radio 5
- EN510 Enterprise Escalation Procedures 5
- EN520 Enterprise Information Systems 5
- EN530 Enterprise Organisational Policy 5
- EN540 Enterprise Operations Policy 5
- ET420 Amplifiers 4
- IN510 Interpersonal Relationships 5
- IN520 Teamwork 5
- IN540 Workplace Networking 5
- MA510 Mathematics 5
- NE520 Network Architecture 5
- NE530 Network Signalling 5
- OH212 Safe Work Practices–Optical Fibre Cable
- OH510 Occupational Health and Safety 5
- PR510 Problem Solving 5
- PS510 Plans and Specifications 5
- RA510 Antennas 5
- RA520 Radio Frequency Theory and Hazards 5
- SC510 Science 5
- SU520 Leadership 5
- SW420 Packet Data Switching 4
- SW530 Switch Networks 5
- TE510 Telephony 5
- TF520 Test Analysis and Diagnosis 5
- TO510 Use of Tools 5
- TO620 Anti-static Procedures 6
- TR510 Transmission Theory 5

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- TR520 Light/Laser Theory 5
- TR530 Modulation Theory and Techniques 5
- TR540 Narrow and Wideband Principles 5
- TR560 Spectrum Management 5
- TR570 Transmission Technologies and Products 5
- TR580 Transmission Hierarchy 5
- TR590 Transmission Test Instruments 5
- VO510 Video Network Techniques 5
- VO520 Video and Sound Principles 5

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification level	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage
Fault escalation procedures	Are defined by the enterprise and usually relate to appropriate repair times
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools
Transmission medium	May be: fibre, cable, radio, satellite, microwave, video

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Alarm management systems	Each component of the network has its own alarm management systems that are self monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
Hardware faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage
Conditions that may not generate an alarm	May be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors, animal damage
Transmission systems	Are governed by international standards set by the ITU
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate's competency in:
  - Methodical approach, identification and ranking of likely causes of faults
  - Using fault history, including details of all investigations undertaken on a first in basis, in fault identification
- Mentor/assessor observes candidate's ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation
- Mentor/assessor observes candidate interacting with enterprise personnel, customers and other contractors and maintaining customer focus and consideration of customer needs within service assurance guidelines
- Mentor/assessor observes candidate – and candidate submits at least three written reports demonstrating:
  - Analysis of tests already undertaken
  - Conduct of further tests appropriate to the type of fault identified
  - Interpretation of test results
  - Recognition of potential causes
- Mentor/assessor observes candidate's ability to operate in a timely manner, report progress, prioritise, and consider financial/commercial implications

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC091D Analyse and organise repair of highly complex telecommunications network faults

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish background information	1.1 All available data relating to both the fault and previous action taken in the fault diagnosis process is obtained and analysed
	1.2 Personnel involved with the fault repair to date are questioned in some detail as to action taken and results achieved
	1.3 Fault history and patterns are ascertained
	1.4 Areas of similarity to likely fault are researched
	1.5 Problem is discussed with industry specialists to determine their experiences with similar faults
	1.6 Problem is discussed in detail with system/equipment vendor for likely solutions
	1.7 Commercial and technical strategies are put in place for identification and repair
	1.8 The problem and strategies developed for overcoming the problem are discussed with the network management centre
	1.9 Access to appropriate hardware, software and firmware codes are obtained where necessary

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2 Undertake fault diagnosis	2.1 Approach to fault identification is methodical and suitable for system and problem type
	2.2 Fault is simulated in a captured environment as appropriate
	2.3 Fault is progressively isolated to remove likely variables from assessment
	2.4 Fault is identified in the shortest time possible
	2.5 Back up support from the vendor is sought at the appropriate time
	2.6 Instructions to on-site repairer where required are clear and methodical
3 Organise fault rectification	3.1 Options to rectify fault including any downtime are determined and presented to network management for decision
	3.2 Vendor assistance and support is sought at the appropriate time
	3.3 Faulty parts and/or equipment are identified and arrangements made for replacement or repair
	3.4 Equipment is reprogrammed as required
	3.5 On-site repair staff are provided with clear and precise instructions on fault rectification where appropriate
4 Document fault details	4.1 Details of fault and actions taken to both find and repair are recorded and stored for future reference
	4.2 Vendors are advised of fault and repair details if applicable
	4.3 Changes to equipment design are recommended where appropriate
	4.4 Problem is passed to vendor where repair has proved either not practical or not commercially viable
	4.5 Cause and effect studies are undertaken and results forwarded to the appropriate area for necessary action
	4.6 Fault details and details of repair action are provided to all areas associated with fault/problem action
	4.7 Fault histories are updated
	4.8 Final tests are undertaken to ensure ongoing repair and to check for other likely faults in the system

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CS610 Customer Relations 6
- CS620 Service Agreements 6
- DI610 Digital Theory 6
- DI630 Digital Radio 6
- EN610 Enterprise Escalation Procedures 6
- EN620 Enterprise Information Systems 6
- EN630 Enterprise Organisational Policy 6
- EN650 Enterprise Operations Policy 6
- ET420 Amplifiers 4
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN640 Workplace Networking 6
- MA620 Mathematics 6
- NE620 Network Architecture 6
- NE630 Network Signalling 6
- NE650 System Protocols 6
- OH212 Safe Work Practices–Optical Fibre Cable
- OH610 Occupational Health and Safety 6
- PR610 Problem Solving 6
- PS610 Plans and Specifications 6
- RA610 Antennas 6
- RA620 Radio Frequency Theory and Hazards 6
- SC610 Science 6
- SU620 Leadership 6
- SW620 Packet Data Switching 6
- SW630 Switch Networks 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6
- TO610 Use of Tools 6
- TO620 Anti-static Procedures 6

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- TR610 Transmission Theory 6
- TR620 Light/Laser Theory 6
- TR630 Modulation Theory 6
- TR640 Narrow and Wideband Principles 6
- TR660 Spectrum Management 6
- TR670 Transmission Technologies and Products 6
- TR680 Transmission Hierarchy 6
- TR690 Transmission Test Instruments 6
- VO610 Video Network Techniques 6
- VO620 Video and Sound Principles 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS

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Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification level	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation
Faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage
Fault escalation procedures	Are defined by the enterprise and usually relate to appropriate repair times
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, antenna sweep measurements
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer
Tools	May include: screwdrivers, pliers, cutters, wire strippers, soldering iron, insulation displacement tools, cable termination tools
Transmission medium	May be: fibre, cable, radio, satellite, microwave, video

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Alarm management systems	Each component of the network has its own alarm management systems that are self monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
Hardware faults	May include: blown fuses, connectors, wiring, cards and card components, antennas, feeders, cable, weather damage, lightning damage
Conditions that may not generate an alarm	May be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors, animal damage
A captured environment	Is usually a network or network element model and may exist within the enterprise or with the vendor
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate's:
  - Methodical approach identification and ranking of likely causes of highly complex faults
  - Use of fault history including details of all investigations undertaken on a first in basis, in identification of highly complex faults
- Mentor/assessor observes candidate's ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Mentor/assessor observes candidate's interaction with enterprise personnel, customers and other contractors, customer focus and consideration of customer needs.
- Candidate submits hard copy of at least two written reports demonstrating:
  - Analysis of tests already undertaken
  - Conduct of further tests appropriate to the type of fault identified
  - Interpretation of test results
  - Recognition of potential causes
- Mentor/assessor observes candidate operating in a timely manner, reporting progress, prioritising, and considering financial/commercial implications.
- Mentor/assessor observes rectification of Tier 3 fault within service assurance guidelines and conduct of tests to verify outcomes applying:
  - All related occupational health and safety requirements and work practices
  - Enterprise escalation and outage procedures
- Candidate submits hard copy of at least two documentations of highly complex fault repairs including: nature, location, likely causes and repair methodology.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC092D Undertake outage management

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. This unit covers the operational role associated with a planned or unplanned outage and must be read in conjunction with:

- ICTTC044C Co-ordinate fault rectification and restoration of service following network outages; and
- ICTTC045C Ensure that network changes are implemented as planned with minimal impact

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify outage details	1.1 Reason for a planned outage is clearly established in line with enterprise policy
	1.2 Details relating to an unplanned outage are identified
	1.3 Extent, timing and likely impact of the outage is determined
	1.4 Designated outage co-ordinator is advised of the outage details and authority sought to proceed where outage is planned
	1.5 Arrangements are initiated to advise affected customers of outage details including timing, duration and likely impact
	1.6 Timeframes are determined to cause minimum disruption to the customer in the event of a planned outage
	1.7 Patching and network strategies are developed in accordance with prescribed procedures
	1.8 Outage conditions are simulated where possible to assist with strategy development

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	1.9	Contingency plans are developed, including alternate testing arrangements should they be needed
	1.10	All parties affected by the outage planned or unplanned are notified and organised
2 Implement planned outage	2.1	Checks are made with all parties involved with the outage immediately prior to the event
	2.2	Communications between near and distant ends are established
	2.3	Temporary rearrangements are implemented where needed and possible
	2.4	Outage is implemented in accordance with strategy plan
	2.5	Contingency plan is implemented where needed
3 Assess and arrange repair of unplanned outage	3.1	Alarms are isolated and analysed
	3.2	Alarm priority is determined
	3.3	Likely causes of outage are determined
	3.4	Consultation with network management centre as to proposed action for repair is undertaken
	3.5	Repair action is initiated in accordance with approved enterprise maintenance regime
4 Normalise system	4.1	Patch or network changes are restored as necessary
	4.2	Tests are conducted to verify the normal operation of the system
	4.3	Faults detected are diagnosed, repaired or escalated in accordance with enterprise policy
	4.4	Alarms are checked and action taken as dictated by any alarm condition
	4.5	Configuration of the network is standardised in accordance with specification and operational requirements
	4.6	Performance checks are undertaken and action taken where performance levels not in accordance with requirements
	4.7	Customers are notified of service normalisation
5 Undertake administrative tasks	5.1	Designated outage co-ordinator is advised as to service restoration
	5.2	Quality audit is undertaken on the strategy plan and the success or otherwise of its implementation

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5.3 Cause and effect studies are undertaken into reasons for unplanned outage or where problems occurred both during a planned outage and upon service restoration

5.4 Test results are recorded and filed in accordance with enterprise requirements

5.5 Software/hardware changes necessary are recorded and advised to the appropriate area

5.6 Appropriate records/data bases are updated in accordance with enterprise policy

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- CS430 Repair and Maintenance Obligations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN410 Enterprise Escalation Procedures 4
- EN420 Enterprise Information Systems 5
- EN430 Enterprise Organisational Policy 4
- EN440 Enterprise Operations Policy 4
- ET420 Amplifiers 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- IN440 Workplace Networking 4
- MA420 Mathematics 4
- NE410 Network Equipment 4
- NE420 Network Architecture 4
- NE430 Switch Networks
- OH212 Safe Work Practices–Optical Fibre Cable
- OH410 Occupational Health and Safety 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4

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- PS420 Basic Building Trades 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- SC410 Science 4
- SU410 Planning 4
- SU420 Leadership 4
- SW420 Packet Data Switching 4
- TE410 Basic Telephony 4
- TE420 Outage and Hazard Processes 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR420 Light/Laser Theory 4
- TR430 Modulation Theory 4
- TR440 Narrow and Wideband Principles 4
- TR450 Signalling Principles 4
- TR460 Spectrum Management 4
- TR470 Transmission Technologies and Products 4
- TR480 Transmission Hierarchy 4
- TR490 Transmission Test Instruments 4
- VO410 Video Network Techniques 4
- VO420 Video and Sound Principles 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor

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Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Maintenance regime	A four (4) tier maintenance regime exists within the industry. This consists of: • Tier 1 – remote and/or first in repair/rectification • Tier 2 – specialist repair/rectification • Tier 3 – network support – network/system/equipment specialist • Tier 4 – vendor support
Fault rectification level	Varies from enterprise to enterprise, but revolves around fault clearance time, customer impact and alarm priority
Alarm priorities	Are enterprise specific but generally consist of four (4) levels: • Priority 1 impact – demanding immediate attention • Priority 2 degradation – decision to be made as to attention given and depends on impact on both network and customer • Priority 3 hazardous – attention given as part of normal activities • Priority 4 no action – alarm noted
Escalation	Is usually through the tiers, but can vary again depending in the nature and impact of the problem
Decision for vendor involvement	Rests with tier 3 alone, and generally tier 3 and tier 4 work together on problem resolution
Alarm/fault handling procedures	Are clearly specified within enterprise instructions and guidelines, along with the enterprise policy relating to fault/problem escalation

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Alarm management systems	Each component of the network has its own alarm management systems that are self monitoring and usually have built in error counters. Such systems are normally centralised and are physically monitored
Alarms	Could result from: new installation, planned outage, network failure, faulty circuits, security breaches, animal damage
Alarm types	Are usually equipment/product or vendor specific and can include: high errors, low errors, loss of signal, AIS, power supply failure, degraded performance, alarm indicating system, loss of optic receiver, laser shutdown/failure, receive signal fail, pilot failure, transmit failure, modulator failure, demodulator failure, digital alarms, low transmitter power, loss of line, high and low deviation, data, VSWR, door, over temperature
Conditions that may not generate an alarm	May be: no dial tone, cut offs, noise, clicking, hums, one way transmission, fading, errors, animal damage
Transmission systems	Are governed by international standards set by the ITU
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor:
  - Analysing the likely impact of outage on both the customer and the network
  - Identifying patch capabilities and equipment operating margins
  - Developing a contingency plan
  - Applying interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors
- Mentor/assessor observes candidate – and candidate delivers at least one oral report to mentor/assessor describing:
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Building a temporary system
- Mentor/assessor observes candidate's ability to comply with all related occupational health and safety requirements, service assurance guidelines and work practices.
- Mentor/assessor observes candidate's ability to:
  - Operate within service assurance guidelines
  - Apply enterprise escalation and outage procedures
  - Maintain customer focus and consideration of customer needs
- Candidate submits hard copies of at least two sets of test results and sets of records.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC093D Manage spare parts

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite. This unit covers the operational role associated with a planned or unplanned outage and must be read in conjunction with:

- ICTTC044C Co-ordinate fault rectification and restoration of service following network outages; and
- ICTTC045C Ensure that network changes are implemented as planned with minimal impact to the customer.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify requirements	1.1 Standard procedures and relevant documentation is obtained
	1.2 Current holdings are monitored and checked against levels determined by procedures
	1.3 Each holding location is checked as to needs
	1.4 Regular assessments are made as to usage and necessary holding levels
2 Procure parts	2.1 Current holdings are matched with need
	2.2 Requests for additional parts are enacted in accordance with enterprise procedures
	2.3 Checks are made as to surplus holdings in other locations
3 Initiate replacement process	3.1 Need for spare parts is determined
	3.2 Data base is activated to check possible location of specific parts required
	3.3 Appropriate checks are initiated to ensure that the part is latest issue and configuration

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	3.4	Arrangements are put in place to deploy the part to the site where it is required
	3.5	Part is changed over with the faulty part
	3.6	Faulty part is recovered and disposed of or returned for repair as determined by condition and enterprise policy
4 Reorder part replacements	4.1	Relevant part request is completed and forwarded to the appropriate enterprise area
	4.2	Delivery of replacement is followed up on a regular and ongoing basis
	4.3	Alternate spares are sought where difficulties are experienced with replacement
5 Complete administrative tasks	5.1	Relevant documentation is completed, signed and forwarded to the appropriate area
	5.2	Regular audit of stock holdings is conducted in accordance with enterprise policy
	5.3	Checks are made to ensure that all parts are latest issue and are compatible with installed systems and equipment

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- EN320 Enterprise Information Systems 3
- EN430 Enterprise Organisational Policy 4
- IN310 Interpersonal Relationships 3
- IN320 Teamwork 3
- IN440 Workplace Networking 4
- MA320 Mathematics 3
- NE310 Network Equipment 3
- NE320 Network Architecture 3
- OH310 Occupational Health and Safety 3
- SP310 Spare Parts 3
- TO310 Use of Tools 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Spare parts	May include: panels, cards, sub racks, systems, components, connectors, wiring, harnesses, software, filters, antennas, power equipment
Management of spare parts	Is enterprise specific
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Identification of the relevant network systems/equipment and features and associated components
- Ordering of spare parts
- Application of spare parts management procedures
- Accurate records and housekeeping
- Spare parts storage ensuring most efficient and economical arrangement
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors
- All related occupational health and safety requirements and work practices
- Customer focus and consideration of customer needs

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC094D Verify new software and hardware releases

Unit descriptor

This unit may apply to switching, transmission and radio (both fixed and mobile) network and the various transmission paths i.e. cable, optic fibre, radio, microwave and satellite.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan the testing of new software releases	1.1 All manuals, specifications and instructions associated with new releases are studied and areas of uncertainty are discussed with the vendor
	1.2 Decision is made on whether to test the release in a simulated or live environment
	1.3 Details relating to testing of release including time, location and likely impact are discussed with network management centre
	1.4 Resources required to assist with the test are determined and their availability negotiated
	1.5 Impact on the network and its impact on customers during the test are notified through the appropriate channels
	1.6 Outage requirements are determined, planned and notified as appropriate in conjunction with network management
	1.7 Contingency plans are developed to cater for likely problems during the test
2 Undertake tests	2.1 New software is loaded in accordance with specification
	2.2 Tests are undertaken in accordance with specification
	2.3 Functionality and features are assessed against vendor documentation, discrepancies noted and discussed with the vendor

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	2.4	Compatibility with old software/hardware is tested and problems identified, corrective action taken and/or discussed with vendor as required
	2.5	Contingency plans are implemented in conjunction with network management where difficulties arise which impact on the integrity of the network
3 Undertake administrative work	3.1	Test results are documented and stored in accordance with enterprise policy
	3.2	Ongoing or likely problems are discussed with the vendor and follow up arrangements initiated to ensure permanent solution
	3.3	Software/hardware release is cleared for input to the system in accordance with enterprise procedures

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CS610 Customer Relations 6
- CS620 Service Agreements 6
- DI610 Digital Theory 6
- DI630 Digital Radio 6
- EN610 Enterprise Escalation Procedures 6
- EN620 Enterprise Information Systems 6
- EN630 Enterprise Organisational Policy 6
- EN650 Enterprise Operations Policy 6
- ET420 Amplifiers 4
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN640 Workplace Networking 6
- MA610 Basic Mathematics 6
- NE610 Network Equipment 6
- NE620 Network Architecture 6
- OH610 Occupational Health and Safety 6
- PR610 Problem Solving 6

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- PS610 Plans and Specifications 6
- RA610 Antennas 6
- RA620 Radio Frequency Theory and Hazards 6
- SC610 Science 6
- SU620 Leadership 6
- SW620 Packet Data Switching 6
- SW630 Switch Networks 6
- TE610 Telephony Principles 6
- TF610 Test Equipment 6
- TF620 Test Analysis and Diagnosis 6
- TR610 Transmission Theory 6
- TR630 Modulation Theory 6
- TR640 Narrow and Wideband Principles 6
- TR660 Spectrum Management 6
- TR680 Transmission Hierarchy 6
- VO610 Video Network Techniques 6
- VO620 Video and Sound Principles 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite

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Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Affect of new software/ hardware releases	Is assessed on: network, network management tools, new vendor network elements
First release software testing	Decision on whether testing of first release software occurs in a simulated (controlled) environment or in a live situation may depend on: • The nature of the release • The availability of suitable location for testing • The compatibility of existing software and hardware
Tests, both type and extent	Are normally detailed in the manufacturers specifications but can and usually is varied by the tester during the testing process, depending on the findings of the tests and their compatibility with design specifications
Tests	May include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys – mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output – audio/bit error rate, full test
Functions and features related to software releases	Are equipment/system specific and are detailed in the vendor documentation
Test equipment	May include: multi meters, communication testers, transmission measuring sets, directional couplers, lap top computer, mobile test phones
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Telecommunications Act and associated codes

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least two oral reports to mentor/assessor – demonstrating:
  - Recognition of potential causes of problems and impact on service levels
  - Analysis of impact of integration of new hardware/software release on the network
  - Communication with organisations/people affected by the change and use of these resources in the most effective manner
  - Identification of key performance indicators and the service agreements with customers impacted by the new release
  - Development of a contingency plan
- Mentor/assessor observes candidate competently:
  - Interacting with enterprise personnel, customers and other contractors, while maintaining a customer focus and consideration of customer needs
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
- Candidate implements test regime and submits hard copies of at least two sets of test results with interpretation, and mentor/assessor observes candidate:
  - Identifying equipment/system specifications and required performance standards
  - Adopting a systematic approach to test and analysis of problems arising
  - Adhering to all related occupational health and safety requirements and work practices
- Candidate submits detailed hard copy change/improvement recommendations, demonstrating candidate's problem analysis skills.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC095D Conduct radio frequency measurements

Unit descriptor

In the event of a problem/fault occurring or being identified as a result of the measurement, repair/rectification is covered by units ICTTC085C to ICTTC091C.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan and prepare for measurements	1.1 The need for and the type of measurements required is established
	1.2 Appropriate tools/test equipment are identified and obtained
	1.3 Tools and test equipment are checked for accuracy and calibration organised where required
	1.4 Checks are conducted to ensure that built in tests associated with particular test equipment have run and action taken in accordance with manufacturers specifications in the event of failure
	1.5 Required resources are identified and obtained
	1.6 Impact of measurements on the network are assessed and appropriate personnel, including customers are advised accordingly
	1.7 Previous measurement data is obtained where appropriate
	1.8 Installation specifications and appropriate vendor documentation is obtained
	1.9 In place management frequency data is accessed
	1.10 Necessary safety gear is obtained and checked to be in good working order
2 Conduct radio frequency and level measurements	2.1 Configuration of test gear is selected appropriate to the measurements to be undertaken and in accordance with specifications
	2.2 Appropriate measurement are undertaken in accordance with planned requirements

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	2.3 Measurements are continually checked against specified frequency criteria
	2.4 Number and time span over which measurements are taken is sufficient to enable validity of results
	2.5 Work is conducted in a manner which is safe to self, fellow workers and the public at large
3 Conduct radio frequency hazard measurements	3.1 Source of the potential radio frequency hazard is identified
	3.2 Previous radio frequency level measurements are obtained
	3.3 Configuration of test gear is selected appropriate to the measurements to be undertaken and in accordance with specifications
	3.4 Appropriate measurements are undertaken in accordance with planned requirements
	3.5 Measurements are continually checked against specified frequency criteria
	3.6 Number and time span over which measurements are taken is sufficient to enable validity of results
	3.7 Radio frequency levels are assessed at both occupational and non occupational distances
	3.8 Work is conducted in a manner which is safe to self, fellow workers and the public at large
4 Analyse measurement outcomes	4.1 Measurements are checked against relevant standards and specifications
	4.2 Specifications are checked with the vendor where spurious results are obtained
	4.3 Problems identified are either fixed or escalated in accordance with enterprise procedure
	4.4 Negotiations are undertaken with relevant Spectrum Management Authority where there is a conflict as to the frequency measurement reading
	4.5 Results are documented and reports prepared and forwarded to appropriate area where resolution of a frequency dispute cannot be resolved
	4.6 Variations to radio frequency hazard levels are assessed and recorded

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	4.7	Reasons for radio frequency hazard level variance is determined and appropriate corrective action initiated or escalated to appropriate level in accordance with enterprise policy
	4.8	Appropriate checks are initiated to ensure that prescribed safety arrangements associated with radiation are in place and corrective action taken if not
5 Document measurement results	5.1	Appropriate proforma is obtained
	5.2	Details of measurement and the time and date of reading is recorded on the correct proforma
	5.3	Test configurations and all other relevant data are recorded in accordance with enterprise policy or spectrum management requirements
	5.4	Measurement results are located in an appropriate location on site for future reference
	5.5	Test results are recorded on a central data base as required in accordance with enterprise policy
	5.6	Results are on forwarded to the Spectrum Management Agency where required by legislative requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- MA420 Mathematics 4
- NE410 Network Equipment 4
- NE420 Network Architecture 4

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- OH320 Safe Handling
- OH410 Occupational Health and Safety 4
- OH420 Occupational Health and Safety Regulations 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- PS420 Basic Building Trades 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- RC310 Riggers Certificate 3
- SC410 Science 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR410 Transmission Theory 4
- TR460 Spectrum Management 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM

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Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Tools and test equipment	May include: power meter, frequency analyser, spectrum analyser, dummy loads, constellation analysers, radio frequency connectors tests and cords, radiation meter
Radio frequencies	Are allocated under licence by the relevant Spectrum Management Authority
Measurements	May be undertaken as a routine, a complaint from another frequency user, on request by the relevant Spectrum Management Authority or other government bodies
Safety precautions associated with radiation hazards	Are defined by legislation
Details of operating frequency and radiation levels associated with wireless/radio equipment	Are held securely on site
Tests	Are undertaken in accordance with specification and/or enterprise policy but can be varied to suit the conditions and the uncertainty surrounding validity of results
Relevant legislation, codes, regulations and standards	Include: • International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law • Spectrum Management legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate:
  - Identifying measurements required and expected outcomes
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Focusing on the customer and consideration of customer needs
  - Using test equipment including: power meter, frequency analyser, spectrum analyser, dummy loads, constellation analysers, radio frequency connector tests and cords
  - Complying with all related occupational health and safety requirements and work practices
  - Interacting with enterprise personnel, customers and other contractors
  - Analysing test results.
- Candidate submits hard copy of at least three sets each of radio frequency measurement results and radio frequency hazard measurement demonstrating successful completion of the procedures.
- Candidate delivers at least three oral reports to mentor/assessor reporting on findings complete with recommendations.
- Candidate submits hard copy of at least three written reports documenting measurement results.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC096D Conduct field tests of radio and wireless networks

Unit descriptor

This unit covers the requirements for a person to make field tests on mobile and radio telephony systems to assist in optimising system operation. Could include Packet based information transfer supporting a wide range of services Utilising end to end Quality of Service (QoS) capability as described by the ITU-T Next Generation Networking (NGN) Study group 13 definition.

This unit applies to both cellular and trunked radio systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan tests	1.1 Need for tests and the particular types of tests to be undertaken are identified
	1.2 Area to be tested is clearly identified
	1.3 Location and number of tests are determined
	1.4 A pre determined route is established
	1.5 Current data is obtained from a print out from the switch(es)
2 Obtain tools	2.1 Appropriate tools/test equipment are identified and obtained
	2.2 Tools and test equipment are checked for accuracy and calibration organised where required
	2.3 Checks are conducted to ensure that built in tests associated with particular test equipment have run and action taken in accordance with manufacturers specifications in the event of failure
3 Conduct tests	3.1 Tests specific to equipment, area and test purpose are conducted in accordance with specification
	3.2 Sufficient test calls are made to achieve an adequate statistical sample

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	3.3	Validity of tests is ensured by comparison with current and previous data as required
	3.4	Work is conducted in a manner which is safe to self, fellow workers and the public at large
4 Analyse test results	4.1	Test results are analysed against specified standards
	4.2	Variations to standards are investigated and reasons identified
	4.3	Faults are diagnosed and either repaired or escalated in accordance with enterprise policy
	4.4	Design faults are documented and recommendations for change are submitted to the appropriate enterprise area
	4.5	Service degradation is noted and action initiated to optimise or reconfigure equipment in accordance with specifications and/or enterprise directions
5 Undertake administrative tasks	5.1	Test results are recorded on the appropriate proforma and/or data base
	5.2	Results are distributed in accordance with enterprise policy
	5.3	Tools and test equipment is checked and returned for recalibration or stored in accordance with enterprise policy
	5.4	Transporting of tools and test equipment in suitable protective casing is organised where appropriate

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- DI410 Digital Theory 4
- DI430 Digital Radio 4
- EN420 Enterprise Information Systems 4
- EN430 Enterprise Organisational Policy 4
- ET420 Amplifiers 4

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- IN410 Interpersonal Relationships 4
- IN420 Teamwork 4
- MA410 Basic Mathematics 4
- NT410 Emerging Network Technologies
- OH410 Occupational Health and Safety 4
- PE320 Remote Work
- PS410 Plans and Specifications 4
- PS420 Basic Building Trades 4
- RA410 Antennas 4
- RA420 Radio Frequency Theory and Hazards 4
- TE460 Pager Operation 4
- TE480 CMTS 4
- TF420 Test Analysis and Diagnosis 4
- TO410 Use of Tools 4
- TO420 Anti-static Procedures 4
- TR430 Modulation Theory 4
- TR460 Spectrum Management 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks and other emerging network technologies
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite. Services could fall within the general heading of Next Generation Networks delivering services such as Voice over IP, Multimedia, data transfer, video etc.

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Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Tools and test equipment	May include: GPS System, lap top computer, motor vehicle, in vehicle and hand held phone, test software, fixed antenna on vehicle, frequency plans, geographic maps
Test equipment calibration	Test equipment self calibrates, but primary/secondary calibration is undertaken by appropriate specialists
Types of tests undertaken	Include: integration, quality of signal, comparison with other carriers, optimisation, coverage
Tests	Are undertaken in accordance with specification and/or enterprise policy but can be varied to suit the conditions and the uncertainty surrounding validity of results
Reason for tests	May include: validation e.g. base station, optimisation, comparison, coverage confirmation, signal level
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000 and 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Privacy Act • Private property law • Spectrum management

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor – planning relevant tests, including:
  - Driving and navigation capability
  - Identification of tests required and likely outcomes
  - Interaction with enterprise staff, customers and contractors.
- Mentor/assessor observes candidate obtaining and using test tools, including GPS system, lap top computer, test software and hand held phone.
- Mentor/assessor observes candidate:
  - Complying with all related occupational health and safety requirements and work practices
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Candidate submits hard copy of at least three test result analyses and reports detailing outcomes with recommendations as to action to be taken.
- Mentor/assessor observes candidate's customer focus and consideration of customer needs.
- Candidate submits at least three sets of hard copy test results, recorded on the appropriate proforma and/or database.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC097D Conduct tests on handset enhancements and international roaming agreements

Unit descriptor

This unit covers the requirement for a person to test the international roaming facilities on mobile and radio telephony equipment. This unit applies to both cellular and trunked radio systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify need for tests	1.1 Details of new mobile equipment and associated features are obtained and analysed
	1.2 Details of new roaming agreements are received
	1.3 SIM cards associated with phones are received and programmed into test equipment
2 Plan tests	2.1 Testing conditions are established
	2.2 Details and location of tests to be conducted are developed
	2.3 Resource needed to conduct tests are identified and organised
	2.4 Routing information for international carriers is received and studied
	2.5 Contact details for international carriers is identified
	2.6 Translation of international carrier SIM card information is arranged
	2.7 Specific details relating to agreement such as restricted access is established
	2.8 Network management centre is advised of the test details and work permit obtained where necessary

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3 Initiate test calls	3.1	Test calls are made to specified areas of the network in accordance with ITU regulations and in accordance with the roaming agreement
	3.2	All enhancement/features are fully tested against manufacturers specifications
	3.3	Tests are undertaken to ensure billing integrity
	3.4	Sufficient test calls are made to ensure the validity of the test
	3.5	A drive test is organised where appropriate
4 Analyse results	4.1	Performance results on mobile phone enhancements and new features are documented and checked against manufacturers stated specifications
	4.2	Impact of enhancements and new features on the network are established with network management staff
	4.3	Tests associated with roaming agreements are documented and discussed with international carrier where appropriate
5 Finalise action	5.1	Recommendations are made to marketing people relating to results of tests associated with enhancements/new features on mobile phones
	5.2	Results of tests are forwarded to mobile phone manufacturer where appropriate
	5.3	Full details of tests associated with roaming agreements are documented and forwarded to international company concerned

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CS610 Customer Relations 6
- DI610 Digital Theory 6
- DI630 Digital Radio 6
- EN620 Enterprise Information Systems 6
- EN630 Enterprise Organisational Policy 6
- ET420 Amplifiers 4

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- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN640 Workplace Networking 6
- MA610 Basic Mathematics 6
- NE620 Network Architecture 6
- OH610 Occupational Health and Safety 6
- PR610 Problem Solving 6
- PS610 Plans and Specifications 6
- RA610 Antennas 6
- RA620 Radio Frequency Theory and Hazards 6
- RA630 Mobile Equipment 6
- RE670 ITU and International Agreements 6
- SC610 Science 6
- SU620 Leadership 6
- TE610 Telephony Principles 6
- TE680 CMTS 6
- TF620 Test Analysis and Diagnosis 6
- TF640 Radio Tests 6
- TR630 Modulation Theory 6
- TR660 Spectrum Management 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite

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Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Mobile phone enhancements	May include: message waiting indicators, receipt messages, fax/data
Tests on enhancements/ new phones and features	Include: operational capability, compatibility with normal features provided by carriers, impact on the network, check against manufacturers standards, battery life, aerial, phone durability, ciphering, authentication
International roaming agreement testing	Is conducted under the auspices of ITU regulation 24 and standards defined therein
Testing conditions	May include: acceptance to network, establishing path, CCS signalling
Translation of international carrier SIM cards	Can involve: language, software loading and switch changes such as additions, network growth and upgrades
Tests	Involve talking to HLR for both billing purposes and enabling for roaming
Frequency of tests associated with roaming agreements	Is specific to enterprise but can be done at least twice a week
Test calls	Can be made to directory assistance, emergency numbers and dedicated numbers on the PSTN. The are made mobile to fixed phone and mobile to mobile
Information provided to international carrier	Includes: test time, date recorded, call success, call quality
Tests	May involve special test software

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Relevant legislation, codes, regulations and standards include:

- International Standards ISO 9000 and 9001
- ACMA Standards TS 14
- ITU recommendations
- Occupational Health and Safety
- Privacy Act
- Frequency management

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor – identifying relevant tests, including:
  - Operational capability
  - Compatibility
  - Network impact
  - Check against manufacturer's standards
  - Battery life
  - Aerial
  - Phone durability
  - Likely outcomes
- Mentor/assessor observes candidate's competency in:
  - Interacting with enterprise personnel, customers and other contractors
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
  - Translating of international sim cards including: language, software loading, switch changes
  - All related occupational health and safety requirements and work practices
- Mentor/assessor observes candidate's ability to:
  - Maintain customer focus and consideration of customer needs
  - Conduct international roaming agreement testing in accordance with its recommendations
  - Use test equipment, conduct tests

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- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor:
  - Reporting on findings
  - Applying international roaming agreements
  - Interpreting results
- Candidate to submit at least three written reports containing analyses of new handsets/features and detailed findings. One of these reports to be on a type of handset not previously encountered in supervised training.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC098D Monitor the capacity of and recommend changes to the mobile network

Unit descriptor

This unit covers the requirements for a person to make recommendations at the system design level for mobile and radio telephony systems.

This applies to both cellular and trunked radio systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify current data	1.1 Details of current traffic levels are obtained
	1.2 Customer forecast data is obtained from marketing group
	1.3 Planned network growth is identified from approved enterprise plans
	1.4 Capacity trigger criteria is obtained from marketing
2 Analyse data	2.1 Identified data is applied against trigger criteria
	2.2 Coverage and cell parameters are determined
	2.3 Requirements for additional capacity is identified
3 Make recommendations relating to capacity changes	3.1 Changes to frequency parameters are identified and recommendations submitted to frequency planners
	3.2 Recommendations relating to capacity are developed and submitted to planning personnel
	3.3 Ability of transmission path and switch resources to carry increased capacity is assessed and recommendations for improvement are submitted to planning personnel
	3.4 Traffic is manipulated through switch parameter settings as a means of relieving traffic congestion
	3.5 Cost of proposed changes is determined and appropriate return on investment studies undertaken

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4 Assess capacity changes	4.1 Tests and studies are organised to ensure that increased capacity adequately caters for traffic flow
	4.2 Recommendations for further change to network is made in the event that the increase does not fully meet need or provides other problems

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI610 Communication 6
- CO610 Computer Skills 6
- CS610 Customer Relations 6
- DI610 Digital Theory 6
- DI630 Digital Radio 6
- EN620 Enterprise Information Systems 6
- IN610 Interpersonal Relationships 6
- IN620 Teamwork 6
- IN640 Workplace Networking 6
- MA620 Mathematics 6
- MA630 Mathematical Modelling 6
- NE620 Network Architecture 6
- OH610 Occupational Health and Safety 6
- PR610 Problem Solving 6
- RA620 Radio Frequency Theory and Hazards 6
- RA640 Mobile Traffic Management Principles 6
- SC610 Science 6
- SU610 Planning 6
- TE610 Telephony Principles 6
- TF620 Test Analysis and Diagnosis 6
- TR650 Traffic Management 6
- TR660 Spectrum Management 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries	Are now being crossed with technologies such as Asynchronous Transfer Mode (ATM), Digital European Cordless Telephone (DECT), ISDN, and intelligent networks
Network systems and products	Vary considerably across the specific technologies and are usually unique to a particular vendor
Technologies	Can be described in broad terms as: switching, transmission, radio (fixed and mobile), video and satellite
Transmission medium	May be: copper cable, coaxial cable, optic fibre cable, radio, video, satellite
Network Architecture	Can be described as: Analogue (to be phased out by 2000), PDH (plesiochrynous digital hierarchy), SDH (synchronous digital hierarchy), ATM
Network hierarchy	Can be described as backbone, transport, broadband, data, HLS, CLS
Capacity trigger	Can be formula, erlang, feature effect, forecast method
Frequency plans	Include: interference levels, frequencies, signal levels, frequency reuse, degree of separation
Traffic data	Is generally available from: network management tool, switch
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000, 9001 • ACMA Standards TS 14 • ITU recommendations • Occupational Health and Safety • Spectrum Management

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Mentor/assessor observes candidate's competency in:
  - Source identification, collection and analysis of relevant data
  - Preparing of a plan indicating growth potential and recommendations for meeting such growth within timeframes which meets customer demands
  - All related occupational health and safety requirements and work practices
- Mentor/assessor observes candidate – and candidate delivers at least three oral reports to mentor/assessor explaining:
  - Using tools and software packages for forecasting and measurement
  - Identifying site/ channel capacity, relevant network growth and forecasting growth
  - Reading, interpreting and using equipment/system manuals and specifications and relevant enterprise policy and documentation
- Candidate delivers at least two oral reports to mentor/assessor explaining:
  - Interaction with enterprise personnel, customers and other contractors
  - Customer focus and consideration of customer needs
- Candidate submits hard copy of a report containing assessment of required capacity changes.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC099D Remotely locate and identify cable network faults

Unit descriptor

This unit applies to voice, vision and data telecommunications applications.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Verify fault report	1.1 Source of fault is identified from available information
	1.2 Where fault is reported by customer, customer relationship is established
	1.3 Operational testing is performed in accordance with type of fault presentation, fault environment and enterprise guidelines
	1.4 Nature of fault presentation is identified from available information and operational test data
	1.5 Historical data are analysed to identify possible causes and/or solutions
2 Identify and clarify nature of fault	2.1 The problem is clearly described or identified from test data
	2.2 Likelihood of a problem existing in the cable or electronics systems is assessed
	2.3 Urgency and impact of fault is determined and required response time frame identified
3 Dispatch fault finding field personnel	3.1 Detailed report is prepared in accordance with enterprise guidelines
	3.2 Report is completed and forwarded to appropriate staff in accordance with enterprise guidelines

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI410 Communication 4
- CO410 Computer Skills 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU470 Project Management 4
- TF410 Test Equipment 4
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Data in relation to the fault	May include: site installation and maintenance records, manufacturer's documentation, urgency of situation, test results, type of fault
Equipment in which the fault may occur	May include: cables (both with and without air pressure), connections, electronic equipment, entire system, antennae, radio system
Historical details	May relate to: service records, customer interaction, name of previously involved staff, equipment type
Suitability of test equipment	May include: equipment calibration certification is current to reduce possibility of unreliable test data and ensure traceability
Work	Can relate to scheduled and unscheduled maintenance
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements

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- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history in fault identification
- Identification and ranking of likely causes of faults
- Methodical approach to fault identification
- Conduct of tests appropriate to the type of fault identified
- Interpretation of test results
- Application of enterprise escalation and outage procedures
- Provision of clear and precise instructions to staff engaged in on-site repair
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors
- All related occupational health and safety requirements and work practices
- Customer focus and consideration of customer needs

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC100D Locate and diagnose cable faults

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Obtain suitable test tools and equipment	1.1 Tools and test equipment relevant to the identified system type and fault are obtained
	1.2 Equipment is set up in accordance with manufacturer's specifications, checked to be in safe working order and calibration is current
2 Establish context and background information	2.1 Safety hazards and risks associated with the site and installation are identified
	2.2 Site variables are determined to enable a full assessment of the fault context
3 Apply simple checks and tests	3.1 Continued existence of problem is confirmed and verified against fault report
	3.2 Site installation records and manufacturer's documentation is obtained and reviewed to identify likely solutions
	3.3 Cable, conduit and pit are visually or physically checked for external signs of defects / damage in accordance with applicable maintenance manual
	3.4 Simple connections, plugs and leads are checked for operation and against reference items

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4	**Locate cable fault**	4.1 Approach to fault identification is methodical, safe, and suitable for system and problem type
		4.2 Test suitable to fault type, equipment, service type, and location is selected/devised
		4.3 Fault is progressively isolated, as appropriate, using selected test equipment
		4.4 Continued existence of problem is verified regularly
		4.5 Fault is identified without undue interruption to customer activity in the shortest time possible
5	**Diagnose cable fault**	5.1 Options to rectify fault are determined and presented for decision
		5.2 Test methods and results are promptly documented and filed with other system installation records
		5.3 Warranties and service agreements are checked to establish if any identified repair / alteration requirement is covered by such documents
6	**Provide temporary service**	6.1 Provision for temporary service is determined based on enterprise guidelines
		6.2 Where temporary service is required, this provision is made and communicated to the appropriate enterprise staff
		6.3 Measures are taken to ensure that the temporary service meets the intended standards of the existing cable
		6.4 Details of identified problem are clearly explained to the customer
		6.5 Service that satisfies customer needs is provided as promptly as possible
7	**Determine parties liable for costs**	7.1 Whether or not repair costs are recoverable is determined by evaluation of evidence in light of enterprise business policies
		7.2 Evidence is collected for possible future cost recovery or legal use and reports annotated for future reference
		7.3 Customer is informed of proposed cost, where appropriate, in accordance with enterprise guidelines

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI410 Communication 4
- CO410 Computer Skills 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU470 Project Management 4
- TF310 Test Equipment 3
- TF410 Test Equipment 4
- TO310 Use of Tools 3
- TO330 Installation Practices 3
- TO410 Use of Tools 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)

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Cable type	May be: optic, coaxial, copper, aluminium, wave guides, under air pressure
Costs	May be recoverable when responsibility for damage can be allocated eg. contractor, other utilities, private individual May not be recoverable when damage was incurred by the enterprise
Data in relation to the fault	May include: site installation and maintenance records, manufacturer's documentation, customer interaction and equipment type, identification of staff previously involved
Enterprise records	May record: type of fault, cause of fault, location of fault, recommended repair activity
Evidence	May be: photographic, witnesses, observations, technical data for further analysis, sampler, incorrect work practices
Equipment in which the fault may occur	May include: cables (with and without air pressure), connections, entire system
Location of fault	May be at any point throughout the Customer Access Network and may be: enclosed, unenclosed, in a joint, at a termination point, along the length of the cable, on premises not owned by the enterprise, and may be aerial or underground
Options for repair	May include: replace cable, replace joint, repair cable, repair joint, change pair, replace jumper, replace terminal, replace electrical equipment, replace protection equipment, temporary / interim repair
Site variables	May include: environment in which equipment is installed, cable type on which equipment is installed, service type carried by equipment, location of equipment installation, possible safety hazards
Suitability of test equipment	May include: Equipment calibration certification is current to reduce possibility of unreliable test data and ensure traceability
Temporary service	May be the use of a different transmission path / medium (eg emergency radio)

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Type of equipment installed	May be: polarity conscious
Work	Can relate to scheduled and unscheduled maintenance and may involve individual and team related activities
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International standards • Local government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history in fault identification.
- Identification and ranking of likely causes of faults.
- Methodical approach to fault identification.
- Conduct of tests appropriate to the type of fault identified.
- Interpret test results.
- Application of all related OHS requirements and work practices (including protective clothing and personal safety items).
- Safe use of general hand and power tools and general equipment normally related to these tasks.
- Correct interpretation and application of relevant regulations and standards.
- Interpersonal skills related to clients, employer, supervisors, work associates, team members, other contractors.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC101D Locate and diagnose electronic faults

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish fault context	1.1 Site variables are determined to enable a full assessment of the fault context
	1.2 All available data in relation to the fault is collected and nature and extent of preliminary investigations are ascertained
2 Conduct preliminary tests	2.1 Where testing is to be performed on premises not owned by enterprise, appropriate consultation is undertaken in accordance with enterprise policy
	2.2 Visual inspection for likely damage is undertaken and cable terminations are checked for integrity
	2.3 Continued existence of problem is confirmed
	2.4 Electronic equipment is functionally tested, in accordance with maintenance manual, for evidence of serviceability or malfunction
3 Obtain suitable test tools and equipment	3.1 Test suitable to fault presentation, equipment, service type, and location is selected / devised
	3.2 Suitable tools and test equipment are selected, are in safe and accurate working order, and are used in accordance with manufacturer's specifications
	3.3 Test equipment is set up to suit the site conditions in accordance with manufacturer's specifications

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4 Locate fault	4.1	Approach to fault identification is methodical, safe and suitable for system and problem type
	4.2	Fault is progressively isolated to specific equipment or parts of equipment using selected test
	4.3	Test results are interpreted accurately and compared against manufacturer's and site specifications for equipment and system performance
	4.4	All test requirements and parameters are considered when evaluating test results and test results are assessed fairly and accurately and are based on verifiable data
	4.5	Test results are documented accurately and without delay to ensure test results remain current
	4.6	Work is performed safely to remove risk of injury to operator, other users and / or equipment
	4.7	Continued existence of fault is verified regularly
5 Diagnose fault	5.1	Site installation records and manufacturer's documentation is obtained and reviewed to identify likely solutions
	5.2	Possible cause of fault is clearly identified and accurately recorded in maintenance documentation, where required
	5.3	Repair or adjustment requirements are determined
	5.4	Specialist advice is obtained, where required, to assist with diagnostic processes
	5.5	Warranties and service agreements are checked to establish if any identified repair / alteration requirement is covered by such documents
6 Provide temporary service	6.1	Provision for temporary service is determined based on enterprise guidelines
	6.2	Where temporary service is required, this provision is made and communicated to the appropriate enterprise staff
	6.3	Measures are taken to ensure that the temporary service meets the intended standards of the existing equipment
	6.4	Details of identified problem are clearly explained to the customer
	6.5	Service that satisfies customer needs is provided as promptly as possible

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7 Determine parties liable for costs	7.1 Whether or not repair costs are recoverable / chargeable is determined by evaluation of evidence in light of enterprise business policies
	7.2 Evidence is collected for possible future cost recovery or legal use and reports annotated for future reference
	7.3 Customer is informed of proposed cost, where appropriate, in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI410 Communication 4
- CO410 Computer Skills 4
- EL420 Impedance Matching 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU470 Project Management 4
- TF310 Test Equipment 3
- TF410 Test Equipment 4
- TO310 Use of Tools 3

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Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
Cable type	May be: optic fibre, coaxial, aluminium, copper, wave guide
Costs	May be recoverable when responsibility for damage can be allocated eg. contractor, other utilities, private individual May not be recoverable when damage was incurred by the enterprise
Data in relation to the fault	May include: site installation and maintenance records, manufacturer's documentation
Enterprise records	May record: type of fault, cause of fault, location of fault, intended repair activity
Equipment in which the fault may occur	May include: connections, electronic equipment, entire system, antennae, radio system, transmission equipment, switching equipment, line conditioning, transceiving equipment, multiplexer, concentrator, satellite receiver

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Historical details	May relate to: service, customer interaction and equipment type
Equipment at fault	May be at any point throughout the Customer Access Network and may be: enclosed, unenclosed, on premises not owned by the enterprise, and may be aerial or underground
Site variables	May include: environment in which equipment is installed, cable type on which equipment is installed, service type carried by equipment, location of equipment installation, possible safety hazards
Suitability of test equipment	May include: Equipment calibration certification is current to reduce possibility of unreliable test data and ensure traceability
Temporary service	May be the use of a different transmission path / medium (eg emergency radio)
Type of equipment being diagnosed	May be: polarity conscious
Work	Can relate to scheduled and unscheduled maintenance and may involve individual and team related activities
Relevant legislation, codes, regulations and standards	May include: • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code

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- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Use of fault history in fault identification.
- Identification and ranking of likely causes of faults.
- Methodical approach to fault identification.
- Conduct of tests appropriate to the type of fault identified.
- Interpret test results.
- Ability to prioritise, operate in a timely manner and report progress.
- Recognition of potential causes.
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC102D Repair communication system faults

Unit descriptor

This unit applies to all telecommunications applications including telephony, wireless, data, video and multi media.

This unit applies to repairs to equipment covering re-calibrate, adjust, and/or replace hardware.

This unit applies to computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs).

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for equipment repairs	1.1 Where equipment is located on premises not owned by enterprise, appropriate consultation is undertaken in accordance with enterprise policy
	1.2 Warranties and service agreements are checked to establish if any identified repair / alteration requirement is covered by such documents
	1.3 The need for replacement or repair is assessed or confirmed in accordance with enterprise guidelines, site requirements and type of equipment
	1.4 Any required additional skills are identified and assistance arranged as appropriate
	1.5 Site access and security arrangements are made where required
	1.6 Customers and / or other affected parties are notified of works to be undertaken
	1.7 Occupational health and safety legislation, enterprise procedures and site specific safety requirements are observed
	1.8 Repair equipment is obtained, and materials are ordered to be on site at the required time
	1.9 Electronic equipment is taken out of commission for repair or replacement

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2 Re-calibrate electronic equipment	2.1 Electronic equipment settings are ascertained from manufacturer's instructions
	2.2 Electronic equipment is re-calibrated to accord with pre-set readings
	2.3 Electronic equipment is functionally tested and, where necessary, cut back into commission and retested
3 Adjust electronic equipment	3.1 Nature and extent of required adjustment is re-checked
	3.2 Adjustments are made to electronic equipment as determined and within manufacturer's guidelines
	3.3 Electronic equipment is functionally tested and, where necessary, cut back into commission and retested
4 Replace hardware	4.1 Tools required for the repair or replacement are selected and obtained
	4.2 Any replacement of parts or equipment is compatible with existing parts and equipment
	4.3 Repair or replacement is undertaken in accordance with manufacturer's specifications
	4.4 Electronic equipment is functionally tested and, where necessary, cut back into commission and retested
5 Complete works on site	5.1 All appropriate records are completed, signed, and stored in accordance with enterprise guidelines
	5.2 Any changes to equipment are clearly noted on the appropriate records and stored in accordance with enterprise guidelines
	5.3 All tools and equipment are cleaned, adjusted and stored in accordance with enterprise guidelines and manufacturer's specifications
	5.4 Waste and debris are removed from worksite and disposed of in accordance with environmental requirements and enterprise guidelines
	5.5 All parties notified prior to works are notified of fault repair in accordance with enterprise guidelines

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CO410 Computer Skills 4
- EL420 Impedance Matching 4
- EN420 Enterprise Information Systems 4
- EN450 Enterprise Policy and Practice
- MA210 Basic Telecommunications Mathematics
- OH410 Occupational Health and Safety 4
- PK410 Product Knowledge 4
- PR410 Problem Solving 4
- PS410 Plans and Specifications 4
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU470 Project Management 4
- TE410 Basic Telephony 4
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TF410 Test Equipment 4
- TF430 Fault Finding 4
- TO310 Use of Tools 3
- TO320 Anti-static Procedures 3
- TO330 Installation Practices 3
- TO410 Use of Tools 4
- TR310 Basic Transmission Theory

Computer Systems

The following relate specifically to the Computer Systems group of qualifications

- CN421 Installing And Managing A Graphical User Interface
- CN422 Configuring And Optimising A Graphical User Interface
- CN430 Digital Electronics 1
- CN431 Digital Electronics 2
- CN435 Digital And Computer Systems
- CN440 Database Fundamentals
- CN460 Fault-Finding And Diagnostic Skills

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Systems	Can include telephony networks, data networks, computer systems including Local Area Networks (LANs) and Wide Area Networks (WANs)
Adjustments required	May include programming change, different calibration setting, movement of hardware / connections
Checks / tests made	May include visual check, functional test, aural test
Consultation regarding maintenance procedures	May include discussions regarding: time, location, duration, nature of works, access arrangements
Customer	May not need to be notified of repair if fault report did not originate from customer
Equipment on which fault may occur	Includes: line conditioning, optic transceiver, multiplexer, concentrator, antenna, radio system, transmission equipment, switching equipment, satellite receiver
Faults	May be identified during initial installation or when a system is operational May be reported by: customers, system managers, information technology managers / operators, building owners, enterprise technicians, alarm information systems
Industry standards	May include: enterprise codes of practice, ACMA and Spectrum Management Authority standards, Manufacturer's specifications
Manufacturer's specifications	May be found in: printed instruction leaflets, pre printed on materials or product packaging
Methods for fault finding	Include: equipment testing, visual inspections, component replacement

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Permits	May be required and may relate to the following: heritage, environment, restricted area, quarantined areas
Reason for repair	May include: broken casing, intermittent electronic failure, operation out of specifications
Records	May be stored on either enterprise or customer premises and at equipment site or central enterprise location
Suitability of test equipment	May include: Equipment calibration certification is current to reduce possibility of unreliable test data and ensure traceability
Tools	May include: hand tools, manufacturer's tool, personal computer
Variables that impact on equipment or system faults	May include: recent additions to system, building works, power supply, software problems, time of fault, atmospheric/environmental conditions
Relevant legislation, codes, regulations and standards may include:	• Australian Standards • Australian Building Codes and Regulations • Occupational Health and Safety • Environmental protection • Heritage legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Repair of fault and conduct of tests to verify outcomes. • Documentation of fault including: nature, location, likely causes, repair methodology. • Application of enterprise escalation and outage procedures. • Calibration or re-calibration of equipment. • Adjustment of equipment. • Hardware replacement. • Ability to prioritise, operate in a timely manner and report progress. • Recognition of potential causes.

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- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC103D Maintain cable network

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit should be applied with units dealing with specific cable types and installation environments.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Maintain cables	1.1 Where cable is located on premises not owned by enterprise, appropriate consultation is undertaken in accordance with enterprise guidelines
	1.2 Cable, joints and terminations are visually checked for damage in accordance with enterprise guidelines
	1.3 Cable terminations are checked for leakage in accordance with enterprise guidelines
	1.4 Any evident damage to cable, joints or terminations is assessed and the appropriate person notified
	1.5 Warranties and service agreements are checked to establish if any identified repair/alteration requirement is covered by such documents
	1.6 Any required additional skills are identified and assistance arranged as appropriate
	1.7 Cable repairs/replacements are undertaken where required and in accordance with enterprise guidelines
	1.8 Where repairs are required, other services are located and owners consulted
	1.9 Maintenance is undertaken in a manner that is safe to the employee, the public and the customer

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2 Maintain cable supports	2.1 Where support structure is located on premises not owned by enterprise, appropriate consultation is undertaken in accordance with enterprise guidelines
	2.2 Cable supports are visually checked and assessed for existing/potential causes of damage
	2.3 Warranties and service agreements are checked to establish if any identified repair/alteration requirement is covered by such documents
	2.4 Any required additional skills are identified and assistance arranged as appropriate
	2.5 Cable support repairs/replacements are undertaken where required and in accordance with enterprise guidelines
	2.6 Where repairs are required, other services are located and owners consulted
	2.7 Maintenance is undertaken in a manner that is safe to the employee, the public and the customer
3 Maintain enclosures	3.1 Where enclosure is located on premises not owned by enterprise, appropriate consultation is undertaken in accordance with enterprise guidelines
	3.2 Area is cleaned of debris and, where necessary, vegetation around site is cleared
	3.3 Installation is checked for damage, leaks and security mechanisms are operable
	3.4 Equipment / distribution frame is free of foreign matter
	3.5 Warranties and service agreements are checked to establish if any identified repair / alteration requirement is covered by such documents
	3.6 Enclosure repairs / replacements are undertaken where required and in accordance with enterprise guidelines
	3.7 Maintenance is undertaken in a manner that is safe to the employee, the public and the customer

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA210 Cable Support Systems
- CA315 Cabling Techniques for CAN
- CA325 Cable Jointing and Termination for CAN
- CA375 Cable Installation Practices for CAN
- CI310 Communication 3
- EN310 Enterprise Policy and Practice 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- RA420 Radio Frequency Theory and Hazards 4
- RE310 Working on Non-enterprise Land 3
- SU210 Basic Supervision
- TO310 Use of Tools 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cable replacement	May be of an existing cable section or a new section may need to be inserted
Enterprise guidelines for visual cable and support structure inspections	May include: checking joints, cables and terminations while undertaking other work in the vicinity or regular routine visual inspections
Cable support systems	May be: aerial or underground
Cables	May be: optic fibre, coaxial, copper, lead encased, aluminium, plastic sheathed

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Consultation regarding maintenance procedures	May include discussions regarding: time, location, duration, nature of works, access arrangements
Enclosures	May be for: distribution frames, electronic equipment
Other services	May include: gas, electricity, water, sewerage, drainage, voice, vision, data
Owners	May include: customer, gas company, power company, water authority, council, television company, telephone company
Personal protective equipment	May include: asbestos precautions, dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers' gloves, safety boots, tools to remove enclosure / man hole covers, vests
Visual indicators of cable damage	May include: gas pressure alarms, damaged sheath, damaged conduit
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority

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- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Obtaining cable and support information from plans and documents.
- Maintenance of cables including:
  - Visual check of cable, joints and terminations
  - Leakage checks
  - Cable damage
  - Repair of cable faults/damage
- Maintenance of cable supports including:
  - Existing or potential damage
  - Safety considerations
  - Repair of faults/damage
- Maintenance of enclosures including: vegetation clearance, structure damage, leaks, security arrangements, foreign matter on distribution frame, repair of damage or organisation of repair
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices including:
- Protective clothing and personal safety items, and adequate warning signs and safety devices are installed.
- Correct interpretation and application of regulations and standards related to the installation.
- Communication of maintenance details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC104D Maintain an electronic system

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit relates to the periodic testing of systems and equipment on-site (not at the depot) and from remote locations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Undertake on-site electronic routines	1.1 Where equipment is located on premises not owned by enterprise, appropriate consultation with customer or property owner is undertaken in accordance with enterprise policy
	1.2 Power equipment is monitored for voltage within manufacturer's stated limits and site power routine performed in accordance with enterprise guidelines
	1.3 Ensure alarms operate in accordance with manufacturer's specifications and enterprise guidelines
	1.4 All monitoring points are checked against installation records
	1.5 If faults are detected, corrective action is taken in accordance with enterprise guidelines and manufacturer's specifications
	1.6 Warranties and service agreements are checked to establish if any identified repair / alteration requirement is covered by such documents
	1.7 Existing electronic configuration is copied and stored in accordance with enterprise guidelines

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2 Undertake remote electronic routines	2.1	Signal is generated to test for continuity and operation in accordance with manufacturer's specifications
	2.2	Readings are taken from each significant portion of line to test for continuity and operation in accordance with manufacturer's specifications
	2.3	Ensure alarms operate in accordance with manufacturer's specifications and enterprise guidelines
	2.4	All monitoring points are checked against system records
	2.5	If faults are detected, corrective action is taken in accordance with enterprise guidelines and manufacturer's specifications
3 Update records	3.1	Results of routine tests are detailed on system records
	3.2	Records are stored in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA375 Cable Installation Practices for CAN
- CI310 Communication 3
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PS310 Plans and Specifications 3
- RA420 Radio Frequency Theory and Hazards 4
- RE235 Regulations for CAN
- RE310 Working on Non-enterprise Land 3
- SU210 Basic Supervision
- TE310 Basic Telephony 3
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TO310 Use of Too ls 3
- TO320 Anti-static Procedures 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Cable	May include: copper, coaxial, optic fibre, aluminium, wave guides
Consultation regarding maintenance procedures	May include discussions regarding: time, location, duration, nature of works, access arrangements
Corrective action	May include: electronic or physical adjustment or repair, replacement of parts or equipment, organising warranty replacement from manufacturer
Equipment	May include: line conditioning, optic transceiver, multiplexer, concentrator, antenna, radio system, transmission equipment, switching equipment, satellite receiver
Records	May be stored on either enterprise or customer premises and at equipment site or central enterprise location
System records	May be stored: on site, on paper / cards, electronically, at central recording point
Relevant legislation, codes, regulations and standards may include:	• Australian Standards • Australian Building Codes and regulations • Occupational Health and Safety • Environmental Protection • Heritage legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Identification of maintenance required.
- Conduct and interpret tests including:
  - Equipment and facilities checks
  - Test of backup equipment such as batteries
  - Filters
  - System backup and alarms
- Repair of faults/problems in system, equipment and facilities either hardware or software.
- Completion of documentation including: warranty details, system log books, pricing and billing forms.
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices.
- Correct interpretation and application of regulations and standards related to the maintenance.
- Communication of maintenance details with customers and work associates.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC105D Locate and rectify mobile communication faults on a first in basis

Unit descriptor

This unit covers maintenance of both vehicle and non-vehicle mobile equipment.

This unit applies to all communications applications whether digital or analogue including telephony and data.

This unit may be applied to domestic, commercial or industrial equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish customer and equipment service status	1.1 Details of fault are ascertained from the customer
	1.2 System, product and product model type and functions are identified accurately
	1.3 Existing warranty and service agreements are identified and coverage established
	1.4 Customer is advised of likely charges and approximate repair times
2 Identify and clarify symptoms of fault	2.1 All available information including that provided by customer is used to identify the problem where appropriate
	2.2 Likelihood of fault being located in the mobile equipment is assessed
	2.3 Customers are referred to appropriate carrier network where fault is isolated to the network
	2.4 Customer is advised of action taken in the event that the fault is not in the mobile equipment
3 Perform tests	3.1 Continued existence of problem is confirmed
	3.2 Visual inspection for likely damage is undertaken
	3.3 Most probable causes of fault are determined from available data and historical trends where available

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	3.4	Suitable tools and test equipment are obtained and calibrated
	3.5	Batteries are tested for functionality, if required
4 Diagnose faults	4.1	Test results are used as a guide to fault identification
	4.2	Approach to fault identification is methodical and suitable for system and problem type
	4.3	Fault is progressively isolated to remove likely variables from assessment
	4.4	Continued existence of problem is verified regularly
	4.5	Customer is advised where quoted repair times cannot be achieved
	4.6	Options to rectify fault are determined and presented to the customer for decision where appropriate
5 Rectify fault	5.1	Further problems are either attended to or brought to the attention of the customer for decision as to action necessary
	5.2	Faulty parts and/or equipment are identified and replaced or repaired in accordance with manufacturers specifications
	5.3	Unresolved faults are referred back to the manufacturer or repair agent
	5.4	Equipment is reprogrammed and activated, if required
	5.5	Functionality checks are undertaken to identify likelihood of further or likely problems
	5.6	Work is completed in a safe manner
6 Provide temporary service to customer where required	6.1	Details of identified problem are explained to the customer
	6.2	Faulty equipment is referred back to manufacturer or repair agent for repair or replacement
	6.3	Customers are provided with temporary or replacement equipment similar to existing equipment where possible
	6.4	Arrangements are made for the programming/testing of replacement equipment where possible

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7 Organise return of repaired equipment to the customer	7.1 Customer is contacted and arrangements made for return of equipment
	7.2 Equipment is tested for functionality on return from manufacturer
	7.3 Equipment is reprogrammed and activated as appropriate
	7.4 Customer satisfaction of repair is verified
8 Complete documentation	8.1 Invoices and other financial documentation are prepared, where required and presented to the customer
	8.2 All other relevant paper work is completed and distributed as appropriate
	8.3 Authorised signature(s) are obtained on required documentation to confirm acceptance of work

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CS310 Customer Relations 3
- EL310 AC/DC Theory 3
- EN210 Enterprise Policy and Practice 2
- IN320 Teamwork 3
- MA210 Basic Telecommunications Mathematics
- MO310 Mobile Phone Products Knowledge
- MO320 Mobile Phone Operation – Basic
- MO330 Fault Finding for Mobile Phones
- OH210 Occupational Health and Safety 2
- RA210 Radio Frequency Theory and Hazards 2
- TE210 Basic Telephony 2
- TF310 Test Equipment 3
- TF320 Test Analysis and Diagnosis 3
- TO210 Hand and Power Tools
- TO410 Use of Tools 4

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Mobile communication equipment	May include: telephone, pager, facsimile and associated accessories
Fault finding	May be done as part of a service agreement or on a fee for service basis as agreed with a client
Faulty equipment still under warranty	Is returned immediately to the manufacturer or where arrangements apply are repaired locally on behalf of the manufacturer and an appropriate rebate is claimed
Temporary or replacement service	Is time allowed for fault identification and repair at initial repair point before providing customer with a temporary or replacement service relies on enterprise policy. The faulty equipment is returned to the manufacturer
Variables that may affect faults	May include: wear and tear, operator error, power supply, software problems, environmental/atmospheric conditions, product failure, design flaw
Equipment specifications and documentation	May be found in: contract documents, specification schedules, system configuration diagrams and manuals, technical information bulletins
Warranties	Are as specified by the equipment manufacturer/supplier
Service agreements	Are maintenance agreements between communication companies and their clients and vary from company to company and with the type of equipment owned or leased by the client
Paper work and financial documentation	Is enterprise specific

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Mobile equipment faults	May include: battery failure, battery terminations, programme errors, faulty parts, faulty circuit board, equipment failure, aerial problems, power cable problems, including terminations, fuses, battery chargers, cable connectors, power source
Available data	May include: test data, customer records, details of system checks, software programme, equipment/product manuals/guides, customer questioning details, observation of unit operation
Other likely fault areas	Include: mobile network, activation settings, diversion and user set parameters
Methods for fault finding and repair	Include: visual inspections, functionality tests, equipment reprogram, replacement repair and/or modification
Fault finding methodology	Is usually described in system/equipment/product manuals and guides
Tools may include:	• Hand – screwdrivers, pliers, terminating tools, crimping tools • Electrical – power drills, soldering iron, cordless drill • Other – ladder, cable identification kit
Test equipment	May include: multimeter, JRC cellular tester, Triplet cellular tester, Curtis ESN leader, antenna matchbox, Hewlett-Packard test equipment, battery analyser, aerial tester, battery analyser
Typical tests	May include: hand off-changes from channel to channel, receiver sensitivity, in call options, power output, frequency, standing wave ratio, SWR on the aerial, battery performance, antenna performance and termination
Programming of replacement or temporary equipment	Can only occur when the necessary arrangements have been made with the carrier for connection to the network
Fee for service	Varies from company to company and usually involves charges relating to labour and parts

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Relevant legislation, codes, regulations and standards include:	• ACMA Technical Standards • Australian Standards AS 3901, 3902, AS 4346 • International Standards ISO 9000, 9001 • Occupational Health and Safety • Environmental Protection Act • Trade Practices Legislation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Acquisition of full fault details from the customer.
- Advice to customer as to likely fault, duration of repair and charges.
- Use of fault history in fault identification.
- Identification and ranking of likely causes of faults.
- Methodical approach to fault identification.
- Conduct of tests appropriate to the type of fault identified.
- Interpretation of test results.
- Assessment of fault and whether it can be repaired or needs to be returned to manufacturer.
- Ability to prioritise, operate in a timely manner and report progress.
- Repair of fault and conduct of tests to verify outcomes.
- Documentation of fault including: nature, location, likely causes, repair methodology.
- Conduct of functionality test on return from manufacturer.
- Ability to read, interpret and use equipment/system manuals and specifications, and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- Application of all related occupational health and safety requirements and work practices
- Customer focus and consideration of customer needs.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC126D Complete all administrative work associated with CPE activity

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to both customer premises cabling and customer premises equipment.

This unit applies to all communications applications whether digital or analogue including telephony, data, video including digital broadcasting, computer networks including LANs and WANs, and multi media.

This unit may be applied to domestic, commercial or industrial installations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Complete/update all building records	1.1 Record details of all work undertaken in building equipment records
	1.2 Record system and equipment functionality accurately
	1.3 Records are stored/returned to correct location
	1.4 Modify and complete all plan/programme details and store promptly and conveniently where appropriate
2 Invoice customer	2.1 Identify and price all chargeable work in accordance with company procedures and policy
	2.2 Explain invoice and ensure it is understood by the customer
	2.3 Handle billing queries with tact and refer to the appropriate authority in the event of a dispute
	2.4 Invoices are signed off by the customer

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3 Sign off against project	3.1 Complete paper work accurately and return to appropriate location promptly
	3.2 Record miscellaneous material and parts usage and arrange for replenishment as appropriate
	3.3 Initiate sign off procedures in accordance with company policy
4 Identify further business opportunities	4.1 Make the customer aware of ideas for improvement to system equipment or system functionality
	4.2 Identify obsolete equipment to the customer
	4.3 Advise the customer of maintenance agreements and new or additional products and make sales made as appropriate
	4.4 Notify details of successful sales to the proper authorities
	4.5 Refer opportunities for further sales to the company sales area

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PE310 Personal Skills 3
- PS310 Plans and Specifications 3
- RE310 Working on Non-enterprise Land 3
- RE320 Employment Regulations
- SU210 Basic Supervision

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Documentation	Can be: written on paper or recorded on computer disc and include system and equipment details such as extension relationship to cable pair, MDF, IDF and FDP records
Correct location for system records	Is usually: the MDF, IDF or FDP or a location which is designated by the customer
Records	Are in some cases: kept and maintained by the customer
Invoices and invoicing arrangements	Are company specific
Company paper work	May include: costing details, parts usage, equipment provided, product features provided, cable details, labour usage
Relevant legislation, codes, regulations and standards include:	• ACIF Standards and Codes • Australian Standards AS 3901, 3902 • Occupational Health and Safety • Trade Practices Legislation • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Completion of all equipment records including system and equipment details, extension relationship to cable pair, MDF, IDF and FDP records. • Completion of all company records including pricing and billing records, labour and material activity sheets, and job records. • Application of appropriate sign off procedures. • Informing customers as to activity completed.

- Availing of the opportunity to advise the customer of other products/facilities including maintenance agreements, other associated products and facilities, existence of obsolete equipment.
- Ability to read, interpret and use equipment/system manuals and specifications and relevant enterprise policy and documentation.
- Interpersonal skills related to customers, employer, work associates, team members, individuals and other contractors.
- All related occupational health and safety requirements and work practices.
- Customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC127D Supervise worksite activities

Unit descriptor

This unit applies to all telecommunications applications including telephony, data, video and multi media.

This unit relates to the supervision of small-scale projects with a limited range of technical skills, not general management of people and processes.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan for worksite activities	1.1 Requirements of job are clarified with customer and project originator, where appropriate
	1.2 Staff, equipment and material resource requirements are specified and time allocated with work supervisor
	1.3 Order of activities specified
	1.4 Occupational health and safety legislation, enterprise procedures and site specific safety requirements are observed
	1.5 Plan is documented/articulated clearly and presented to project originator for verification
2 Organise resources for worksite activities	2.1 Materials and equipment are sourced as authorised and in accordance with enterprise policy
	2.2 External agency licences and approvals are obtained and in order
	2.3 Affected parties are notified of works to be undertaken when appropriate
	2.4 Materials are ordered to be on site at the required time
	2.5 Staff are informed of their responsibilities on site

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3	**Implement and monitor worksite activities**	3.1 Ensure all resources are programmed
		3.2 Staff are directed in activities for each period of work
		3.3 Work is undertaken together with staff following documented plan guidelines
		3.4 Staff, activities and resource usage are accounted for and supervised
		3.5 Training needs are identified and organised as required
		3.6 Contingency situations are recognised and appropriate corrective actions taken
4	**Perform site administration**	4.1 Management reporting is completed in a timely and accurate manner
		4.2 Decisions are sought from management as required
		4.3 Site administration is monitored to ensure compliance with enterprise procedures
		4.4 Simple project report is written to authorise payment for work and materials and to inform management of project details

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI310 Communication 3
- CO310 Computer Skills 3
- EN310 Enterprise Policy and Practice 3
- EN320 Enterprise Information Systems 3
- MA210 Basic Telecommunications Mathematics
- OH310 Occupational Health and Safety 3
- PE310 Personal Skills 3
- PS310 Plans and Specifications 3
- RE310 Working on Non-enterprise Land 3
- RE320 Employment Regulations
- SU210 Basic Supervision

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Affected parties	May include: customer, neighbour, utility providers, other property owners, occupants
External agency licences and approvals	May include: noise pollution, waste production and removal, environmental protection, site permits
Work organisation	To comply with legal/award obligations
Operations	May be in all weather conditions, and may be modified by extreme weather conditions
Project	May include: small/short term job, part of a larger project
Reporting	Includes completion of enterprise procedures and associated manual and computer-based documentation and electronic communication
Responsibility	May be for: basic coordination and direction of small groups working on a site remote from the enterprise headquarters, small projects or parts of projects
Training needs	May be satisfied by either on or off-the-job programs
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise

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- International Standards
- Local Government
- Manufacturer's enterprise operating policy and procedures
- National Code
- Occupational Health and Safety Act
- Other services and utilities codes of practice and standards (electricity, water, gas)
- Power company requirements
- Privacy Act
- Spectrum Management Authority
- Statutory requirements
- Trade Practices Act
- Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Planning of work activities including: liaison with customer/project planner, task allocation, task prioritisation, task communication.
- Resource planning including: material/equipment ordering, arrangement of authorities/licences, staff responsibility awareness, contingency planning.
- Staff supervision including: staff training, workload balancing, resource usage, regulation compliance.
- Obtaining supervision information from plans and documents.
- Safe use of any specialised hand or power tools and/or equipment and application of all related OHS requirements and work practices including: protective clothing and personal safety items, and adequate warning signs and safety devices are installed.
- Correct interpretation and application of regulations and standards related to the installation.
- Communication of supervision information with customers and work associates.

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Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC130C Prepare site for support installation

Unit descriptor

This unit may be in preparation for aerial or underground cable or for erection of radio towers or above ground or underground equipment enclosures.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for installation	1.1 Confirm the location of proposed installation is in accordance with the installation plan
	1.2 Obtain approvals and authorisations for work
	1.3 Land owner/tenant is informed of imminent works
	1.4 Locate and identify adjoining services in accordance with enterprise guidelines and occupational health and safety practices
	1.5 Observe local environment to ensure that reinstatement may be completed appropriately
	1.6 Safe working practices are employed and personal protective equipment used where appropriate in the manner intended by the manufacturer and stipulated by the enterprise
	1.7 Tools and equipment are used in accordance with guidelines
2 Clear site for installation	2.1 Paperwork relating to necessary licences and approvals for plant and equipment installation and land clearances is carried at all times during works
	2.2 Clear site of vegetation and debris, in accordance with work specifications and any relevant approvals
3 Excavate site	3.1 Place pegs for proposed installation in accordance with enterprise guidelines and site plans
	3.2 Excavate using the appropriate equipment for the size of excavation, the location of the works, and in accordance with enterprise guidelines

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3.3 Site is levelled within the tolerance specified in the installation plan

3.4 Safe working practices are employed and personal protective equipment used where appropriate in the manner intended by the manufacturer

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA280 Soil Types
- CA281 Underground Installation of Enclosures and Pipe/Conduits
- CI210 Communication 2
- OH210 Occupational Health and Safety 2
- OH214 Safe Work Practices – Underground
- PS217 Plan reading, Specifications and Records – Underground
- RE215 Legislative Codes, Practices and Access Requirements
- RE224 Building Standards, Regulations and Codes – Underground
- TO210 Hand and Power Tools
- TO215 Mechanical Equipment Operational Skills – Underground

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Affected parties	May include: customer, neighbour, utility providers, other property owners, occupants
External agency licences and approvals	May include: noise pollution, waste production and removal, environmental protection, site permits
Work organisation	To comply with legal/award obligations

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Operations	May be in all weather conditions, and may be modified by extreme weather conditions
Project	May include: small/short term job, part of a larger project
Reporting	Includes completion of enterprise procedures and associated manual and computer-based documentation and electronic communication
Responsibility	May be for: basic coordination and direction of small groups working on a site remote from the enterprise headquarters, small projects or parts of projects
Training needs	May be satisfied by either on or off-the-job programs
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental Protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National Code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Authority • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Plan reading indicating features relevant to work.
- Identification of obstructions and other services.
- Demonstration of safe work practices.
- Testing for gas.
- Selection and safe use of appropriate excavation tools.
- Identification of asbestos and semi-asbestos products.
- Placement of safety guards in relation to trench and spoil.
- Communicating the purpose of work to customers and land owners.
- Recording variations to plans.
- Checking fall and level of trench using dumpy level or similar equipment.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC131C Install an above ground equipment enclosure

Unit descriptor

This unit applies to installation of enclosures such as pillars, cabinets, Remote Integrated Multiplexers (RIMs) and mobile equipment enclosures.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTCI133C Construct underground telecommunications infrastructure

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Obtain materials	1.1 Confirm that location of proposed installation is in accordance with the installation plans
	1.2 Obtain and use specified materials and appropriate tools and equipment safely in accordance with manufacturer's specifications
	1.3 Identify and action installation constraints and safety hazards
	1.4 Approved alterations to the design are undertaken in accordance with enterprise guidelines
2 Build/locate enclosure	2.1 Construct footings or foundations to the construction design specifications
	2.2 Connect enclosure to earth in accordance with construction plan and industry practice
	2.3 Construct enclosure to the specifications given in the construction design
3 Complete project	3.1 Note alterations to the design using appropriate symbols and design
	3.2 Complete reports in accordance with enterprise policy
	3.3 Site is restored in accordance with the requirements of the enterprise or approving authority
	3.4 Tools and materials are stored in accordance with enterprise guidelines

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA286 Brick Laying and Concrete Pouring
- CA216 Installation of Above Ground Enclosures
- CI210 Communication 2
- OH210 Occupational Health and Safety 2
- PS210 Building Plan Reading
- RE215 Legislative Codes, Practices and Access Requirements
- RE224 Building Standards, Regulations and Codes – Underground
- TO210 Hand and Power Tools
- TO215 Mechanical Equipment Operational Skills – Underground

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Enclosure	May be built on site or may be pre-constructed May be constructed of: metals, fibreglass, plastic
Personal protective equipment	May include: dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers' gloves, safety boots, tools to remove enclosure/man hole covers
Protective fence	May be required to be constructed
Tools used	May include: power tools, hand tools Lifting equipment such as cranes (require licensing in accordance with industry requirements

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Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Agency • Statutory requirements • Trade Practices Act • Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Plan reading indicating features relevant to work. • Identification of obstructions and other services. • Demonstration of safe work practices. • Testing for gas. • Selection and safe use of appropriate construction or installation methods. • Placement of safety guards in relation to trench and spoil.

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- Communicating the purpose of work to customers and land owners.
- Recording variations to plans.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC132C Erect cable supports

Unit descriptor

This unit applies to all telecommunication applications including voice, vision and data.

This unit applies to all small aerial cable installation types and mounts. Tower work is covered in units ICTTC055C and ICTTC062C. This unit follows on from the work described in unit ICTTC130B Prepare site for support installation.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Install aerial support structures	1.1 Identify and obtain tools, equipment, clothing and safety requirements for the installation
	1.2 Check tools and equipment to be in good working order and adjusted to manufacturers' specifications
	1.3 Installation site is made safe through erection of necessary barriers in accordance with enterprise guidelines
	1.4 Excavate a hole to specifications and in accordance with enterprise guidelines
	1.5 Install a pole using mechanical lifting devices/aids in accordance with enterprise guidelines
	1.6 Install fixing structures on pole securely in accordance with manufacturer's specifications
	1.7 Install fixing devices where the support is other than a pole in accordance with enterprise guidelines
2 Complete project	2.1 Note alterations to design using appropriate symbols
	2.2 Site is restored in accordance with relevant environment, authorities and owner's requirements
	2.3 Tools and materials are cleaned and stored in accordance with enterprise guidelines and manufacturer's instructions
	2.4 Complete reports in accordance with enterprise policy

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA290 Pole Types and Aerial Service Identification
- CA291 Installation of Aerial Supports
- CA296 Pole Testing
- CI210 Communication 2
- CS210 Customer Relations
- OH210 Occupational Health and Safety 2
- OH215 Safe Work Practices – Aerial
- PS212 Read Plans and Specifications – General
- PS218 Plan Reading, Specifications and Records – Aerial
- RE215 Legislative Codes, Practices and Access Requirements
- RE226 Building Standards and Regulations – Aerial
- TO210 Hand and Power Tools
- TO217 Hand, Power Tools and Equipment – Aerial
- TO218 Mechanical Equipment Operational Skills – Aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Aerial fixing devices	Include: screw hooks, bolts and lugs, bridle rings, riser pipes, clamps, mounts
Birds	Aerial cable with a hardened sheath may be required to provide some degree of protection from birds
Different permissions	May be required for works on public and private property

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Safety equipment	Equipment to ensure personal safety and that of the public may include: witches' hats, flashing lights, guards, traffic signs, aerial safety belts and line, warning signs and tapes, equipment guards, safety cages, helmets
External factors affecting works	May include: terrain, weather conditions, concentration of other services, clearances from other services, ground clearances
Fall arrest systems	May need to be put in place for some structures
Licences that may be required	Include: machinery operation, chainsaw operation, rigger, dogman, crane operator, crane chaser, forklift, driver's, winch operator, backhoe operator, borer, heavy vehicle
Ownership of site and/or support structures	May be public or private (privately owned poles are installed under uncontrolled conditions and are therefore generally not used by carriers
Personal protective equipment	May include: asbestos precautions (applies to underground construction pits etc. not likely in aerial applications., dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers' gloves, safety boots
Poles	May be erected either manually or with the aid of mechanical lifting devices and may be constructed of: concrete, wood, steel and concrete, steel, galvanised steel. May carry high or low voltage cable and may be in joint use with other services
Relevant authorities	May include: local, state, and federal agencies, utility providers (gas, water, power, telecommunications), environmental protection, private owners, cable location service (dial before you dig)
Safety activities	May include traffic management
Tools and equipment	May be mechanical, power or hand tools and may specifically include: auger, elevated platform vehicle, fixing brackets, height measuring device, pole lifting device, lifting jack
Transmission medium	May be constructed of: fibre optic, copper, coaxial

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Unsafe support structures	May be identified by: condemned pole status markings, visible signs of decay or stress, suitable testing methods
Unsafe weather conditions	May include: severe heat, severe cold, high winds, heavy rains, thunderstorms
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Agency • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of pole.
- Work practices that ensure all relevant authorities have been notified and approvals obtained prior to commencement.
- Safe use of any specialised hand or power tools and/or equipment normally used for the installation of aerial cable supports.
- Application of all related OHS requirements and work practices associated with the installation of aerial cable supports (including protective clothing and personal safety items, and adequate warning signs and safety devices are installed).
- Ability to read and interpret drawings, plans and other relevant documentation.
- Correct interpretation and application of regulations and standards related to the installation of aerial cable supports.
- Attend assessment activities with relevant work instructions to ensure compliance with enterprise and regulatory requirements.
- Interpersonal skills related to work associates, supervisors, team members and clients.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC133C Construct underground telecommunications infrastructure

Unit descriptor

This unit refers to enclosures such as pits, pipes, conduits, manholes (prefabricated). It does not include constructed on site manholes and tunnels.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Install enclosure	1.1 Place a foundation of suitable material in an excavation prior to installation of an underground enclosure
	1.2 Place a recognised barrier over the construction where a pit is to be installed over power cables and under the full area of the pit base in accordance with enterprise requirements or agreements with other authorities
	1.3 Construct an enclosure to the construction design using the specified materials
	1.4 Install a pre-built enclosure to manufacturers specifications
	1.5 Install an earth mat facility under the pit/manhole where specified and required by the enterprise
	1.6 Alter a planned enclosure location to suit local physical conditions
	1.7 Alter a design in accordance with enterprise guidelines
	1.8 Use tools in accordance with enterprise guidelines and occupational health and safety regulations
2 Install connecting pipe works	2.1 Install conduit in trench to enterprise specifications
	2.2 Connect conduit to an enclosure in accordance with manufacturer's specification and industry practice

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3 Complete project	3.1	Note alterations to plans using appropriate symbols
	3.2	Complete reports in accordance with enterprise policy
	3.3	Obsolete materials and equipment are recovered, packaged and returned to appropriate point for disposal
	3.4	Site is restored in accordance with the requirements of enterprise or approving authority and to customer satisfaction
	3.5	Tools and materials are stored in accordance with enterprise guidelines

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- AJ203 Conduit – Types, Fittings and Applications
- AP200 Cross-connecting Units
- AP201 Dangerous Gases, Detection and Actions
- AP202 Distribution area Plans and Plan Symbols
- AP203 Introduction to the Telstra Customer Access Network
- AP204 Jointing Pit Types, Sizes, Fittings and Applications
- AP205 Public Relations, Dealing with Customers
- AP206 Quality Assurance
- AP207 Repair, Raising or Lowering Pits
- AP208 Rodding and Roping 0f Conduits
- AP209 Trenching, including Sharing Trenches with Other Utilities

Manhole Installation – Manholes should be a separate elective course

Or use this set of topics for a generic coverage

- CA280 Soil Types
- CA281 Underground Installation of Enclosures and Pipe/Conduits
- CA286 Bricklaying and Concrete Pouring
- CA287 Construction Principles – Layout, Drainage, etc
- CI210 Communication 2
- OH214 Safe Work Practices – Underground
- PS212 Read Plans and Specifications – General
- PS217 Plan Reading, Specifications and Records – Underground
- RE215 Legislative Codes, Practices and Access Requirements

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- RE223 ACMA Standards and Regulations – Underground
- RE224 Building Standards, Regulations and Codes – Underground
- RE235 Regulations for CAN
- TO210 Hand and Power Tools
- TO214 Hand, Power Tools and Equipment – Underground
- TO215 Mechanical Equipment Operational Skills – Underground

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Recognised barrier	Where a pit is to be installed over power cables a barrier of an agreed material should be placed under the full area of the pit base in accordance with enterprise requirements or agreements with other authorities
Enclosure	May be: pre-fabricated manhole, pit, conduit/pipe May be constructed of: concrete, fibreglass, bricks, concrete panels, plastic, tin
Local physical conditions	For the relocation of cabinets, pillars, or conduit include: geological conditions which make digging or boring difficult, recent inundation of site by water or earthworks, aesthetics, plant integrity and safety of staff
Pad beneath underground enclosure	Foundation may be constructed of, sand, gravel or similar suitable material Barrier (where power cable exists below pit) may be concrete or polymeric strip material
Restoration	May involve: consultation with owner/tenant/authorities, use of other than original materials
Tools used	May be hand, power or mechanical tools and may specifically include: jack-hammers, excavation machinery, cranes. Precautions are necessary where power cables exist eg. hand tools should be wooden (insulated) handled

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Licences required	May include: excavation machinery operators licence, crane, state driver's licence
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Agency • Statutory requirements • Trade Practices Act • Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Installation of plant including: pipe/conduit, pits and manholes • Soil types must include at least two types: from sand, rock, soil or combination soil types. • Work practices that ensure all relevant authorities have been notified and approvals obtained prior to commencement.

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- Shoring an excavation site to meet enterprise and regulatory requirements.
- Safe use of any specialised hand or power tools and/or equipment normally used for excavation, pipe/conduit installation and site restoration.
- Application of all related OHS requirements and work practices associated with excavation, pipe/conduit installation and/or site restoration (including protective clothing and personal safety items, and adequate warning signs and safety devices are installed).
- Ability to read and interpret drawings: site plans, street plans, construction plans, building plans and site layout drawings.
- Correct interpretation and application of regulations and standards related to the installation of the above enclosures.
- Interpersonal skills related to work associates, supervisors, team members and clients.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC134C Fix aerial cable

Unit descriptor

This unit applies to all telecommunications applications including vision, voice and data.

This unit applies to all aerial cable installation types. This unit may apply to either a new cable or a cable in need of repair. This unit should be read in conjunction with the relevant jointing units.

This unit relates to aerial cable in the Access Network.

The following competency can be undertaken at the same time:

- ICTTC132B Erect cable supports

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for aerial cable installation	1.1 Identify cable installation requirements and constraints from plan and site inspection
	1.2 Cable installation equipment is set up in accordance with manufacturer's requirements and enterprise guidelines
	1.3 Site is made safe and secure for cable installation
	1.4 Suitable protective clothing is selected and required safety devices used
	1.5 Support structure is assessed as safe for normal working conditions
	1.6 Support structure is assessed to be sound for cable support
2 Install aerial cable	2.1 Install catenary or gantry wire or Integral Bearer Cable (IBC) and tension to required specifications
	2.2 Install cable in accordance with manufacturer's and enterprise guidelines ensuring that no damage is caused and that the physical characteristics of the cable are maintained

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	2.3 Cable is secured permanently to support structure in accordance with manufacturer's and enterprise guidelines
	2.4 Cable ends are sufficient for jointing, maintenance, and water drip point requirements
	2.5 Cable loop is bent within bending radius tolerance for cable materials
	2.6 Provision for expansion of hard-line cable is made in accordance with manufacturer's specifications
	2.7 Cables on towers are numbered in accordance with enterprise guidelines
3 Terminate, seal and secure aerial cable	3.1 Cables are terminated in accordance with manufacturer's specifications
	3.2 Cable is jointed in suitable closures using enterprise guidelines
	3.3 Cable terminations are sealed to industry standards
	3.4 Cable loop is secured on support structure to reduce damage to conductors
	3.5 Cable loop enables easy of access for maintenance
	3.6 Cable loop is bent within bending radius tolerance for cable materials
	3.7 Test cable for continuity
	3.8 Feeder cables, where installed, are swept and identified
	3.9 Reports on installation and design amendments are accurately completed and filed promptly in accordance with enterprise requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

Either use this set of topics specifically for work on the Telstra access network:

- AA200 Dismantling Aerial Cable – Overview
- AA201 Erecting Aerial Cable
- AA202 Poles, description and use
- AA203 Terminating Aerial Cable

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- AA204 Aerial Cable Construction – Overview
- AA205 Aerial Cable Fittings
- AA206 Aerial Cable Types – Make-up
- AA207 Aerial Lead-in Cable (ALIC)
- AJ216 Joint Use Construction

Or use this set of topics for a generic coverage

- CA200 Cable Installation – General
- CA202 Cable Conductor Identification Codes
- CA210 Cable Support Systems
- CA220 Cable Types
- CA290 Pole Types and Aerial Service Identification
- CA291 Installation of Aerial Supports
- CA292 Cable Installation and Securing – Aerial
- CA293 Cable Termination and Coding – Aerial
- CA294 Cable Sealing Techniques – Aerial
- CA295 Cable Testing – Aerial
- CI210 Communication 2
- CS210 Customer Relations
- EL221 Earth Testing
- OH210 Occupational Health and Safety 2
- OH215 Safe Work Practices – Aerial
- OH250 Pole Top Rescue
- OH251 Working at Heights
- PS210 Building Plan Reading
- PS211 Cable Support Plan Reading
- PS212 Read Plans and Specifications – General
- PS218 Plan Reading, Specifications and Records – Aerial
- RE210 ACMA Licensing Standards, Rules and Regulations
- RE215 Legislative Codes, Practices and Access Requirements
- RE225 ACMA Standards and Regulations: Aerial
- RE226 Building Standards and Regulations – Aerial
- TO210 Hand and Power Tools
- TO217 Hand, Power Tools and Equipment – Aerial
- TO218 Mechanical Equipment Operational Skills – Aerial
- TO219 Cable Hauling Equipment Operational Skills – Aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Aerial fixing devices	Include: screw hooks, bolts and lugs, hooks, riser pipes, clamps, mounts
Cable	May be: fibre optic, copper, coaxial
Bird protection	May be required for some cables. See previous note re sheath types which provide some form of bird protection
Cable	May be the distribution cable, the lead-in cable, or a radio feeder
Catenary wire	May be integrated or installed separately and may be constructed of steel (single or multi stranded depending on cable size
Gantry	Is the support for cable between the equipment and the mast
Catenary fixing aids	Mechanical aids used to hang and affix catenary wire may include: elevated platform vehicles, ladders, winches, hoists, working platforms, cranes
Ownership of site and/or support structures	May be public or private
Personal protective equipment	May include: dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers' gloves, safety boots
Rollers	May be hung using: ladder, elevated platform vehicle, fibreglass insulated raising stick
Safety equipment	May include: aerial safety belts and lines, equipment guards, fall arrest systems, flashing lights, guards, helmets, safety cages, traffic signs, trench guards, warning signs and tapes, witches' hats
Support structures	May carry high or low voltage cable

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Tensioning of cable	May be to specifications stated by: manufacturer, enterprise, power company
Tools and equipment	May be mechanical or hand tools and may include: hammers, auger, cherry picker, scissor lifts, ladders, spanner, nails, fixing brackets, cable tensioner, height measuring device, drill, wire raising tool (insulated), height measuring stick for clearances
Transmission medium	May be constructed of: fibre optic, copper, coaxial
Unsafe support structures	May be identified by: condemned pole status markings, visible signs of decay or stress, suitable testing methods
Unsafe weather conditions	May include: severe heat, severe cold, high winds, heavy rains, thunderstorms
Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Agency • Statutory requirements • Trade Practices Act • Traditional land owners

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Installation of one type of aerial cable: copper, optical fibre, coaxial.
- Identifying safe support structures from pole status markings, visual inspection or approved testing procedures.
- Work practices associated with hauling aerial cable, cable securing and sealing processes.
- Safe use of any specialised hand or power tools and/or equipment normally used in installing aerial cable.
- Application of all related OHS requirements and work practices associated with installing aerial cable (including protective clothing and personal safety items, and adequate warning signs and safety devices are installed). Pole and ladder safety
- Attend assessment activities with relevant work instructions to ensure compliance with enterprise and regulatory requirements.
- Correct interpretation and application of regulations and standards related to the installation of aerial cable.
- Interpersonal skills related to work associates, supervisors, team members and clients.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC135C Joint metallic conductor cable – Access Network

Unit descriptor

This unit relates to the jointing of non-working metallic cable for both installation and repair.

This unit applies to all telecommunications applications – vision, voice and data – and for both digital and analogue transmission.

Jointed cable is tested and commissioned in ICTTC013D Perform an accurate customer premises cable and system test.

This unit relates to cable in the Access Network.

The following competency can be undertaken at the same time:

- ICTTC067D Rearrange and cut over cable

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for jointing	1.1 Use safety equipment to protect self and public in accordance with enterprise guidelines and occupational health and safety practices
	1.2 Read and interpret installation plan and physical conditions at site to determine layout of job
	1.3 Copy of records is obtained, where appropriate
	1.4 Locate and identify adjoining services in accordance with enterprise guidelines and occupational health and safety practices
	1.5 Test for presence of dangerous gases in accordance with enterprise guidelines
	1.6 Approved alterations to the design are undertaken in accordance with enterprise guidelines

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2 Prepare materials	2.1	Enclosures are prepared for jointing
	2.2	Place cable supports in accordance with plan (where required eg. in manholes)
	2.3	Lay up cable up for jointing
	2.4	Cable bends are within bending radius tolerance for cable materials
	2.5	Determine length of joint opening and remove sheath
	2.6	Joint enclosure suits type and size of cables
3 Joint metallic cable	3.1	Select connector size and type appropriate to the conductor
	3.2	Jointing is performed in accordance with enterprise guidelines and industry practice
	3.3	Joint is sealed in accordance with earlier decisions and enterprise guidelines
	3.4	Joint is labelled, tagged and housed in accordance with enterprise guidelines and industry practice
4 Complete jointing operation	4.1	Cable is placed under pressure and alarms connected, as required, in accordance with enterprise guidelines (This criterion is optional and unlikely to apply)
	4.2	Other cables are tidy and no safety hazards are evident
	4.3	Other services are in place in accordance with enterprise guidelines
	4.4	Waste and debris are removed from worksite and disposed of in accordance with environmental requirements and to maintain safe worksite conditions
5 Complete installation administration	5.1	Complete reports in accordance with enterprise policy
	5.2	Note alterations to plans using appropriate symbols

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

Either use this set of topics specifically for work on the Telstra access network

- AA208 Aerial Lead-in Cable – Installation Practices
- AJ200 Cable Housing and Sheath Removal

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- AJ201 Cable Joint Enclosures, Types Sizes and Applications
- AJ202 Cable Pair Identification, Use of ID Instruments
- AJ204 Connector Jointing
- AJ205 Connector Types and Uses, Butt, In-Line and Modular connectors
- AJ206 Cross Connect Units (CCU's), Pillars/ RIMs/RCMs
- AJ207 Customer Lightning Protection (CLP) – awareness
- AJ208 Cut-over and Maintenance Kits
- AJ209 Distribution area Plans and Plan Symbols
- AJ210 Distribution Cables, Types, Sizes and Applications
- AJ211 Fault Conditions and FAST Testing
- AJ212 Installation of Sealed Heat Shrink Joint Enclosures
- AJ213 Installation of XAGA 550 In-Line Joint Enclosure and Encapsulation of Conductors
- AJ214 Introduction to Basic Electrical Principles
- AJ215 Introduction to the Telstra Customer Access Network '*'
- AJ217 L.P.G. Equipment
- AJ218 Pole Mounted Joint Enclosures
- AJ219 Re-entry of an In-Line Joint
- AJ220 Re-entry to Sealed CAN Joints
- AJ221 Replacement/Alternatives for Above Ground Jointing Posts (EJs)
- AJ222 Rotational and Connected Pairs
- AJ223 Sealed CAN Practices
- AJ224 Working Cable Precautions, including Special Services and Pair Gain Systems
- AJ225 Basic Line Test Equipment
- AP201 Dangerous Gases, Detection and Actions '*'
- AP205 Public Relations, Dealing with Customers
- AP206 Quality Assurance

Or use this set of topics for a generic coverage

- CA200 Cable Installation – General
- CA202 Cable Conductor Identification Codes
- CA210 Cable Support Systems
- CA225 Cable Types for CAN
- CA235 Cable Jointing for CAN
- CI210 Communication 2
- OH210 Occupational Health and Safety 2
- OH214 Safe Work Practices – Underground
- OH215 Safe Work Practices – Aerial
- OH250 Pole Top Rescue
- PS210 Building Plan Reading
- PS212 Read Plans and Specifications – General
- PS213 Cable Record Systems – General

- RE215 Legislative Codes, Practices and Access Requirements
- TO210 Hand and Power Tools
- TO215 Mechanical Equipment Operational Skills – Underground
- TO218 Mechanical Equipment Operational Skills – Aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Joint types and cable capacities	Include 2/5 pair joint closures and aerial cable joint closures
Cable jointing	Usually occurs in the following situations: long cable runs, cable damage, where specifications require access points
Cable location	May be in aerial or underground support structures
Cables	Are ***regularly*** new (non working)
Cable	May be required to be labelled and such labelling may include: cable size, conductor weight, cable range, cable number (applies to large size cables only)
Cable Identification within joint closures	In openable joints, unit and pair collets are required for later identification whilst fanning out cable. Where 10 pair modular style connectors are used then only unit collets are required
Labelling	Is in accordance with enterprise requirements
Tools and equipment	May include: jointing machine/tool, gas detector, assorted hand tools
Type of enclosure	May be: openable, in line, sealed, under air pressure (larger cables only – usually above 800 pair and applicable only for more advanced jointing)

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Relevant legislation, codes, regulations and standards may include:	• AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • ACMA Technical Standards • Australian Building Codes and Regulations • Australian Standards • Enterprise Standards • Environmental protection • Fire regulations • Heritage legislation • Industrial relations agreements including awards and enterprise • International Standards • Local Government • Manufacturer's enterprise operating policy and procedures • National code • Occupational Health and Safety Act • Other services and utilities codes of practice and standards (electricity, water, gas) • Power company requirements • Privacy Act • Spectrum Management Agency • Statutory requirements • Trade Practices Act • Traditional land owners

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of all common types of cable in regular use. • Cable is laid up for jointing with tagging and/or labelling. • Cable is jointed with appropriate connectors. • Joint is sealed in accordance with specifications. • Work practices that avoid cable and conductor damage, provide protection from the elements, vermin and other relevant hazards.

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- Safe use of any specialised hand or power tools normally used in jointing copper cables.
- Application of all related OHS requirements and work practices associated with jointing copper cables.
- Read and interpret cable layout drawings and plans; cable coding system information and identifiers.
- Interpersonal skills related to work associates, supervisors, and clients.

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC136C Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule

Unit descriptor

This unit defines the level of competence that is required for the purpose of the Australian Communications and Media Authority's "Restricted" Cabling Provider Rule. Restricted cabling is used in typical domestic premises small office home offices and small business premises situations. Restricted cablers can install cable in large commercial and industrial premises as long as the cabling is behind a compliant device and cabling is not via jumperable distributors or patch panels.

This unit applies to customer cabling terminated on sockets and network termination devices (NTD). It applies to the installation, maintenance and modification of indoor and external cabling at the levels stated in the range of variables.

Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications including: telecommunications (phones, facsimile and answering machines), simple data and computer use, security alarm panels, and fire control panels.

Assessment by a TITAB registered assessor is recommended.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Work within the constraints imposed by customer premises	1.1 Identify building infrastructure which places critical constraints on cabling 1.2 Develop strategies to manage other infrastructure in relation to cabling
2 Manage Remote Power Feed	2.1 Identify the risks posed by contact with Remote Power Feeding services 2.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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3	**Install/alter cables and protective earth wires**	3.1 Cables/wires handled in accordance with manufacturer's application specifications including tension and bending stress requirements
		3.2 Sources of possible damage to cable/wires are identified and avoided including hot pipes, sharp edges and cable burn
		3.3 Sufficient excess is allowed at cable ends to facilitate termination
		3.4 Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards
		3.5 Cable ties not tightened to the point of causing cable sheath damage or transmission impairment and trimmed flush to prevent risk of personal damage
		3.6 Cables installed underground shall meet minimum depth of cover and segregation from hazardous electrical and other services as per AS/ACIFS009:2006
		3.7 Aerial cables installed shall meet minimum clearance, segregation from hazardous electrical and other services and minimum height requirements as per AS/ACIFS009:2006
		3.8 In accordance with AS/ACIFS009:2006, overvoltage protection devices are fitted to all cable pairs where required to suppress voltage surges and protect from EPR hazards and the devices protectively earthed
		3.9 Earth wire insulation is protected against damage and protective earths segregated in accordance with relevant industry and legislative standards
4	**Terminate and test cables and earth wires**	4.1 Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation
		4.2 NTD terminating modules are installed in accordance to manufacturer's specifications and cable pairs neatly and sequentially fanned for termination
		4.3 Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer's specified manner

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	4.4	Cable shield (if applicable) is earthed to manufacturer's specifications and relevant industry codes of practice and AS/ACIFS009:2006
	4.5	Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end to end testing of wire and pair termination integrity
	4.6	Earth wires are terminated with connectors recommended by manufacturers in accordance with accepted industry codes of practice and AS/ACIFS009:2006
	4.7	Earth wire continuity is maintained through out and interface requirements with electrical systems are observed
	4.8	Earthing installation shall be tested for continuity, insulation resistance and conductive resistance as per accepted industry standards including AS/ACIFS009:2006
	4.9	Compatibility of alterations with existing systems is confirmed and new wok tested both in isolation and when integrated with existing systems
5 Inspect cable route to ensure correct separations	5.1	Check separations along the entirety of the cable route
	5.2	Rectify separations which do not comply with regulations
	5.3	Install barriers to achieve separations where spatial separation can't be met
6 Create records	6.1	Complete TCA form and create NTD records
7 Monitor work activity	7.1	Supervision of cablers not holding appropriate registration for the task is maintained to ensure installation/maintenance activity is in accordance with legislative requirements for safety and network integrity including AS/ACIFS008:2006 and AS/ACIFS009:2006

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA200 Cable Installation
- OH210 Occupational Health and Safety
- RE210 ACMA Provider Rules, Cabler Registration, Rules and Regulations
- TE210 Basic Telephony

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

This unit is generally applied to the ACMA Restricted Cabling Rule coverage which is used in typical domestic premises but is also found in some small office home office and small business premises situations.

Building infrastructure	Includes, but not limited to, High Voltage power, other services, availability and suitability of existing cabling trays and fixing systems
Strategies to manage infrastructure	Includes: appropriate separations, fastening techniques, correct use of cable trays and support systems
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Regulatory environment:	Is defined by the Overview *Telecommunications Act 1997*, and includes, ACMA, ACIF/CA, Labelling, Certified Components List (CCL) accredited registrars and registration

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Cabling environment may include:	• Indoor environments include concealed locations such as: ceilings, false ceilings, internal wall space, under floor, damp situations and within modular workstations • Outdoor environments include cable installations on external walls and underground and/or aerial cabling on private property • Underground cabling would be in an exclusive trench or shared trench with electrical LV cables and/or other utilities • Aerial telecommunications cabling shall not include installations on poles shared with LV/HV electrical power cables/terminations
Cable type:	Includes: copper twisted pair including indoor, external, aerial and underground
Cable identification	Refers to cable conductor identification codes and may be: • Colour coded, banded, numbered, lettered
Termination systems:	Includes: a range of at least 3 different socket types (Australian and US modular sockets and Mode 3 alarm sockets) and at least one network terminating device (NTD) must be individually terminated. Note: Jumperable distributors not included in this unit requirement.
Earthing and protection	Refers to earthing for protection and surge suppression and must be treated in accordance with AS/ACIFS009:2006
Separations	Is the distance between communications cable and other services. This includes Low Voltage (LV), High Voltage (HV) – Single core and HV Multi-core, Open terminations
Regulations	Cover separations will generally be covered by Wiring Rules standard AS/ACIFS009:2006
Spatial separations	Is the distance between communications cable and other cable required by regulations where no barrier is installed
Barriers	Refers to physical barriers installed when there is not enough space to achieve spatial separations

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Records:	Is a TCA form (and future NTD record cards) must conform with AS/ACIFS009:2006
Relevant legislation, codes, regulations and standards (or their replacements)	Include relevant components of: • ACMA Technical Standards • AS/ACIFS008:2006, AS/ACIFS009:2006 – or subsequent replacements • SAA Communications Cabling Manual (Restricted) • AS/NZS 3000

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Demonstration of a cabling installation including 3 types of telephone sockets, one network termination device (NTD) and one alarm panel including TCA compliance form • Accurate application of cable conductor identification codes • Conduct and interpret cable test results • Correct interpretation and application of standards and regulations
Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC137C Install, maintain and modify customer premises communications cabling: ACMA Open Rule

Unit descriptor

This unit defines the level of competence* that is required for the purpose of the Australian Communications Authority's "Open" Cabling Provider Rule. This rule is associated with small installations connected to sockets and larger commercial and industry installations involving many lines, multi-pair cables, backbone cabling, multi-story buildings and more complicated termination modules and distributors.

This unit applies to customer cabling terminated on distributors. It applies to the installation, maintenance and modification of indoor, external, underground cabling at the levels stated in the range of variables.

Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications including for example: telecommunications (phones and facsimile), data including video and multimedia, security and alarms, and fire protection.

This unit meets the minimum ACMA "prescribed level of knowledge and skill that safeguards matters of health, safety, network integrity and addresses matters of interoperability where customer equipment and standard telephone service are involved" only.

Note 1: This does not imply industry competency using specialised cabling such as: Coaxial, Optical Fibre and Structured cabling.

Note 2: Completion of the following 6 cabling units: ICTTC005D, ICTTC006D, ICTTC008D, ICTTC012D, ICTTC017D and ICTTC022D exceeds the requirements of this standard and fulfils the requirements for ACMA Cabling Provider Rules: Open Cabling Category for Cabler Registration.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC136C	Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule

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ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Work within the constraints imposed by customer premises	1.1 Identify building infrastructure which places critical constraints on cabling 1.2 Develop strategies to manage other infrastructure in relation to cabling
2 Manage Remote Power Feed	2.1 Identify the risks posed by contact with Remote Power Feeding services 2.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises
3 Install/modify cable support, earthing and termination infrastructure	3.1 Ensure site is free of telecommunication hazards 3.2 Fixings and cable support structures of adequate strength are installed safely, aligned with the environment and in accordance with manufacturer's and customer's specifications 3.3 Catenary supports are secured to building structure and tensioned where necessary to ensure cable weight can be carried in operating conditions with interference and safety segregation maintained including adherence to AS/ACIFS009:2006 3.4 Protective earthing of metal work is installed to industry standards where required 3.5 Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation 3.6 Terminating equipment positioning and fixing follows accepted industry codes of practice, standards and customer requirements 3.7 Back-mount and outlet layout conforms to manufacturer's specifications and allows adequate work space for ease of access and avoid overlaying 3.8 Incoming and outgoing cables are segregated to ensure ease of access and avoid overlaying

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4 Install/alter cables and earth wires	4.1	Cables/wires handled in accordance with manufacturer's application specifications including tension and bending stress requirements
	4.2	Sources of possible damage to cable/wires are identified and avoided including hot pipes, sharp edges and cable burn
	4.3	Sufficient excess is allowed at cable ends to facilitate termination
	4.4	Telecommunication outlet ends of cable is uniquely labelled to match identifier at originating location
	4.5	Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards
	4.6	Cable ties not tightened to the point of causing cable sheath damage or transmission impairment and trimmed flush to prevent risk of personal damage
	4.7	Cables installed as catenaries or supported by catenaries in external environment shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIFS009:2006
	4.8	Cables installed underground shall meet minimum depth of cover and segregation from hazardous electrical and other services as per AS/ACIFS009:2006
	4.9	In accordance with AS/ACIFS009:2006, over-voltage protection devices are fitted to all cable pairs, where required, to suppress voltage surges with the devices protectively earthed
	4.10	TRC/CES/Earth wire insulation is protected against damage and TRC/CES and protective earths segregated in accordance with relevant industry and legislative standards AS/ACIFS009:2006
5 Terminate and test cables and earth wires	5.1	Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation
	5.2	Terminating modules are installed in accordance to manufacturer's specifications and cable pairs neatly and sequentially fanned for termination
	5.3	Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer's specified manner

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		5.4 Cable shield (if applicable) is earthed to manufacturer's specifications and relevant industry codes of practice including AS/ACIFS009:2006
		5.5 Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end to end testing of wire and pair termination integrity
		5.6 TRC/CES /Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIFS009:2006
		5.7 TRC/CES /Earth wire continuity is maintained through out and interface requirements with electrical systems are observed
		5.8 TRC/CES /Earthing installation shall be tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including AS/ACIFS009:2006
		5.9 Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems
6	**Inspect cable route to ensure correct separations**	6.1 Check separations along the entirety of the cable route
		6.2 Rectify separations which do not comply with regulations
		6.3 Install barriers to achieve separations where spatial separation can't be met
7	**Evaluate earthing needs for cable systems on customer premises**	7.1 Identify the role of functional, protective and CES earthing systems in customer premises
		7.2 Recognise existing earthing systems in customer premises
		7.3 Analyse the earthing needs of cable systems in a range of building types
		7.4 Identify cable characteristics relevant to the calculation of earthing requirements
		7.5 Calculate the upper and lower limits of resistance for a variety of cable system earths
8	**Label earthing systems**	8.1 Identify label requirements for all types of earthing systems
		8.2 Label earthing systems in accordance with industry regulations

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9 Create/update cable plans and records	9.1	Record sheets and plans of cable location, type and infrastructure are accurately created or updated and stored in accordance with customer requirements
	9.2	Cable pairs are clearly labelled to provide an accurate identification in accordance with manufacturer's, industry and client standards
	9.3	Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with industry codes of practice and AS/ACIFS009:2006
	9.4	Complete Cabling Completion Advice/TCA form
10 Monitor work activity	10.1	Close supervision of cablers not holding appropriate registration for the task is maintained to ensure installation/maintenance activity is strictly in accordance with legislative requirements and industry standards for safety and network integrity including AS/ACIFS008:2006 and AS/ACIFS009:2006

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA200 Cable Installation: Open
- CA201 Cable Termination Products
- CA202 Cable Conductor Identification Codes
- CA210 Cable Support Systems
- CA220 Cable Types
- PS212 Read Plans and Specifications: General
- PS213 Cable Record Systems: General
- RE210 ACMA Cabling Provider Rules, Cabler Registration, Rules and Regulations
- SW210 Basic Switching Systems
- TE210 Basic Telephony

Topics not covered in Skill and Knowledge Register

- Telecommunication hazard awareness

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

This unit applies to the ACMA Open Cabling Rule coverage for communications cabling installations applications to include larger commercial and industry installations involving many lines, multi-pair cables, backbone cabling, multi-story buildings and more complicated termination modules and distributors.

Building infrastructure	Includes but not limited to High Voltage power, other services, availability and suitability of existing cabling trays and fixing systems
Strategies to manage infrastructure	Include appropriate separations, fastening techniques, correct use of cable trays and support systems
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)
Regulatory environment	Is defined by the Overview *Telecommunications Act 1997*, and includes, ACMA, ACIF/CA, Labelling, Certified Components List (CCL) accredited registrars and registration
Cabling environment	May include: • Indoor environments include locations such as: ceilings, false ceilings, riser shafts, internal wall space, under floor, damp situations and within workstations. • Outdoor environments include cable installations on external walls and underground and/or aerial cabling on private and public property. • Underground cabling including shared trenches with electrical LV cables and/or other utilities. • Aerial cabling installations which may include the sharing of poles with LV/HV electrical power cables/terminations.
Cable support systems	May be: suspension catenary wire, ducts, cable tray, line poles, pipes, pits, wall and island mounted patched and jumperable distributors including CDs, BDs, FDs, LDs. NB: Cable trays may be galvanised steel or PVC: perforated low or high sided, single or multi channel Cable ducts may be closed, open, PVC, metal, single or multiple channel

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Cable types	Includes: copper twisted pair from 2 pair upwards but must include 2 and 4 pair and at least one larger cable (50 pair or greater). NB: Cable and topology may be chosen to suit a range of applications including analogue voice (3.4 kHz bandwidth), digital voice (64 kB/s) and digital (2 MB/s ISDN).
Cable identification	Refers to cable conductor identification codes and may be: • Colour coded, banded, numbered, lettered
Cable Termination systems	Includes termination of at least one jumperable distributor (CD/BD) with a capacity of 100 pairs or greater. Termination of a non-jumperable distributor (LD). Termination of a patch panel
Earthing and protection systems	Includes: • Installation of protective earth(s) for over voltage and surge/spike suppression. • Installation of protective earth barriers for segregation, cable tray, duct and metal equipment enclosures. • Running of equi-potential bonding conductors to MEN (Multiple Earth Neutral) and use of earth stakes. • Installation of functional earth(s) including TRC and CES types to provide customer switching system facilities. • Earthing of screened cable, barriers and cable trays for the reduction/elimination of interference from electromagnetic, radio frequency and power sources.
Records	Include: • Cabling Completion Advice/TCA (sign off form) • Building, cabling and equipment location plans • BD/CD and FD record books, LD record cards • Labelling of patch panels, distributor verticals, distributor pairs, equipment closets and rooms • Labelling of telecommunication outlets • And in the future possibly NTD record cards NB: Record books and cards may be hard copy or software versions but must conform with AS/ACIFS009:2006

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Functional, protective and CES earthing	Refers to the three common types of earthing system used in customer premises for cabling systems. Cablers must understand the features and application of each type
Cable characteristics	Includes the electrical performance of the cable and its' physical characteristics. Cabers must be able to identify the critical characteristics for each type of cable they use
Label requirements	Are defined in detail by the Industry regulations. Cablers must meet these requirements whenever installing earthing
Clearances and segregation:	Refers to clearances and segregation requirements as defined in AS/ACIFS009:2006 (or its replacement)
Separations	Is the distance between communications cable and other services. This includes Low Voltage (LV), High Voltage (HV) – Single core and HV Multi-core, Open terminations
Spatial separations	Is the distance between communications cable and other required by regulations where no barrier is installed
Barriers	Are physical barriers installed when there is not enough space to achieve spatial separations
Relevant legislation, codes, regulations and standards (or their replacements)	Include relevant components of: • ACMA Technical Standards • AS/ACIFS008:2006, AS/ACIFS009:2006 • SAA Communications Cabling Manual (Open) • AS/NZS 3000 • Building Codes

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Demonstration of termination systems at both distributor and outlet locations and at least one 50 pair copper cable, including accurate completion of installation records, drawing alterations and compliance forms
- Placement of cables on support structures and building faces for both internal and external locations
- Securing methods for above locations
- Work practices which avoid cable damage such as crushing, burning, kinking, sheath twist, cutting and nicking, bending radius
- Ability to read and interpret drawings related to cable layouts, outlet location, cable coding system and identifiers, distributor locations
- Conduct and interpret cable test results
- Correct interpretation and application of standards and regulations

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC138B Install, maintain and modify customer premises communications cabling: ACMA Lift Rule

Unit descriptor

This unit defines the level of competence that is required for the purpose of the Australian Communications Authority's "Lift" Cabling Provider Rule. Lift cabling is used between the local distributor (LD) adjacent to the lift machine/motor room and the lift control cubicle and lift cars.

This unit applies to customer cabling terminated on distributors (LD). It applies to the installation, maintenance and modification of lift cabling at the levels stated in the range of variables.

Customer cabling, for the purpose of this standard, may be used to connect devices for a range of applications including for example: telecommunications phones, data including video, audio and alarms.

Employability skills

This unit contains employability skills.

Prerequisite units

Certificate III in Electrical (Electrician) or equivalent qualifications or units as required by the regulator ACMA.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Work within the constraints imposed by customer premises	1.1 Identify building infrastructure which places critical constraints on cabling 1.2 Develop strategies to manage other infrastructure in relation to cabling
2 Manage Remote Power Feed	2.1 Identify the risks posed by contact with Remote Power Feeding services 2.2 Identify Remote Power Feeding services in a range of commonly encountered circumstances inside customer premises

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3 Install/modify cable support, earthing and termination infrastructure	3.1	Fixings and cable support structures of adequate strength are installed safely, aligned with the environment and in accordance with manufacturer's and customer's specifications
	3.2	Catenary supports are secured to building structure and tensioned where necessary to ensure cable weight can be carried in operating conditions with interference and safety segregation maintained including adherence to AS/ACIFS009:2006
	3.3	Protective earthing of metal work is installed to industry standards where required
	3.4	Installed support structure is checked to ensure cable will not be exposed to damage during installation and general operation
	3.5	Terminating equipment positioning and fixing follows relevant industry codes of practice, AS/ACIFS009:2006 and customer requirements
	3.6	Control cubicles, travelling cable supports, junction boxes, line isolator units, back-mount and outlet layout conforms to manufacturer's specifications and allows adequate work space for ease of access and avoid overlaying
	3.7	Incoming and outgoing cables are segregated to ensure ease of access and avoid overlaying
4 Install/alter cables and earth wires	4.1	Cables/wires handled in accordance with manufacturer's application specifications including tension and bending stress requirements
	4.2	Sources of possible damage to cable/wires are identified and avoided including hot pipes, sharp edges and cable burn
	4.3	Sufficient excess is allowed at cable ends to facilitate termination
	4.4	Cable is placed and secured to maintain safety and interference segregation in accordance with legislative and industry standards
	4.5	Cable ties not tightened to the point of causing cable sheath damage or transmission impairment and trimmed flush to prevent risk of personal damage
	4.6	Cables installed as catenaries or supported by catenaries shall meet minimum above ground clearances and clearances from hazardous electrical services as per AS/ACIFS009:2006

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	4.7 Travelling cables installed and secured to maintain safety and in accordance to relevant legislative, industry and manufacturer's standards
	4.8 Local Isolation Units (LIU) are fitted as required by TS001 and AS/ACIFS009:2006
	4.9 In accordance with ACMA TS009, over-voltage protection devices are fitted to all cable pairs where required to suppress voltage surges with the devices protectively earthed
	4.10 Earth wire insulation is protected against damage with protective earths segregated in accordance with relevant industry and legislative standards
5 Terminate and test cables and earth wires	5.1 Cable sheath removed to allow for correct termination length and without damage to underlying conductors and their insulation
	5.2 Terminating modules are installed in accordance to manufacturer's specifications and cable pairs neatly and sequentially fanned for termination
	5.3 Conductors are terminated in accordance with recommended colour code sequence using appropriate termination tools in the manufacturer's specified manner
	5.4 Cable shield (if applicable) is earthed to manufacturer's specifications and relevant industry codes of practice including AS/ACIFS009:2006
	5.5 Visual inspection is undertaken to confirm termination colour code sequence has been followed prior to end to end testing of wire and pair termination integrity
	5.6 Earth wires are terminated with connectors recommended by manufacturers in accordance with relevant industry codes of practice including AS/ACIFS009:2006
	5.7 Earth wire continuity is maintained through out and interface requirements with electrical systems are observed
	5.8 Earthing installation shall be tested for continuity, insulation resistance and conductive resistance as per relevant industry standards including AS/ACIFS009:2006
	5.9 Compatibility of alterations with existing systems is confirmed and new work tested both in isolation and when integrated with existing systems

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6	**Inspect cable route to ensure correct separations**	6.1 Check separations along the entirety of the cable route
		6.2 Rectify separations which do not comply with regulations
		6.3 Install barriers to achieve separations where spatial separation can't be met
7	**Evaluate earthing needs for cable systems on customer premises**	7.1 Identify the role of functional, protective and CES earthing systems in customer premises
		7.2 Recognise existing earthing systems in customer premises
		7.3 Analyse the earthing needs of cable systems in a range of building types
		7.4 Identify cable characteristics relevant to the calculation of earthing requirements
		7.5 Calculate the upper and lower limits of resistance for a variety of cable system earths
8	**Label earthing systems**	8.1 Identify label requirements for all types of earthing systems
		8.2 Label earthing systems in accordance with industry regulations
9	**Create/update cable plans and records**	9.1 Record sheets and plans of cable location, type and infrastructure are accurately created or updated and stored in accordance with customer requirements
		9.2 Cable pairs are clearly labelled to provide an accurate identification in accordance with manufacturer's, industry and client standards
		9.3 Cable pair record books are created or updated to provide an accurate record of pair locations, inter-connections and usage in accordance with industry codes of practice and AS/ACIFS009:2006
		9.4 Complete TCA form
10	**Monitor work activity**	10.1 Close supervision of cablers not holding appropriate registration for the task is maintained to ensure installation/maintenance activity is strictly in accordance with legislative requirements and industry standards for safety and network integrity including AS/ACIFS008:2006 and AS/ACIFS009:2006

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- RE210 ACMA Cabling Provider Rules, Cabler registration, Rules and Regulations
- TE210 Basic Telephony

Topics not covered in Skill and Knowledge Register

- Cable Installation: Lifts
- Cable Types: Lifts
- Cable Conductor Identification Codes: Lifts
- Read Plans and Specifications: Lifts
- Cable Record Systems: Lifts
- Australian Standards and Regulations: Lifts

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

This unit is generally applied to the ACMA Lift Cabling Rule coverage for communications customer cabling in lift installations

Note: All telecommunications cabling not falling within the lift boundary must be undertaken by registered cablers who meet the ACMA “Open” Cabling Provider Rule.

Building infrastructure	Includes, but not limited to, High Voltage power, other services, availability and suitability of existing cabling trays and fixing systems
Strategies to manage infrastructure	Includes: appropriate separations, fastening techniques, correct use of cable trays and support systems
Remote Power Feed	Applies to telecommunications services which operate at above TNV (Telecommunications Network Voltage)

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Regulatory environment	Is defined by the Overview *Telecommunications Act 1997*, and includes, ACMA, ACIF/CA, Labelling, Certified Components List (CCL) accredited registrars and registration
Cabling environment includes:	• The lift machine/motor room • The lift shaft including inside and outside the lift car and communications cabling of the lift travelling cables and connections
Cable support systems	Includes: conduit, catenary wire, simple cable tray runs, open and closed ducts, travelling cable supports shall be in accordance with AS/ACIF009 (or replacement)
Cable types includes:	• Copper twisted pair • Travelling cable flat and circular types complying to Australian Standards
Cable identification includes:	• Cable conductor identification codes that may be: – Colour coded, banded, numbered, lettered
Termination systems may include:	• Travelling cable terminations • Distributors, sockets, connectors, modules
Earthing and protection systems	Must be treated in accordance with AS/ACIF009
Records include:	• TCA (sign off form) • Building, cabling and equipment location plans • LD record cards NB: Record books and cards may be hard copy or software versions but must conform with AS/ACIF009
Functional, protective and CES earthing	Includes the three common types of earthing system used in customer premises for cabling systems. Cablers must understand the features and application of each type
Cable characteristics	This includes the electrical performance of the cable and it physical characteristics. Cabers must be able to identify the critical characteristics for each type of cable they use
Label requirements	Are defined in detail by the Industry regulations. Cablers must meet these requirements whenever installing earthing

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Clearances and segregation	Must be applied as defined in AS/ACIF009 (or its replacement)
Separations	Is the distance between communications cable and other services. This includes Low Voltage (LV), High Voltage (HV) – Single core and HV Multi-core, Open terminations
Spatial separations	Is the distance between communications cable and other cable required by regulations where no barrier is installed
Barriers	Are physical barriers installed when there is not enough space to achieve spatial separations
Relevant legislation, codes, regulations and standards (or replacements) include relevant components of:	• ACMA Technical Standards • AS/ACIFS008:2006, AS/ACIFS009:2006 • SAA Communications Cabling Manual (Open) • AS/NZS 3000 • AS1979 Travelling Cables • Cabling security codes and regulations

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Demonstration of a typical lift cabling installation from local distributor to lift car socket, including accurate completion of installation records, drawing alterations and compliance forms • Ability to read and interpret cable drawings and plans for locations and terminations • Accurate application of cable conductor identification codes • Conduct and interpret cable test results, • Correct interpretation and application of related regulations and/or industry codes

Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC140B Use hand and power tools

Unit descriptor

This unit applies to the skills required to safely use hand and power tools in the workshop and on the worksite.

This unit is based on the Clothing, Textiles and Footwear Training Package competency unit LMTPRTF14A Use hand tools.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Select hand and power tools	1.1 Identify the type of work to be performed accurately from work instructions
	1.2 Select appropriate hand and power tools for the work to be performed
2 Set and check tools for use	2.1 Inspect tools for damage, missing components or other defects prior to use
	2.2 Set or adjust tools for the proposed use in accordance with available information
	2.3 Install operating components (bits or blades) in tools to prepare for use
3 Prepare work area for safe tool use	3.1 Examine work environment and plan work with tools to maximise safety and productivity
	3.2 Clear and clean work area to make it free of obstructions and to allow clear access to tools
	3.3 Use appropriate barriers or screens to control access and minimise dust and noise
	3.4 Place power cables to maximise safety
4 Prepare work piece for tool use	4.1 Work piece is correctly mounted in, supported or aligned to the tool or machine to be used
	4.2 Work piece is securely anchored where necessary to prevent movement

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5	**Operate hand and power tools**	5.1 Use hand and power tools in accordance with industry and enterprise safe working practices
		5.2 Place tools in safe positions when not in use
		5.3 Safety equipment is used during tool operation in accordance with industry and enterprise safe working practices
		5.4 Monitor tool operation continuously and discontinue use if abnormal operation occurs
		5.5 Clean the work area on completion of work
6	**Maintain hand and power tools after use**	6.1 Clean and store tools in accordance with industry and enterprise safe working practices
		6.2 Report abnormal tool operation or other problems in accordance with established procedures
		6.3 Perform programmed maintenance of tools in accordance with work role
		6.4 Arrange inspection of power tools in accordance with regulatory requirements

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- General precautions and safe working practices based on relevant OH&S legislation, codes of practice, policies and procedures
- Hazards associated with use of particular hand and power tools
- Operating principles of a range of hand and power tools and appropriate applications
- General properties and working characteristics of materials
- Safety and environmental requirements of industry and enterprise procedures
- General housekeeping policies and procedures
- Recording and reporting procedures
- Interpret and apply work instructions and established procedures
- Use technical information about tools, processes, materials and equipment
- Select and use appropriate hand and power tools
- Use relevant chemicals and cleaning agents and dispose of waste products (MSDS and environmental compliance)
- Document and transfer information

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Work instructions	May include: Oral, written or visual communication including completion of standard forms, interpretation of information and instructions associated with workplace activities, and recording and reporting of work outcomes
Conditions of work may include:	• Work may be undertaken either individually or in a team environment and may require the exercise of independence, discretion and judgement • Work may involve interaction with other people in the workplace including supervisors and production personnel • Work is assessed in accordance with statutory requirements, enterprise insurance requirements, OH&S legislation, manual handling procedures and relevant health and safety regulations • Work is generally performed under moderate supervision and subject to review by supervisors
Work environment may include:	• Operational indoor workplaces • Operational outdoor workplaces • On client site • Restricted or confined spaces • Hazardous or exposed conditions
Work type will be based on:	• Processes to be performed • Materials to be used (e.g. Steel, aluminium, bronze, stainless steel, wood, plastic, canvas) • Working environment (e.g. wet or exposed conditions)

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Hand and power tools	Safe use should be demonstrated on a selection of the following, including at least two power tools: Measuring equipment, spanners, pliers, screwdrivers, wire strippers, hacksaws, hammers, shovels and crowbars, chisels, files, pop riveting machines, power tools – drills, angle grinders, hammer drills, grinders, circular saws, jig saws and lifting/hoisting equipment Safe use should include identification of potential hidden hazards eg. as associated with 'blind' drilling in walls and use of relevant safety equipment such as RCDs, rubber mats, rubber gloves etc.
Sources of information	May include: • Tool manufacturers' specifications, operating procedures and setting instructions • Enterprise work orders and instructions • Industry codes and symbols • Australian and enterprise quality standards and procedures • Product change policies and procedures • Enterprise or external personnel • Job procedures
Reports	Cover verbal and written communications in accordance with enterprise policies and procedures
Applicable regulations and legislation	May include: • Occupational health and safety legislation relevant to workplace activities • Workers' compensation legislation • Environment protection legislation • Workplace agreements and awards • Federal or State/Territory legislation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Comply with all relevant safety requirements applying to the use of hand and power tools
- Interpret work orders relevant to the selection and use of tools
- Interpret specifications and instructions relating to the materials and equipment on which the tools are to be used
- Prepare work environment for safe and effective tool use
- Set up tools for safe and effective use
- Perform work processes with the tools
- Safe use of a range of hand and power tools (see RANGE STATEMENT)
- Monitor tool operation for correct operation during use
- Inspect completed work to verify correct tool operation and use
- Document and communicate work related information including reporting of faults and other problems

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC141B Work effectively in a telecommunications technology team

Unit descriptor

This unit applies to individual work and work with others in a telecommunications technology.

This unit has been developed with reference to ICAITTW011B Work individually or as a team member to achieve organisational goals.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Relate personal role to the industry	1.1 Document past and present or intended roles comprehensively
	1.2 Identify realistic short and long term career objectives
	1.3 Relate personal capabilities to career objectives
	1.4 Relate current or intended role to career objectives in a positive manner
	1.5 Identify telecommunications technology associated with work
	1.6 Relate work to enterprise operations and telecommunications infrastructure
2 Establish own work schedule	2.1 Identify work to be completed
	2.2 Prioritise work according to organisation guidelines
	2.3 Urgent requests are prioritised and acted on according to organisational guidelines
3 Participate in team structure	3.1 Identify members and roles of team
	3.2 Identify and contribute to team tasks and goals
	3.3 Seek assistance from team members when necessary
	3.4 Give and receive feedback to assist in meeting team and organisation goals

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3.5 Recognise and respond positively to conflict within team

3.6 Identify and use strategies for projecting a professional image

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI210 Communication 2
- CI310 Communication 3
- CS210 Customer Relations
- CS310 Customer Relations 3
- RE320 Employment Regulations
- SU440 Conflict Resolution
- TE210 Basic Telephony
- TE310 Basic Telephony 3
- TE410 Basic Telephony 4
- TE430 Telecommunications Works Issues 4
- TE470 Communications Industry 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Document past and present or intended role	Should take the form of a portfolio of information (or similar) with particular emphasis on roles – actual or intended – in the telecommunications industry
Career objectives	Can be short statements which convey an appreciation of the industry

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Telecommunications infrastructure	Requires a contemporary understanding of the status of the industry and Networks at a national and local level and some understanding of future trends in technology
Prioritise work	May include: logical sequencing of sub-tasks within a single task and sequencing of work over periods from several hours to several days according to organisational priorities
Conflict	Negative conflict should be managed at a personal level to minimise impact on team performance. Positive conflict should be capitalised on to improve team performance.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Demonstration and explanation of individual role in relation to industry
- Presentation of career portfolio or similar information
- Examples of work scheduling
- Demonstration of professional performance
- Explanation of team structure and team operations
- Handling of conflict to achieve positive outcomes

Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC142B Use photonics devices

Unit descriptor

This unit applies to the monitoring and control of single channels which are part of a Photonics system and the related measurement and calculations.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify propagation features of optical systems	1.1 Identify the factors which affect propagation in optic fibre 1.2 Distinguish between transmission paths for and single mode fibres 1.3 Identify causes of pulse dispersion in multi-mode propagation systems 1.4 Identify a range of special fibre types used in optical systems
2 Recognise optical transmitters and receivers in optical systems and identify their functions	2.1 Recognise and identify the function of photo detectors in optical systems 2.2 Recognise and identify the role of photodiodes in optical systems 2.3 Distinguish between electrical and optical parameters of a range of photodiodes 2.4 Identify appropriate roles for LEDs in optical systems 2.5 Identify appropriate roles for ILDs in optical systems 2.6 Identify methods for coupling LEDs and ILDs to optical systems
3 Identify the role of Photonics devices in optical systems	3.1 Identify the interactions between fields and matter in Photonics devices 3.2 Recognise, and identify the roles of, modulators and attenuators in optical systems

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	3.3 Identify the role and characteristics of a range of optical couplers and splitters
	3.4 Distinguish between in-fibre and micro-optical devices in terms of their physical and operational features
4 Perform power margin measurements	4.1 Identify and manipulate optical attenuators and patch cables to take power margin measurements
	4.2 Operate a BER tester to obtain measurements of an optical system
	4.3 Conduct and record accurate optical system power margin measurements
5 Calculate a link budget for an optical system	5.1 Identify the appropriate calculations required to calculate a link budget for an optical system
	5.2 Perform accurate calculations given the power margin measurements
	5.3 Report the link budget in the appropriate format

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- Fibre Propagation
- Photonics Transmitters and receivers
- Photonics devices
- Power margin measurement

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Factors Affecting Propagation	Includes: • Rayleigh or back scattering • Radiation (micro or macro bends) • Mismatches • Coupling/connector/splice • Chromatic dispersion
Special Fibre Types	Includes: • Dispersion shifted fibre • Dispersion optimised fibre • Dispersion flattened fibre • Dispersion compensated fibre • Polarisation maintaining fibre
LEDs and ILDs	• LED is a light emitting diode • ILD is an Injection Laser Diode
Coupler Splitter Characteristics	Includes: • Loss • Number of ports • Directionality
Coupler /Splitter Types	Includes: • T and Y couplers • 1 – to N or Tree couplers • Star couplers
Budgets	Includes power budgets and bandwidth budgets
Propagation Systems	Includes single mode and multi mode

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Theoretical knowledge of optical systems and Photonics devices
- Identification of Photonics devices in optical systems
- Identification of the roles of Photonics devices in optical systems
- Identification of factors influencing the operation of Photonics devices
- Accurate measurement and calculation of optical system features

Context of and specific resources for assessment

Assessment must ensure:

- A telecommunications operations site. A mentor or supervisor appropriately experienced in relevant telecommunications technology, telecommunications infrastructure.

  AND

- Access to a range of Photonics devices and optical systems including – lasers, LEDs, couplers, splitters, in-fibre devices, micro-optic devices, optical attenuator, BER tester, calibrated light source, Optical Power meter, OTDR, arrange of cable types, dual trace oscilloscope, function generator, multi-meter, microscope.

  OR

- A simulated telecommunication operations site with similar resources.

Guidance information for assessment

- Access must be provided to appropriate learning and assessment support when required.
- Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.
- In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC143B Integrate specialised photonics devices into telecommunications systems

Unit descriptor

This unit applies to the principles, design and application of specialised devices in telecommunications systems. It reflects the extensive knowledge base required to work with advanced Photonics devices and the diversity of applications possible.

The Photonics industry is moving rapidly through a number of scientific and technological advances. Specific technologies or scientific concepts will vary substantially over the life of the unit and are not addressed in detail here. This competency unit creates a broad framework for assessment within these rapidly evolving circumstances.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify the application of specialised Photonics devices in telecommunications systems	1.1 Identify a range of specialised Photonics devices **(Called 'Photonics devices' from here on)** 1.2 Identify the purpose of a range of devices 1.3 Relate the purposes of devices to applications in a Photonics system 1.4 Demonstrate with diagrams the application of devices in a variety of telecommunications systems
2 Take measurements of the features which characterise Photonics devices	2.1 Measure and compare the transmission and reflection of Photonics devices using an optical analyser 2.2 Measure the spectral characteristics of special Photonics devices 2.3 Measure the power and bandwidth penalties for a range of Photonics devices 2.4 Explain the results of measurements taken in terms of the relevant theory

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3 Research technological advances for enhancing photosensitivity	3.1 Identify the need for constant research into Photonics technology advances
	3.2 Report recent advances in Photonics materials science
	3.3 Describe established technologies in Photonics
	3.4 Identify and report advances in Photonics
	3.5 Describe manufacturing methods for optical devices
	3.6 Identify the laser sources used for writing various types of gratings
4 Identify performance parameters for a range of specialised devices	4.1 Identify a range of Photonics devices performance parameters
	4.2 Explain how these parameters are influenced by physical factors
	4.3 Relate performance parameters and physical factors to a range of Photonics devices

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- Fibre Propagation
- Photonics Transmitters and receivers
- Photonics devices
- Power margin measurement

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

A range of specialised Photonics devices	The nature of this range will vary with time and circumstances. The range applied in any specific case should include sufficient devices of various types to allow the construction of a functional optical system. As an example at the time of writing this range of Photonic devices would include – active filtering, switching, add/drop Muxing and Demuxing, gain equalisation
Measure spectral characteristics	Should involve a spectrum analyser in measurement processes
Measure transmission and reflection	Should involve an optical analyser and broadband source in measurement processes
Photonics materials science	Include photo-refractivity, photo-chromic effects and photo-sensitivity

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Logical and theoretically correct schematic diagrams of the use of Bragg Gratings
- Accurate measurement of Bragg grating operation
- Logical explanation of Bragg grating measurements
- Accurate reporting of technological advances

Context of and specific resources for assessment

Assessment must ensure:

- Assessment requires access to Bragg grating devices and suitable test equipment.

  AND
- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR
- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC144B Use a virtual instrument

Unit descriptor

This unit applies to the application of Virtual Instrument systems to optical systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Distinguish between virtual and hardware instrument applications	1.1 Identify the specific applications for virtual instruments in optical systems measurement 1.2 Identify the features of virtual instruments applicable to optical systems 1.3 Identify advantages of virtual instruments over manual instruments 1.4 Identify the limitations of virtual instruments
2 Recognise the operating processes of virtual instruments	2.1 Identify the sampling process of virtual instruments 2.2 Identify the conversion processes used in virtual instruments 2.3 Recognise the potential effect of virtual instrument algorithm on the reading taken
3 Recognise a range of virtual instruments	3.1 Identify a range of simple and complex virtual instruments applicable to optical systems
4 Use virtual instruments	4.1 Measure optical systems or other relevant data using simple virtual instruments 4.2 Simulate and display the properties of a modulated signal with software generated instruments 4.3 Simulate and display a data signal transmitted through a band-limited channel
5 Use data bus connection instruments	5.1 Distinguish between parallel and serial data bus modes of operation 5.2 Control a virtual instruments using data bus operation

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5.3 Download an instrument control from the internet and run the control via data bus

5.4 Maintain a current knowledge of data bus virtual instruments

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- Instrumentation principles and practices
- Virtual instruments features and benefits
- Sampling and data conversion processes
- Application of virtual instruments
- Use of internet support services
- Emerging developments in virtual instruments

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Features of Virtual Instruments	Includes: cost, size, portability, adaptability, data control, sampling rates, processing speed, bandwidth, resolution, accuracy and aliasing
Conversion processes	Are analogue to Digital and Digital to Analogue
Algorithms	Fast Fourier transforms
Types of instruments	Includes: • Simple – multimeter, oscilloscope, spectrum analyser, OTDR • Complex – electronic design automation systems, total systems simulation, development and process control applications

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Distinguishing between hardware and virtual instruments
- Knowledge of the range and application of virtual instruments available
- Measurement using simple virtual instruments
- Simulation of signals and systems using complex virtual instruments
- Knowledge of current developments in virtual instruments

Context of and specific resources for assessment

Assessment must ensure:

- Web access to virtual instrument sites, Pico converter boards, Electronic workbench or similar software, virtual instrument applications and media.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC145B Perform photonics device laboratory techniques

Unit descriptor

This unit applies to the maintenance of clean room conditions, fabricate Photonics materials and make measurements of Photonics components in a Photonics laboratory.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Maintain clean room conditions	1.1 Relate clean room classifications to usage
	1.2 Identify the characteristics of a class 350 clean room
	1.3 Identify the role of airlocks and curtains in clean rooms
	1.4 Identify the consequences of failing to maintain clean room conditions
	1.5 Enter a clean room using correct procedures
	1.6 Identify personal health issues related to work in the Photonics industry
2 Perform microscopy techniques	2.1 Recognise and outline the characteristics of microscopes commonly used in Photonics laboratories
	2.2 Identify the role of a range of microscope types in Photonics laboratory work
	2.3 Select an appropriate microscope to observe a range of Photonics components
	2.4 Manipulate microscope equipment to observe a range of Photonics components
3 Perform manual optical alignment	3.1 Identify the principles of alignment in optical systems
	3.2 Identify sources of error in optical alignment processes

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	3.3	Perform manual alignment of a range of optical components
	3.4	Identify and explain the role of automated alignment systems
4 Conduct Photonics measurements	4.1	Identify a need for measurements from work instructions or work circumstances
	4.2	Select measurement techniques appropriate for the identified need
	4.3	Perform a range of Photonics laboratory measurement
	4.4	Record and report measurements
	4.5	Use software automation facilities where available

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- Clean room technique for Photonics laboratories
- Microscopy techniques
- Optical fibre alignment techniques
- Test instrumentation
- Photonics measurement techniques

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Microscope types	Includes: light microscope, compound microscope, video magnification, scanning and electron microscopes
Work Circumstances Measurements	May arise from circumstances such as failures or anomalies in equipment operation or as part of the progress of a research or manufacturing situation

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Measurement Techniques include:	• Film thickness and refractive index – prism coupler • Surface profile using surface contact techniques – dektac profilometer • Surface profile using non-contact techniques – laser or optical profilometer or sem • Surface hardness – surface indent tester or ultrasonic hardness tester or scratch tester • Thermal expansion – dilatometer or michelson interferometer • Thermal conductivity – thermal conductivity meter • Optical attenuation or insertion loss – light source and optical power meter or light source and optical spectrum analyser or otdr • Optical spectrum – wavelength meter or OSA

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Consistent use of clean room techniques • Use of a range of microscope technologies • Consistent and accurate alignment of a range of optical system components • Consistent and accurate use of a range of measurement techniques
Context of and specific resources for assessment	Assessment must ensure: • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC146B Test and manipulate WDM devices and systems

Unit descriptor

This unit applies to analysis, testing and manipulation of Wave Division Multiplex (WDM) optical system technology. It addresses the complex technical and conceptual details that underpin the technology, system components and the operational characteristics of these systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Recognise the principles of a Wave Division Multiplex (WDM) optical system	1.1 Recognise a WDM system by its features 1.2 Identify the role of a range of devices in a WDM system 1.3 Distinguish between a WDM system and a single channel system in terms of advantages and disadvantages 1.4 Explain the transmission of multiple signals on a single fibre using WDM technology 1.5 Identify the spectral and frequency characteristics of signals on WDM optical systems 1.6 Distinguish between the various types of WDM systems in common use 1.7 Relate WDM technical terminology to the operation of WDM systems 1.8 Explain how optical and electrical networks interface
2 Recognise the components of a WDM system	2.1 Produce and label a diagram of a WDM system 2.2 Identify the function of components in a WDM system 2.3 Explain the function of routing by changing wavelength

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	2.4	Identify methods for reducing dispersion and cross-talk in WDM systems
	2.5	Identify the function of fibre lasers in WDM systems
3 Select appropriate optical switching technology for a range of operations	3.1	Identify and select methods of interconnecting a WDM network for a range of operations
	3.2	Explain wavelength conversion and identify
	3.3	Distinguish between optical mesh and wavelength conversion and relate them to appropriate operations
	3.4	Identify WDM system components that may introduce jitter
	3.5	Identify methods of achieving synchronisation over WDM networks
	3.6	Identify basic protection and restoration techniques in WDM systems
	3.7	Identify interoperability in WDM systems
	3.8	Select optical add/drop multiplexing technology for distributing bandwidth to customers
	3.9	Maintain a knowledge of emerging topological features of WDM systems
4 Test and manipulate components of a WDM system	4.1	Test the operation of a WDM system
	4.2	Measure the gain of an optical amplifier
	4.3	Tune a laser
	4.4	Measure levels in an optical system

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- WDM principles
- WDM system components
- WDM system characteristics
- WDM network topology
- WDM device testing and manipulation

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Signal Characteristics	Includes: Operating spectrum, Frequency, Wavelength spacings and Bit rates
WDM Terminology and Characteristics	Includes: Four-wave mixing, Chirp, Optical Domain Switching, Common traffic types on WDM systems, Protocol and service independent transport and routing, Extendibility, Reconfigurability
WDM System Components	Includes: Braggs diffraction grating, tuneable laser, optical amplifiers, wavelength add/drop multiplexer, optical cross connect, optical switch, multiplexers and demultiplexers, wavelength selective couplers, filters, planar wave guides, splitters, couplers, polarisers and depolarisers, dispersion compensators, Fabry-Perot resonators and cavities, modulators, wavelength converters, wavelength multipliers, optical gateways, circulators
Currency of Information	RANGE STATEMENT items may not represent contemporary technology subsequent to publication of this unit – particularly in the Photonics field. Delivery of this unit and use of the RANGE STATEMENT must take into consideration new advances in technology and address these when delivering learning and assessing competence
Passive Optical Devices	Includes: circulators, attenuators, isolators, filters, couplers
Active Optical Devices	Includes: active filtering, switching, add/drop Muxing and Demuxing, gain equalisation

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Knowledge of the role and operation of WDM technology in optical systems
- Identification and explanation of contemporary WDM technology
- Analysis of operational characteristics of a range of contemporary WDM systems
- Measurement and testing of WDM systems

Context of and specific resources for assessment

Assessment must ensure:

- Optical systems using WDM technology and the related equipment and system components.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC147B Administer a data communications network (LAN or WAN)

Unit descriptor

This unit applies to the management and administration of a local area network or wide area network.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Install and configure a network	1.1 Identify the physical and logical structure of a LAN design
	1.2 Identify and resolve hardware and software compatibility conflicts
	1.3 Perform a file server preparation
	1.4 Install network server software
	1.5 Execute workstation boot procedures
	1.6 Verify network and work station functionality
	1.7 Document network physical connections and workstation characteristics
2 Set up network facilities	2.1 Set up a network print server
	2.2 Set up a network printer
	2.3 Set up a shared file system
	2.4 Connect a bridge or router between two networks
	2.5 Set up a gateway for a network
	2.6 Set up a logical disk or volume structure
3 Administer user accounts	3.1 Create a user account
	3.2 Create a user log script
	3.3 Produce document of network users and their rights
	3.4 Add and delete users
	3.5 Establish disk quotas for users

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	3.6	Demonstrate common user security procedures
	3.7	Set up user profiles
4 Install common applications	4.1	Install and configure an application in client – server mode
	4.2	Establish security and multiple access to an application
	4.3	Set up and configure an email client
	4.4	Set up and configure a browser
5 Install and configure systems applications	5.1	Configure a backup system
	5.2	Administer disk fault tolerance and redundancy techniques
6 Maintain system integrity	6.1	Implement system integrity techniques
	6.2	Implement system monitoring and diagnostic software
	6.3	Diagnose and isolate system faults

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CO410 Computer Skills 4
- CO610 Computer Skills 6
- CO650 Management of Information Systems
- CO660 Operating Systems 6
- CO680 Software Management 6

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Data Communications Network	Includes but is not limited to – computers and/or communications technology involving servers, workstations or remote user equipment, cabling, applications and systems software. This will typically be a LAN but may also be a WAN, or some other form of communications network
Network size	Should be of the order of a 50 user system but may be larger in the case of WANs
Network terminology	Covers the terms used in the elements and performance criteria and refer to a typical LAN. These provide a guide to the functions and operations to be assessed. Terminology may way between network types

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Establishment of a data communications network
- Creation of links to other networks
- Management of users and user accounts
- Set up and maintenance of all systems and software for the effective operation of a network
- Diagnosis and isolation of network faults

Context of and specific resources for assessment

Assessment must ensure:

- A telecommunications or data communications operations network of approximately 50 users or a simulated communication operations site with similar resources.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC148B Test and measure mobile phone equipment performance

Unit descriptor

This unit applies to the testing and measuring of the performance of mobile phone equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Measure output power	1.1 Identify the power output characteristics of a range of mobile phone equipment types
	1.2 Estimate expected power output for a range of equipment types
	1.3 Implement power output measurement software
	1.4 Observe and record power output
	1.5 Identify potential causes in variation between actual and expected values
2 Test the operation of mobile phone equipment	2.1 Identify the network types available for mobile phone transmission
	2.2 Identify the characteristics of mobile phone networks
	2.3 Identify the network applicable to a range of mobile phones
	2.4 Implement operation testing software
	2.5 Observe and record performance characteristics of a range of mobile phone equipment
3 Perform field measurement tests	3.1 Identify parameters influencing mobile phone field performance
	3.2 Estimate expected performance for a range of field settings
	3.3 Perform and record field tests
	3.4 Identify potential causes in variation between actual and expected values

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4 Perform cell identification	4.1 Implement cell identification software
	4.2 Perform and record field identification tests

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- DI530 Digital Radio 5
- DI630 Digital Radio 6
- MO330 Faultfinding for Mobile Phones
- OH410 Occupational Health and Safety 4
- RA310 Radio Frequency Theory and Hazards
- TE310 Basic Telephony
- TE470 Communications industry
- TE480 Cellular mobile telephony services

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Performance testing software	Includes a range of products available from vendor for the performance of field tests
Network types	Covers the two primary mobile phone networks are GSM and CDMA. Satellite systems are not applicable to this unit
Performance parameters	Includes: signal strength, power output, power usage

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Performance of tests with live mobile phone equipment
- Records of tests
- Logical analysis of results

Context of and specific resources for assessment

Assessment must ensure:

- Access to mobile phone networks and mobile phone equipment. Performance testing software.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC149B Apply knowledge of Access Network architecture and core components

Unit descriptor

The location, type and capacity of the Access Network infrastructure is ascertained, technology applications within the network defined and the capacity of the network to support required products and services is determined.

This unit applies to the Access Network and the various transmission paths i.e. cable, optic fibre, terrestrial radio and satellite.

Assessment candidates will have a wide range of telecommunications industry skills, knowledge and competency.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Technology applications within the Access Network are defined	1.1 Core technology components, and their application, within the access network are identified 1.2 The architectural sub-structures that comprise the access network are identified 1.3 Enterprise tools and systems are used to identify new technologies and their application
2 Determine location, type and capacity of access network infrastructure	2.1 Locate and identify plant relating to the area of the network being analysed using: • Enterprise tools and systems • Expertise/'on the ground knowledge' within the team • Field visits (where required) • Product/retail forecasts

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	2.2 Information from data sources is analysed to determine the nature, quantity, architecture and condition of existing plant. Attributes such as the type, capacity, occupancy, condition, layout, performance and limitations may be determined
	2.3 Differences in the access network architecture, and technology used, due to geographical impacts are identified
3 Capability of existing network technology is evaluated to determine network capacity to support products and services	3.1 The ability of the plant to support additional services or support expansion/modification of the network is established
	3.2 Potential bottlenecks or shortfalls in performance and ability to deliver services are determined
	3.3 Data is analysed to identify problem areas in the network with respect to capacity, capability and performance
	3.4 The capacity to integrate new technologies with existing network technology is determined

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI620 Research Skill 6
- CO410 Computer Skills 4
- EL411AN Electrical (Access Network)
- EN420 Enterprise Information Systems 4
- MA310 Basic Mathematics 3
- NE320 Network Architecture 3
- OH420 Occupational Health and Safety Regulations 4
- PR310 Problem Solving 3
- PS610 Plans and Specifications 4
- RA211AN Radio Frequency Theory and Hazards (Access Network)
- RA411AN Antennas (Access Network)
- RA421AN Radio Frequency Theory and Hazards 4 (Access Network)
- TE310 Basic Telephony 3
- TE411AN Telephony (Access Network)
- TE420 Outage and Hazard Processes 4

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- TE481AN Basic Architecture (Access Network)
- TR311AN Transmission Theory (Access Network)
- TR341AN Transmission Technologies and Products
- TR412AN Digital Transmission Theory (Access Network)
- TR413AN Analogue Transmission Theory (Access Network)

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries:	Boundaries between the access and inter-exchange networks and between access network technology and exchange switching and transmission systems are blurring. Access network electronics now interface into switches at the 2 MB level and may even be technically the same equipment as the switching equipment used at the exchange. Transmission systems used to deliver wideband capacity are now similar to those used in the inter-exchange network, while inter-exchange fibre cables may also be used to provide bearers for access network electronics
Network systems and products:	May vary across the specific technologies and vendors however are now standardised as much as possible across platforms and products
In broad terms technologies	Can be described as: switching, physical bearers, transmission systems, terrestrial radio, and satellite
Transmission medium	May be: copper cable, optic fibre cable, terrestrial radio and satellite. Transmission systems may be analogue or digital, multiplexed or non-multiplexed, switched or dedicated
Network Architecture	Can be described as: • Mains network or distribution network • Point to point. Point to multipoint. Physical or derived bearers

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Network condition information:	Is obtained from capacity assessment data, traffic dimensioning data and network performance data, which is available through the various network management tools associated with the network
New technology information and impact on existing network	Is obtained through enterprise specific policies, procedures and information systems
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • Australian Standards applying to radiation hazards • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of the core technology components that currently exist within the access network and their application • Definition and description of the access network architecture • Report (utilising all relevant enterprise data sources) detailing the current state of the existing access networks including: • The networks current capability, capacity and performance • The networks capacity to support products and services • The identification of potential problem areas (bottlenecks, shortfalls etc) • The capacity to integrate new technologies within the existing network technology

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Context of and specific resources for assessment	Assessment must ensure: • An access network planning area, with access to systems and deployment rules/standards. AND • A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor. OR • A simulated environment with similar provisions which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC150B Apply knowledge of internal and external influences upon enterprise and telecommunications industry

Unit descriptor

Internal and external influences affect all planning decisions regarding the development of the Access Network. This unit identifies the impact of deregulation, competition, economic conditions, regulations and legislation on enterprise specific policies and procedures and its subsequent incorporation into the planning process.

This unit applies to planning the Access Network.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Economic and political influences on the Telecommunications Industry in Australia is identified	1.1 The impact of deregulation and competition on the telecommunications industry in Australia is outlined 1.2 The influence of local and international economic conditions on the industry is assessed 1.3 Economic and political influences upon public and commercial enterprises are contrasted
2 Regulation and legislation of key impact to the Telecommunications Industry is identified	2.1 Identify the Legislation that governs carriers in Australia 2.2 Describe the Telecommunications Industry Regulatory Framework and obligations 2.3 Identify the industry regulators and their roles 2.4 Outline the function of Industry self regulation 2.5 Outline the Universal Service Obligation and the role of the National Universal Service Provider

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3 Internal Compliance obligations are defined and applied	3.1 Enterprise-specific investment management systems, financial delegations and authorities are identified
	3.2 Enterprise-specific policies and procedures, underpinned by regulatory and compliance obligations, are incorporated into day to day work practices

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI620 Research Skill 6
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- EN420 Enterprise Information Systems 4
- EN460 Enterprise Pricing Policy 4
- IN410 Interpersonal Relationships 4
- OH420 Occupational Health and Safety Regulations 4
- PS610 Plans and Specifications 4
- TE470 Communications Industry 4

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Information is collected on:	• Legislation • Regulations • Telecommunications Industry Regulatory Framework • Telecommunications Industry deregulation • Universal Service Obligation • Local and international economic conditions • Enterprise specific policies and procedures underpinned by regulatory and compliance obligations

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Planning processes	Are enterprise specific and are usually documented within enterprise process manuals
Planning priorities	Can be driven by network conditions, customer demand, marketing initiatives, revenue projections, legislative requirements
Planning	Can relate to network change, network growth and network reduction and may also cover sites, buildings and structures
Resource arrangements	May be internal or external to the enterprise
Business plan	Is the enterprise vehicle for planning its full resource commitment within a specified period. It covers activities, finance, labour and material
Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Australian Standards • Enterprise Standards • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes • Privacy Act • USO

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Identification of economic and political influences on the Telecommunications Industry in Australia including assessment of local and international economic conditions • Recognition of the impact of deregulation and competition • Evaluation of influences upon public and commercial enterprises

- Identification of the Legislation that governs telecommunications carriers in Australia
- Synopsis of the Telecommunications Industry Regulatory Framework and obligations
- Identification of the industry regulators, their roles and the function of industry self-regulation
- Examination of the Universal Service Obligation and the role of the National Universal Service Provider
- Identification of the enterprise-specific policies and procedures (underpinned by regulatory and compliance obligations) including business drivers, investment management systems, financial delegations, authorisation requirements to be incorporated into day to day work practices

Context of and specific resources for assessment

Assessment must ensure:

- An access network planning area, with access to systems and deployment rules/standards.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC151B Plan the Access Network

Unit descriptor

'Plan the Access Network' involves the collation and evaluation of data relating to network shortfalls and/or projected usage, leading to the development of solutions and ultimately network plans.

This unit applies to the Access Network and the various transmission paths i.e. cable, optic fibre, terrestrial radio and satellite.

Assessment candidates will have a wide range of telecommunications industry skills, knowledge and competency.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC149B	Apply knowledge of Access Network architecture and core components
ICTTC150B	Apply knowledge of internal and external influences upon enterprise and telecommunications industry

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Data related to both existing and projected network usage is accessed using enterprise tools and systems	1.1 Demand data relating to both current and proposed network growth is obtained
	1.2 Information relating to new and emerging technologies, facilities/features and their specific applications are accessed
	1.3 Current data relating to both traffic quantity and flow is gathered
	1.4 Enterprise tools and systems are used to obtain forecasts in relation to both service and traffic demand
	1.5 Enterprise tools and systems are used to determine current network capacity
	1.6 Relevant legislation and associated regulatory/operational codes are accessed

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2 Evaluate need for network growth	2.1 Capacity of the existing network to absorb planned growth is evaluated
	2.2 Need and likely timing of necessary network increments is identified
	2.3 Use of new or alternate technologies to rectify network shortfall is assessed
	2.4 Barriers relating to planned network extensions are identified
	2.5 Impact of not meeting network shortfall needs is assessed
3 Develop solution/ network plan to address network shortfall	3.1 Overall planning parameters including organisational policies, procedures and guidelines are reviewed and understood prior to commencement of the planning process
	3.2 Network shortfall is analysed incorporating the use of enterprise tools and systems
	3.3 Potential solutions, including forecasts for specific network area and cost/benefit analyses, are identified
	3.4 Optimum solution is established and justification outlined
	3.5 Project details are determined and preliminary costings ascertained
	3.6 Resource requirements are clearly identified
	3.7 Availability of required technology or technology feature within the specified timeframe is determined
	3.8 Network Plan/solution is presented for comment and approval in accordance with recognised enterprise procedures
4 Contribute to the development of long-term Access Network development plan/s	4.1 Contribution is made, within a team environment, to identify specific projects aimed at meeting the longer term projected network development requirements over a specified period of time
	4.2 Contribution is made, within a team environment, to the implementation of appropriate investment studies including cost/benefit analyses
	4.3 Contribution is made, within a team environment, to identifying resource requirements and availability, within required timeframe
	4.4 Contribution is made, within a team environment, to the allocation of priorities relating to the network development plans

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI620 Research Skill 6
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- EN420 Enterprise Information Systems 4
- EN460 Enterprise Pricing Policy 4
- IN210 Team work skills
- IN320 Teamwork 3
- IN330 Negotiation 3
- OH420 Occupational Health and Safety Regulations 4
- PE610 Personal Skills 4
- PR310 Problem Solving 3
- PS610 Plans and Specifications 4
- RE236AN Regulations for Access Network
- SU400 Finance Principles
- SU330 Quality Management 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries:	Boundaries between the access and inter-exchange networks and between access network technology and exchange switching and transmission systems are blurring. Access network electronics now interface into switches at the 2 MB level and may even be technically the same equipment as the switching equipment used at the exchange. Transmission systems used to deliver wideband capacity are now similar to those used in the inter-exchange network, while inter-exchange fibre cables may also be used to provide bearers for access network electronics

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Network systems and products:	• May vary across the specific technologies and vendors however are now standardised as much as possible across platforms and products In broad terms technologies can be described as: • Switching, physical bearers, transmission systems, terrestrial radio and satellite
Transmission medium	May be: copper cable, optic fibre cable, terrestrial radio and satellite. Transmission systems may be analogue or digital, multiplexed or non-multiplexed, switched or dedicated
Network Architecture	Can be described as: • Mains network or distribution network • Point to point. Point to multipoint. Physical or derived bearers
New technology information and impact on existing network	Is obtained through enterprise specific policies and procedures
Timeframes for development or growth planning	Are influenced both by financial capacity as determined by the business plan or via the marketing plan
Barriers to planned network growth	May include: financial constraints, planning approvals, environmental considerations, heritage legislation restrictions, government policy, technology availability, land acquisition problems, building availability, material availability
Planning processes	Are enterprise specific and are usually documented within enterprise process manuals
Planning priorities	Can be driven by network conditions, customer demand, marketing initiatives, revenue projections, legislative requirements
Planning	Can relate to network change, network growth and network reduction and may also cover sites, buildings and structures
Resource arrangements	May be internal or external to the enterprise
Business plan	Is the enterprise vehicle for planning its full resource commitment within a specified period. It covers activities, finance, labour and material

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Relevant legislation, codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • ITU Recommendations • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • Australian Standards applying to radiation hazards • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes • Privacy Act

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the following is essential: • Interrogation, interpretation and use of relevant enterprise tools and systems and other data sources • Identification of data including legislative requirements, demand data, new and emerging technologies, equipment and features current traffic data, growth forecasts, existing network capacity • Contribution to the development of longer-term network plans • Maintaining customer focus and consideration of customer needs • Interacting with enterprise personnel and customers • Candidate submits a clearly documented network development plan, within specification and within specified timeframes that demonstrates: • Implementation of planning processes including the associated monitoring and control mechanisms • Development of solutions to address access network shortfalls that satisfy customer and enterprise needs (including issues such as congestion, data speeds, service compatibility, connection of additional services and other performance issues) • Merging of technological development and product implementation into network development plans • Resource requirements

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- Appropriate financial analysis
- Compliance with all related occupational health and safety requirements and work practices

Context of and specific resources for assessment

Assessment must ensure:

- An access network planning area, with access to systems and deployment rules/standards.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC152B Brief the project

Unit descriptor

Brief the Project involves identifying all relevant details relating to the project from the approved network plans including customer requirements and all impacts to the project; resulting in the development of the project brief.

This unit applies to the Access Network and the various transmission paths i.e. cable, optic fibre, terrestrial radio and satellite.

This unit should be applied with units dealing with scope management and risk management.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC151B	Plan the Access Network
BSBWOR401A	Establish effective workplace relationships OR
BSBFLM303C	Contribute to effective workplace relationships

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Identify requirements	1.1 Details relating to the project are identified from the approved network plan
	1.2 Current Access network conditions are assessed
	1.3 Specific customer requirements are sought and analysed
	1.4 Site survey data is analysed where required
	1.5 Geographical information is obtained as required
	1.6 Barriers to plan realisation are identified
	1.7 Information relating to new technology or technology features is obtained and studied
	1.8 Relevant legislation and associated operational codes are studied and impact on planning processes analysed

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2 Develop project brief	2.1 Planning options are developed and studied, considering present and future needs
	2.2 Both current and new technology, facilities and features are considered when developing options
	2.3 Cost/benefit studies are undertaken as a guide to the decision making process
	2.4 Project outcomes are determined in keeping with approved planning parameters
	2.5 Project brief is discussed with the customer as required
	2.6 Final option is presented for approval before proceeding with project brief
	2.7 Specifications relating to location, route, area, product and/or platform are established
	2.8 Costing estimates are developed and an operating budget proposed in accordance with enterprise policy
	2.9 Proposed project timing is determined taking into consideration other related projects where required
	2.10 Brief is prepared and includes broad details of the resources required to complete project, broad scheduling data, relevant maps, sketch plan and broad project description
	2.11 Sketch plan for area in question is drafted in accordance with enterprise practice
3 Manage the Project	3.1 The three phases of project management are defined and applied to complete the project brief
	3.2 Roles and responsibilities within the project are defined
	3.3 Contribute to the completion of project documents in line with enterprise standard and guidelines
	3.4 Resourcing of the project is scoped
	3.5 Contribute to the definition of reporting requirements and the implementation of mechanisms for timely, concise reporting of project progress and outcomes

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI620 Research Skill 6
- CO410 Computer Skills 4
- CS410 Customer Relations 4
- EN420 Enterprise Information Systems 4
- EN460 Enterprise Pricing Policy 4
- IN410 Interpersonal Relationships 4
- IN210 Team Work Skills
- IN320 Teamwork 3
- IN330 Negotiation 3
- OH420 Occupational Health and Safety Regulations 4
- PE610 Personal Skills 4
- PR310 Problem Solving 3
- PS610 Plans and Specifications 4
- SU400 Finance Principles
- SU330 Quality Management 3

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Traditional network technology boundaries:	Boundaries between the access and inter-exchange networks and between access network technology and exchange switching and transmission systems are blurring. Access network electronics now interface into switches at the 2 MB level and may even be technically the same equipment as the switching equipment used at the exchange. Transmission systems used to deliver wideband capacity are now similar to those used in the inter-exchange network, while inter-exchange fibre cables may also be used to provide bearers for access network electronics

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Network systems and products:	May vary across the specific technologies and vendors however are now standardised as much as possible across platforms and products
In broad terms technologies	Can be described as: switching, physical bearers, transmission systems, terrestrial radio and satellite
Transmission medium	May be: copper cable, optic fibre cable, terrestrial radio and satellite. Transmission systems may be analogue or digital, multiplexed or non-multiplexed, switched or dedicated
Network Architecture can be described as:	• Mains network or distribution network • Point to point. Point to multipoint. Physical or derived bearers
Network condition information:	Is obtained from capacity assessment data, traffic dimensioning data and network performance data, which is available through the various network management tools associated with the network
Customer information:	As methods for gathering customer information vary between enterprises, it may include marketing and account management sources
Customers	May be: internal or external to the organisation
External customers	May include: other carriers, service providers, communication consultants, enterprises, government bodies
Site survey data	May include: site availability, site ownership and acquisition data, building availability and/or capacity, power availability, line of sight data, geological/land surveys, regulatory and statutory requirements, earthing requirements, environmental impact, weather conditions
Barriers to planned network growth	May include: Financial constraints, planning approvals, environmental considerations, heritage legislation restrictions, technology availability, land acquisition problems, building availability, government policy, community opposition
New technology introduction:	Is normally part of long term planning and is part of the overall business and forward planning process

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Planning processes:	Are enterprise specific and are usually documented within enterprise process manuals
Enterprise policy	May include decision as to whether project will be subject to tender process, preferred supplier arrangement or undertaken by enterprise resources is governed by enterprise policy
Quality audit:	Is a review of process methodology
Planning approval mechanisms:	Are enterprise specific
Relevant legislation codes, regulations and standards include:	• International Standards ISO 9000/9001 • ACMA Standards TS 14 • Occupational Health and Safety • Heritage legislation • Industrial awards and conditions • Australian Standards applying to radio frequency hazards • State and Federal Environment Acts • National Parks Act • Telecommunications Act and relevant codes

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Identification of all relevant data including: planning requirements, current network conditions, technology, performance and capacity, customer requirements, site survey data, technological innovations and development, barriers to plan realisation.
- Application of legislative and environmental conditions to project brief development
- Reading and interpretation, using equipment/system manuals and specifications and relevant enterprise policy documentation.
- Preparation of clearly documented brief which meets specification, specified timeframes, enterprise financial systems and policy; while applying specified planning processes including associated monitoring and control mechanisms.

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- Compliance with all related occupational health and safety requirements and work practices.
- Identification of the project management phases, including defined roles and responsibilities, and application to the project brief.
- Scope and define project resources
- Produce project documents and reports in line with enterprise standard and guidelines

Context of and specific resources for assessment

Assessment must ensure:

- An access network planning area, with access to systems and deployment rules/standards.

  AND

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Guidance information for assessment

- Access must be provided to appropriate learning and assessment support when required.
- Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.
- In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC153B Work safely near power infrastructure

Unit descriptor

This unit describes the requirements and conditions that must be met when telecommunications workers conduct operations in the vicinity of substantial safety hazards including work:

- at heights
- near electrical distribution infrastructure, radiation devices or other services
- in confined spaces (Assessors – see note on confined spaces in Range Statement.)

It addresses safety from the hazard management perspective and requires the use of assessment and judgement capabilities as well as safe work practices. Candidates will be completing this unit in association with one or more other telecommunications units and will be installing, testing or repairing telecommunications infrastructure. The primary focus of the unit is on aerial work, with consideration given to related tasks including work on elevated work platforms, work in confined spaces and work on roofs and other structures.

The purpose of this competency unit is to ensure the safety of telecommunications workers working in a range of high-risk situations. The performance criteria in it are relatively generic and can be contextualised to particular enterprises or tasks. More task-specific performance criteria are contained in other units in the training package.

Candidates who have completed ICTTC170A Follow Occupational Health and Safety and environmental policy and procedures should have this recognised in the form of a shortened training program and reduced emphasis on the basic risk management aspects of the unit.

(Note: This unit was previously attributed with a degree of equivalence with the generic OH&S unit ICTCC100A. There are now clear differences between this unit and the replacement for ICTCC100A, that is, ICTTC170A which now makes any statement on equivalence redundant.)

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

INDUSTRIAL CONSIDERATION

This unit addresses a cross-industry issue – what constitutes an ‘authorised’ person, that is, a person authorised for ‘working around electrical parts’?

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Unit descriptor (cont)

The Queensland Department of Industrial Relations provides the following advice on this matter:

In determining whether a person is an 'authorised person' under the Regulation, an employer or self-employed person must be satisfied that the following two elements are met:

- Technical knowledge and experience to do work that involves contact with, or being near to, the electrical part. An employer or self-employed person must ensure that the technical knowledge and experience of the person is appropriate. Discharging this obligation should also include having:
  - A system that addresses ongoing competency and identification of persons authorised to work near electric lines
  - Approval of the asset owner.

An employer or self-employed person should contact their training provider, industry association or union to find out whether these organisations provide relevant training.

- Approval by the person in control of the electrical part for the authorised person to contact or work near the part, or act for the person in control. The employer or self-employed person must ensure that this approval is obtained. When an employer or self-employed person is working around an electric line and they have any concerns regarding the performance of that work, they should contact the person in control of the line for safety advice. (Source: Authorised Persons – Work Near Overhead Lines – Fact Sheet – 04.04.03 1 obtained at URL *<http://www.eso.qld.gov.au/legislation/facts/overhead_lines.pdf>. See the source for more information>*

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Conduct a risk assessment	1.1 Confirm work instructions with appropriate personnel and seek clarification if required
	1.2 Identify enterprise guidelines, procedures and personnel relevant to work and work site. (Assessors – see note in Range Statement.)

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	1.3 Identify OH and S legislation, policy and procedures relevant to the work and work site
	1.4 Identify the characteristics of electrical, radiation, gas and other services in or adjacent to the work site
	1.5 Operate test equipment to assess the safety of the work site, other services and support structures
	1.6 Identify potential safety hazards associated with site and work requirements and record in a JSA or similar risk assessment record
	1.7 Report safety hazards which exceed personal authority to relevant personnel
	1.8 Obtain and confirm permits from relevant authorities within scope of personal authority
	1.9 Identify potential emergency situations relevant to the site
	1.10 Identify earthing arrangements for telecommunications infrastructure and any other services impinging on the work site
2 Develop hazard management plan	2.1 Identify strategies to manage potential safety hazards
	2.2 Communicate hazard management strategies and confirm with co-workers
	2.3 Establish and confirm safety procedures to ensure management of emergency situations
	2.4 Identify and obtain safety equipment and personal protective equipment
	2.5 Identify safe work zones and limits of approach to other services
	2.6 Plan and implement road safety and traffic control measures
	2.7 Plan and implement safe strategies for working at heights
	2.8 Plan and implement safe strategies for working in confined spaces (Assessors – see note on confined spaces in Range Statement.)
3 Work safely	3.1 Use or wear safety equipment and clothing effectively
	3.2 Use ladders, climbing or lifting equipment to work safely at height
	3.3 Operate hand and power tools safely at height

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3.4 Work outside identified safety zones and approach limits

3.5 Identify and conform to enterprise and industry earthing practices

3.6 Monitor and manage risks throughout work procedures

3.7 Apply emergency procedures in the event of an incident

3.8 Reinstate the work site to ensure the safety of telecommunications workers, the public and the telecommunications network

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

- Appropriate electrical safety and technical knowledge relating to the type of work, operating plant or vehicle near power lines (safe system of work in accordance with the relevant Electrical Regulations and Acts).
- The possible causes and risks of insulated conductors being damaged, and demonstrate skills and knowledge necessary to implement a safe system of work.
- Exclusion zones and requirements for the different categories of lines, conductors and authorisation of persons.
- Applying emergency procedures in the event of an incident.
- Communication, low voltage and high voltage cables (including ways of ascertaining the voltages present).
- Distinguishing between insulated and bare conductors.

Skills and Knowledge Register

Select from the following list to suit the learning and assessment context. Candidates may have completed some of the items in other situations or as part of ICTTC170A.

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

Categories have been assigned to assist in selecting items to include in training. These are:

- EL210 AC/DC basic theory
- EL222 Earthing and EPR
- EL230 Electric Shock
- EL231 Limits of Approach
- FA220 First Aid – Emergency Response
- AA210 Joint use construction
- OH210 Occupational Health and Safety 2

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- CA296 Pole testing
- OH250 Pole top rescue
- CA290 Pole types and aerial service identification
- OH215 Safe work practices – aerial
- OH230 Hazard Management
- OH240 Personal Safety Equipment
- OH260 Manual Handling
- RA210 Radio frequency theory and hazards
- TO220 Ladder Handling

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Guidelines, procedures and personnel	These will typically be enterprise based
Occupational health and safety legislation, policy and procedures	May include: • State/Territory/Commonwealth occupational health and safety Acts, Regulations and codes of practice, including regulations and codes of practice relating to hazards present in the workplace or industry • General duty of care under occupational health and safety legislation and common law • Provisions relating to roles and responsibilities of health and safety representatives and/or occupational health and safety committees • Provisions relating to occupational health and safety issue resolution
Characteristics of electrical, radiation, gas and other services	May include: • Pole construction, voltages, cable types, radiation emissions, water or gas pipes • Measurements may need to be taken to assess electrical potential or charge leakage into adjoining infrastructure • Other services may include sewerage, water and telecommunications

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Test equipment	Includes devices to test pole safety, gas leakages, electrical current leakages and others relevant to work site
Support structures	May include: • Joint use with electrical services, building services or other utilities • Support structures construction may include concrete, wood, steel or a suitable combination, brick
Identify potential safety hazards	Includes checking all equipment and the work area before work commences
Job Safety Analysis (JSA)	Includes: sheets to record the steps in the risk management process – identification, assessment and control. Both health and safety and environmental hazards can be documented on a JSA. A JSA should be completed for each new workplace or work-site situation.
Safety hazards	May include electrical current leakage, structural faults in support structures, radiation, weather, general site conditions, geography
Personal authority	Individuals will have varying degrees of authority to act on hazard situations. Situations which go beyond this should be escalated to the appropriate level within the individual's organisation
Relevant authorities	May include local government, utility providers (gas, water, electricity, telecommunications), environment protection, cable location services (Dial Before you Dig), private owners
Emergency situations include:	• injury to one or more personnel • collapse of support structure • damage to infrastructure • other situations creating imminent risk
Earthing arrangements	Includes ACMA standards and may include manufacturers, enterprise or local environmental hazard requirements
Manage potential safety hazards	May include: additional safety precautions or equipment, temporary outage, specialised operational equipment, shutdown or relocation of other services, warning signs, road closures, site clearances, roof guards

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Safety equipment	May include: witches hats, flashing lights, guards, warning signs and tapes, aerial safety belts and lines, traffic signs
Personal protective equipment	May include: asbestos precautions, dust protection, ear muffs, eye protection, gas monitoring equipment, gloves (plastic, rubber, leather), gumboots, hard hats, overalls, personal reflecting jackets, riggers gloves, safety boots, vests, radiation protection clothing
Safe work zones and limits of approach	Includes: safe work near electricity supply assets and sources of radiation is defined by safe work zones – typically from one to several metres away from live electrical or radiation emitting infrastructure. ACIF, State and Territory authorities and asset owners (private companies) publish documents advising of safe work zones and limits of approach. These limits may include gas and water services in some cases
Road safety and traffic control measures	May include: placement of cones, barricades, sign and warning lights. Measures may include additional personnel to manage traffic flow
Confined spaces	Includes pits, roof spaces, shafts and equipment cupboards. Includes power asset space
Ladders, climbing or lifting equipment "devices to support construction personnel at heights"	May include non-metallic ladders, fixed ladders, elevated work platforms, safety harnesses
Relevant legislation, codes, regulations and standards	• Technical Standards AS/ACIF S008:2006, AS/ACIF S009:2006 • AS Communications Cabling Manaul (CCM) Volume 1 • ACIF Standards and Codes • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007

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- Occupational Health and Safety Acts and relevant codes/standards
- Environmental Protection Acts
- Road and traffic control legislation and codes
- Cabling security codes and regulations
- ACMA Standards TS 14
- International Standards ISO 9000 and 9001
- ITU recommendations
- Telecommunications Act and relevant codes

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- Application of all related OHS requirements and work practices associated with the installation or repair work (including protective clothing and personal safety items, adequate warning signs and safety devices).
- Demonstrated ability to communicate with work associates, supervisors and team members. (Completion of unit ICTTC170A would satisfy this criterion)
- Demonstrated ability to recognise and report hazards to designated personnel.
- Use of relevant test equipment.
- Demonstrated ability to assess hazard levels and application of safety precautions for self, fellow workers and the public at large.
- Demonstrated ability to accurately follow workplace procedures relevant to controlling risks in the workplace. (Completion of unit ICTTC170A would satisfy this criterion)
- Work practices which ensure all relevant authorities have been notified and approvals obtained prior to commencement.
- Safe use of hand or power tools and/or equipment normally used for the installation or repair of telecommunications infrastructure.
- Demonstrated ability to identify safe support structures from pole status markings, visual inspection or approved testing procedures.
- Correct interpretation and application of regulations and standards.

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Context of and specific resources for assessment

Assessment must ensure:

- A workplace conducting the operations covered by this competency unit, equipment and resources relevant to the context of the work (See Range Statement) and support from a competent supervisor or mentor.

  OR

- A simulated environment with similar provisions which conforms to the Assessment Guidelines.

Method of assessment

Notes to Assessors:

Guidelines, procedures and personnel

These guidelines and procedures will set the context for assessment for this competency unit.

Confined spaces

Reference to or inclusion of 'confined spaces' in this competency unit does not imply that this unit confers competence for work in recognised confined spaces.

This unit approaches the issue of confined spaces at the recognition level only. It does not confer endorsement for work in confined spaces. This requires extensive specialised training which is beyond the scope of this unit. Refer to the Building and Construction Training Package or your State regulatory authority for more information on work in confined spaces

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC155A Construct and operate a simple radio communications device

Unit descriptor

This unit applies to constructing, operating and working with simple radio systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC170A Follow OHS and environmental policy and procedures

Application of the unit

This unit is a foundation for the development of a wide range of radio communications and radio-related competencies. It provides basic skills and knowledge, including the principles of radio communications and the ability to recognise and work with radio communications hardware.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Outline the principles and range of radio communications.	1.1 Explain the principles of ***radio communications***. 1.2 Describe the range of ***communications technologies*** that operate on radio principles. 1.3 Describe a range of ***applications of radio communications technology***.
2 Interpret radio circuit diagrams.	2.1 List the functions of common ***electronic circuit components*** typically used in radio circuits. 2.2 Identify ***circuit diagram symbols*** for radio communications circuit components. 2.3 Discriminate between transmitter, receiver and other circuit types.
3 Construct a simple radio communications device.	3.1 Recognise circuit components and their characteristics from their physical appearance. 3.2 Assemble circuit components according to a circuit diagram or other specification. 3.3 Activate the assembled circuit and adjust until required level of function is achieved.

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4 Operate a simple radio communications device.	4.1 Identify the function of a range of radio communications devices. 4.2 Activate a radio communications device. 4.3 Send or receive data through a radio communications device.
5 Use instruments to take measurements from a radio communications device.	5.1 Identify the range of ***radio communications measurements***. 5.2 Identify ***radio communications measuring instruments*** that can be used to take radio communications measurements. 5.3 Select instruments to make specified radio communications measurements. 5.4 Take a range of radio communications measurements.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context.

Codes refer to the Skills and Knowledge Register included in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- RA430 Radio theory for wireless operations
- RA440 Radio components, terminology and symbols
- RA450 Radio analogue circuits
- RA460 Radio block diagrams, schematics and flow charts
- RA470 Radio modulation schemes
- SC410 Satellite data telecommunications
- TF440 Radio test equipment
- TO430 Hand tools and soldering for radio technicians

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Radio communications may include:

- oscillators and amplifiers
- modulation/demodulation
- magnetic propagation, antennas and wave guides
- power suppliers.

Communications technologies may include:

- cellular mobile
- satellite
- two-way radio systems
- trunked radio
- radio telemetry/digital radio
- broadcasting.

Applications of radio communications technology may include:

- two-way radio systems
- trunked radio
- broadcast radio/TV
- cellular mobile telephony
- satellite mobile telephony
- radar
- wireless local loop/WiFi (802.11)/WiMAX (802.16)
- radio astronomy
- digital telephony
- point-to-point microwave
- personal pager systems.

Electronic circuit components may include:

- integrated circuits (digital and analogue)
- valve devices
- semiconductors
- left, right and centre (L, R and C)
- switches, relays and terminals
- antennas and wave guides
- microphones and speakers
- batteries.

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Circuit diagram symbols may include:	• valve devices • semiconductors • L, R and C • switches, relays and terminals • antennas and wave guides • microphones and speakers • batteries.
Radio communications measurements may include:	• spectrum analysis • signal strength • ingress and egress • distortion and noise • frequency deviation.
Radio communications measuring instruments may include:	• digital voltmeter • variable power supply • frequency counter • frequency synthesizer.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment candidates should produce evidence of the following: • demonstrated knowledge of general radio communications matters, such as current or new technology and its function • demonstrated knowledge of the operation of radio technology, including component level functions and the form and application of specific types of radio signal • construction of simple electronic circuits, given specifications and required components • operation of simple radio equipment, including explanation of its operational parameters • measurement of radio signals and other aspects of the operation of radio equipment.

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Context of and specific resources for assessment	Assessment will occur in a radio or electronics workshop or in a simulated training facility. Assessment for this unit will require access to: • simple radio transmission and reception equipment • radio circuit diagrams and components • functional radio antennas for transmission and reception • radio measurement equipment.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC156A Install digital reception equipment

Unit descriptor

This unit applies to installing all types of customer digital reception equipment (DRE) on customer premises.

It is desirable that ICTTC011D Place, secure and terminate coaxial cable is completed before this unit is undertaken.

Fault finding and rectification is covered in ICTTC157A Locate and rectify digital reception equipment faults.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC170A Follow OHS and environmental policy and procedures

Application of the unit

This unit is for installation technical staff working on customer premises.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Gather data for the installation.	1.1 Identify and acknowledge customer contact point. 1.2 Make building access arrangements where appropriate. 1.3 Verify installation order with customer. 1.4 Identify and address additional needs of customer. 1.5 Confirm location of ***digital reception*** equipment and fittings with customer.
2 Prepare for installation.	2.1 Check job site for safety hazards and complete a ***job safety analysis (JSA)***. 2.2 Identify ***barriers to installation*** and develop strategies to overcome them within time and budget restrictions. 2.3 Take measurements to ensure correct ***signal level*** at wall plate. 2.4 Check customer's existing equipment for operational condition and reception quality. 2.5 Discuss detected faults or problems with customer and note them in writing.

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	2.6	Identify interconnection cabling requirements.
	2.7	Prepare cables for job requirements.
	2.8	Check customer interconnection requirements to assist in connector selection.
3 Obtain tools and materials.	3.1	Select ***tools*** and materials appropriate for the work order.
	3.2	Locate tools and materials to ensure ready access during installation.
	3.3	Check that all tools and equipment are in safe working order and adjusted to manufacturer ***specifications***.
4 Install equipment.	4.1	Affix wall plate to agreed position on wall and secure cable according to specification.
	4.2	Connect ***set top unit*** to ***customer equipment***.
	4.3	Connect ***cabling*** between wall plate and set top unit.
5 Commission and test installation.	5.1	Power up set top unit, configure it to customer requirements and confirm.
	5.2	Activate customer services.
	5.3	Conduct functional ***test*** to assess transmission signal quality.
	5.4	Conduct tests to ensure that all services are being delivered.
	5.5	Check that all interconnected equipment is functional.
6 Finalise installation.	6.1	Restore furniture and fittings to original location.
	6.2	Check for damage that may have occurred during installation.
	6.3	Remove waste and debris from site and dispose of it in a safe and environmentally appropriately manner.
7 Handover to customer.	7.1	Check completed work with the customer to ensure that original requirements are met.
	7.2	Check quality of all services against pre-existing conditions and confirm.
	7.3	Conduct customer education appropriate to the equipment, including explaining relevant literature.
	7.4	Discuss damage that occurred during installation with customer and make arrangements for repair or replacement of damaged components.

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8 Complete contract documentation.	8.1 Where work and equipment are subject to warranty, provide ***warranties*** to customer in required format.
	8.2 Prepare invoices and other financial documentation where required and presented to customer.
	8.3 Obtain authorised signatures on required documentation to confirm acceptance of completed work.
	8.4 Complete job-closure tasks.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- customer service principles, particularly dealing with customers face-to-face
- quality assurance – enterprise requirements
- OHS – general principles and enterprise-specific JSA requirements
- pre-installation – enterprise-specific requirements
- interconnection – understanding of contemporary equipment and connection methods
- installation of return path – awareness of return path technology
- radio frequency (RF) theory – basic principles and safety
- basic telephony – principles to support return path awareness
- hand and power tools – skill to use general tools
- customer education – basic objectives and methods of training for product use
- product knowledge – enterprise/service-specific knowledge of products and services supplied
- visual system awareness – broader awareness of whole industry product range

Required knowledge

The relevant required knowledge is articulated in the above guidelines.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Digital reception:	• services include: – free-to-air television (Open Broadcast TV) – subscription television (Pay TV) – internet protocol television (IPTV) – community television • service provision media includes: – cable – satellite – wireless – terrestrial.
Job safety analysis (JSA) is:	• a form completed as part of a safety check before commencing work on a job site.
Barriers to installation may include:	• provision and location of power outlets • furniture location • internal walls • personal safety.
Signal level is:	• the level of signal required to operate equipment effectively and is set by carrier specifications.
Tools may include:	• general hand tools, terminating tools, stripping tool, crimping tool, fold covering sack • general electrical tools.
Equipment ***specifications*** and documentation may be found in:	• contract documents • specification schedules • system configuration diagrams and manuals.
Set top unit installation:	• may require more than one provider.
Customer equipment refers to:	• audiovisual or electrical equipment that may be connected to a digital reception device.
Cabling:	• type of cable that may be connected to a digital reception device.

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Test equipment may include:	• signal level meters • spectrum analysers • carrier specific testing devices.
Warranties are:	• as specified by the equipment manufacturer/supplier.
Service agreements:	• are maintenance agreements between communication companies and their clients • vary from company to company and with the type of equipment owned or leased by client.
Relevant legislation, codes, regulations and standards include:	• Australian Communications Industry Forum (ACIF) standards and codes • Australian standards AS3901 and AS3902 • International standards ISO9000 and ISO9001 • OHS • Environmental Protection Act • trade practices legislation • relevant building and electrical codes • enterprise-specific policies, procedures and standards.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment candidates should produce evidence of the following: • identification of installation requirements, including customer's preferred location, existing power outlets, furniture location, measuring signal level at wall plate, and check of customer's equipment and cabling requirements • installation of equipment, including wall plate, cable cutting and stripping, connection of set top unit to customer equipment, cable connection, and powering up and configuring set top unit • conduct of functionality tests and interpretation of results • completion of the task, including securing cables, return of furniture and fittings to original location and condition, removing waste and debris, and communicating customer's requirements to service provider

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- handover to customer, including functionality tests in customer's presence, advising and training customer on equipment use, discussing damage that occurred during installation with customer, providing all appropriate literature, and completing all financial and other documentation
- application of OHS requirements and work practices, including JSA, personal protective clothing and safety items
- safe use of general hand and power tools normally related to these tasks
- safe use of general equipment normally related to these tasks
- correct interpretation and application of relevant regulations and standards
- communication of installation details to customer and work associates
- customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor

  or

- a simulation of the above environment with similar provisions, which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC157A Locate and rectify digital reception equipment faults

Unit descriptor	This unit applies to locating and rectifying all types of customer digital reception equipment (DRE) faults on customer premises. Installation is covered in ICTTC156A Install digital reception equipment and can be undertaken at the same time. Cabling aspects of installation are covered in a range of units in ICT20308 Certificate II in Telecommunications Cabling. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	This unit contains employability skills.
Prerequisite units	Nil
Application of the unit	This unit is for technical staff required to locate and rectify faults of digital reception equipment on customer premises.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Establish context of work to be undertaken.	1.1 Identify existing ***warranties*** and ***service agreements*** and establish coverage. 1.2 Accurately identify system, product and product model type and functions. 1.3 Advise customer of likely charges. 1.4 Check job site for safety hazards and complete a job safety analysis (JSA).
2 Identify and clarify fault.	2.1 Identify the problem using all available information. 2.2 Discuss problem fully with the customer. 2.3 Assess likelihood of fault being located in the ***set top unit***. 2.4 Advise customer of action taken where ***digital reception*** equipment fault is related to other than set top unit.

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3	**Determine and rank likely causes of fault.**	3.1 Determine most probable causes of fault from ***available data*** and historical trends where available.
		3.2 Rank likely causes of fault in order of probability to ensure that a ***methodical approach*** to ***fault finding*** is used.
4	**Perform tests.**	4.1 Confirm continued existence of fault.
		4.2 Conduct visual inspection for likely damage.
		4.3 Obtain suitable ***tools*** and test equipment.
		4.4 Check tools and test equipment for accuracy and that they are in safe working order and are modified or reprogrammed as required.
		4.5 Check simple connections, plugs and leads for operation.
		4.6 Check cable terminations for effectiveness.
		4.7 Undertake functional test of basic facilities.
		4.8 Conduct checks to ensure correct signal level at wall plate and beyond.
5	**Diagnose faults.**	5.1 Ensure that approach to fault identification is methodical and suitable for system and problem type.
		5.2 Progressively isolate fault to remove likely variables from assessment.
		5.3 Verify continued existence of problem regularly.
		5.4 Obtain and review manufacturers' documentation for likely solutions.
		5.5 Identify fault without undue interference with client activity and in the shortest possible time.
		5.6 Provide customer with regular progress reports.
6	**Rectify faults.**	6.1 Identify faulty parts and equipment and replace or repair as per service agreement.
		6.2 Advise customer of cost of repair in the event of there being no service agreement.
		6.3 Refer unresolved faults to other parties for a second opinion where required.
		6.4 Reprogram equipment if required.
		6.5 Complete work in a manner that is safe to repairer and customer.

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	6.6	Undertake routine checks to identify possibility of further or likely problems.
	6.7	Attend to further problems or discuss them with customer so that necessary action is determined.
7 Provide replacement service to customer where required.	7.1	Expl ain details of identified problem to customer.
	7.2	Provide customer with temporary or replacement equipment similar to existing equipment.
	7.3	Program replacement equipment correctly.
	7.4	Test replacement service for functionality prior to giving it to customer.
8 Clean up work site.	8.1	Clean, adjust and store all tools and equipment in an accessible location.
	8.2	Remove waste and debris from work site and dispose of in a safe and environmentally required manner.
	8.3	Complete work in a safe manner.
	8.4	Restore work area to customer's premises during fault repair to customer's satisfaction.
9 Complete documentation.	9.1	Prepare invoices and other financial documentation where required and present to customer.
	9.2	Complete other relevant paper work and distribute as appropriate.
	9.3	Obtain authorised signatures on required documentation to confirm acceptance of completed work.
	9.4	Complete job closure tasks.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context

- customer service principles – particularly dealing with customers face-to-face
- quality assurance – enterprise requirements
- OHS – general principles and enterprise-specific JSA requirements
- pre-installation – enterprise-specific requirements
- interconnection – understanding of contemporary equipment and connection methods
- installation of return path – awareness of return path technology

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- radio frequency (RF) theory – basic principles and safety
- basic telephony – principles to support return path awareness
- hand and power tools – skill to use general tools
- customer education – basic objectives and methods of training for product use
- product knowledge – enterprise/service-specific knowledge of products and services supplied
- visual system awareness – broader awareness of whole industry product range
- problem solving and fault finding techniques – halving technique, enterprise methods and escalation level
- test equipment – signal measurement and other enterprise-specific tools
- test analysis and diagnosis – enterprise diagnosis methods

Required knowledge

The relevant required knowledge is articulated in the above guidelines.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Warranties are:	• as specified by the equipment manufacturer/supplier.
Faulty equipment still under ***warranty*** is:	• returned immediately to manufacturer.
Service agreements:	• are maintenance agreements between communication companies and their clients • vary from company to company.
Set top units are:	• the control mechanisms for transmitting Pay TV channels.
Digital reception:	• services include: – free-to-air television (Open Broadcast TV) – subscription television (Pay TV) – internet protocol television (IPTV) – community television • service provision media includes: – cable – satellite – wireless – terrestrial.

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Available data may include:	• test data • customer records • details of system checks • equipment/product manuals and guides • customer questioning details.
Methodical approach includes:	• methods for fault finding and repair, such as: – visual inspections – functionality tests – equipment reprogram – replacement repair or modification • fault finding methodology, which is usually described in system, equipment and product manuals and guides.
Fault finding may be done:	• as part of a service agreement • on a fee for service basis as agreed with client.
Tools may include:	• general hand tools, terminating tools, stripping tool, crimping tool, fold covering sack • general electrical tools.
Equipment specifications and documentation may be found in:	• contract documents • specification schedules • system configuration diagrams and manuals.
Faults on existing customer equipment may include:	• poor reception • ghosting • colour variation • rolling picture • picture not filling the screen • distorted sound quality • customer TV and video • pre-made fly leads • use of non-approved peripheral equipment connected to Pay TV equipment.
Set top faults may include:	• power and TV terminations • program errors • faulty parts • faulty circuit board • equipment failure • aerial problems.

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Relevant legislation codes, regulations and standards include:	• Australian Communications Industry Forum (ACIF) standards and codes • Australian standards AS3901 and AS3902 • International standards ISO9000 and ISO9001 • OHS • Environmental Protection Act • trade practices legislation • relevant building and electrical codes • enterprise-specific policies, procedures and standards.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment candidates should produce evidence of the following: • obtain full fault details from the customer • advise customer as to likely fault, duration of repair and charges • demonstrate methodical approach to fault identification • interpret test results • repair fault and test to verify outcomes • document fault, including nature, location, likely causes and repair methodology • read, interpret and use equipment and system manuals and specifications, and relevant enterprise policy and documentation • communicate fault details to customers and work associates • apply related OHS requirements and work practices • demonstrate customer focus and consideration of customer needs.
Context of and specific resources for assessment	Assessment must ensure: • a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor or • a simulated environment with similar provisions, which conforms to the Assessment Guidelines.

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Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC160A Set up and operate a contractor business

Unit descriptor	This unit applies to operating a small scale contractor operation involving an owner operator and employees installing a service. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	This unit contains employability skills.
Prerequisite units	Nil
Application of the unit	This unit is for installers who operate their own contracting business delivering installation services to major service providers.

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Set up and maintain a business operation.	1.1 Develop a ***business plan*** for a small business operator. 1.2 Outline the requirements to ***register a business*** as sole trader, Pty Ltd company or partnership. 1.3 Provide details of ***business insurance*** policies. 1.4 Provide details on the requirements to ***purchase and maintain a vehicle*** through leasing, hiring purchasing, including managing fringe benefits tax (FBT) liabilities.
2 Provide customer service.	2.1 Determine a ***customer*** base. 2.2 Analyse and determine ***customer expectations***. 2.3 Provide customer service that meets customer expectations in accordance with enterprise standards. 2.4 Monitor and evaluate performance on installations completed.
3 Perform simple *financial management* tasks.	3.1 Apply bookkeeping tools and software to record income and expenditure. 3.2 Construct a ***simple financial balance sheet*** using banking records or supply information to accountant.

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	3.3 Calculate simple taxation and superannuation requirements or supply information to accountant.
	3.4 Complete a ***business activity statement (BAS)*** or supply data to accountant.
4 Cost and quote an installation.	4.1 Establish the extent of work to be completed through discussions with customer.
	4.2 Complete a job specification for the ***quote*** with cost estimates of time required to complete work.
	4.3 Estimate and include cost of materials to be used.
	4.4 Determine and include a ***margin for profit and ongoing costs*** for installation.
	4.5 Check finalised quote for accuracy and ensure it is in accordance with established policies and procedures.
	4.6 Submit quote to customer within agreed time frame.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication with customers
- time management for scheduling of own work
- developing simple business plans, given a template and advice
- customer service skills
- basic numeracy and literacy
- operating simple computer software packages
- job estimating techniques

Required knowledge

- understanding of costs associated with running a business
- current tax rates
- understanding of basic business banking principles
- industry standards regarding materials and labour costs
- industry standard rates of pay
- understanding of simple cash or accrual accounting principles

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Business plan may include:	• a statement of vision/mission • values • objectives • personnel • products • capital investment • costing for labour and margins for materials • cash flow projection • profit margins.
Register a business is:	• the identification of a process to register a business with the relevant state government authority.
Business insurances may include:	• public liability • professional indemnity • income protection • WorkCare/workers compensation • vehicle and equipment.
Purchase and maintain a vehicle may include:	• organising payments • servicing and maintenance • registration • garaging • fitting out for business operations.
Customer is:	• any person or entity in receipt of products or services both internal and external.
Customer expectations involve:	• exceeding the minimum needs of the customer, which includes the approach taken to the attainment of those needs.

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Financial management may include some or all of:	• controlling income, expenditure and cash flow • banking • maintaining records, either cash or accrual accounting method • making simple financial decisions • using simple financial management software.
Simple financial balance sheet may include:	• maintaining an ongoing financial balance based on either cash or accrual accounting.
Business activity statement (BAS) is:	• a report to the taxation office on business activity for a particular period, which may be completed by an accountant or bookkeeper, or automatically from financial management software.
Quote:	• may be a single price or a detailed costing • may include a statement of costs for work, as well as a job description of work to be undertaken.
Margin for profit and ongoing costs may be:	• set in the business plan or set on a job-by-job basis • ongoing costs include all operating costs, such as vehicle costs, insurances, tools, registration, accounting.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Demonstration of the applicant's understanding and knowledge of the requirements of setting up and operating a contractor business. Assessment candidates should produce evidence of the following: • producing a business plan • providing vehicle maintenance documents, including financial details • completing BAS, FBT and insurance documentation • performance data indicating customer service achievements • quotations for installation jobs that cover all aspects of costings.

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Context of and specific resources for assessment	This unit is appropriate to individuals who trade as a small business. Assessment could be a set of simple tasks drawn from the individual's daily business operations or conducted as a project in which individuals set up their own business before starting work. Resources can include: • Australian Taxation Office guides • financial management record keeping software • access to industry standard labour rates and material suppliers • general office bookkeeping procedures • customer service guides.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC161A Operate a contractor business with employees

Unit descriptor	This unit applies to operating a developing business involving multiple employees in a competitive installation environment. It applies to individuals who have an established business or are in the process of establishing one. It does not apply to novice installers and would not be appropriate in a pre-employment training program. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	This unit contains employability skills.
Prerequisite units	ICTTC160A Set up and operate a contractor business
Application of the unit	This unit is for an installer who operates a business employing others – either support staff or installers. It may also apply to a business that works through a subcontractor workforce.

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Recruit employees.	1.1 Define and document ***employee roles***. 1.2 Locate and tap ***sources of employees***. 1.3 ***Evaluate and select*** employment candidates based on documented employee roles. 1.4 Provide ***induction*** to employees.
2 Manage employees.	2.1 Assign work to employees in line with employee roles. 2.2 Develop a strategy for retention of employees with ***rewards and incentives***. 2.3 Apply a ***payroll operation***. 2.4 Maintain and manage ***employee on-costs*** using a manual or computer-based system. 2.5 Monitor and evaluate ***employee performance*** against business policies and standards.

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3 Promote the business.	3.1 Identify growth opportunities for the business. 3.2 Design and develop advertising material to stimulate ***growth*** of the business, including evaluating the process for establishing a ***website***. 3.3 Research the availability of a ***network*** to promote the business.
4 Maintain compliance.	4.1 Research and identify ***compliance*** requirements for the business. 4.2 Develop and implement ***procedures*** to ensure compliance. 4.3 Implement a system to monitor compliance. 4.4 Implement actions to improve compliance performance.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication with internal and external customers
- communication with employees, contractors and subcontractors
- people management within the limits of a small contracting business
- technical skills associated with installation services
- basic numeracy and literacy
- human resource management within the limits of a small contracting business
- payroll management for a small contracting business
- business planning for a small contracting business
- performance management to ensure delivery of contracting services within timelines and budgets

Required knowledge

- compliance requirements within the limits of an installation service business

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Employee roles may include:	• job role title • agreed duties • documented job description.

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Sources of employees may include:	• job agencies • advertising in public or industry magazines • using industry networks and associations.
Evaluate and select candidates is to include:	• review of application details • interview • assessment of on-the-job performance or simulated activities.
Induction is to include instruction in:	• safety • standard procedures • job role • relationship to other employees • other workplace conditions.
Rewards and incentives may include:	• cash or in-kind payments additional to agreed salary or wages.
Payroll operation may include:	• documentation of agreed rates of pay • recording of hours worked • calculation of salary or wages • arrangement of payment to employees.
Employee on-costs may cover costs for:	• WorkCare and other insurances • allowances for annual and sick leave • tools and other equipment costs • sundry other costs of employment.
Employee performance should cover:	• setting agreed performance expectations • measuring performance • adjusting performance.
Growth may include business expansion, including:	• more work and employees • wider diversity of clients • expansion into new regions.
Website is to include:	• business-specific website listing capabilities and contact details.
Network may include:	• interpersonal connection with other industry personnel through associations, work or social contact.
Compliance must meet:	• technical standards for installation or maintenance.

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Procedures are to include:	• standard methods of working to ensure compliance.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Demonstration of the applicant's understanding and knowledge of the requirements of recruiting and managing employees within the confines of a contractor business. Assessment candidates should produce evidence of the following: • developing recruitment documentation • initiating and maintaining payroll management records • interpreting market analysis data • monitoring and maintaining compliance performance data • developing and maintaining staff performance history • developing and initiating strategies for developing work performance • developing and applying work schedules.
Context of and specific resources for assessment	This unit is appropriate to individuals who trade as a small to medium business. Assessment could be a set of simple tasks drawn from the individual's daily business operations or conducted as a project in which individuals set up their own business before starting work. Resources can include: • Australian Taxation Office payroll guides • financial management software • human resource texts • recruitment guides • performance management tools • compliance legislation, codes and policies.

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Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC162A Install a cable lead in

Unit descriptor

This unit applies to all contexts for indoor and outdoor installation within a customer premises and applies to customer digital reception equipment. It applies to both aerial and underground lead ins.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC011D	Place, secure and terminate coaxial cable
ICTTC140B	Use hand and power tools
ICTTC156A	Install digital reception equipment
ICTTC157A	Locate and rectify digital reception equipment faults
ICTTC170A	Follow OHS and environmental policy and procedures

Application of the unit

This unit is for installation technical staff working in domestic, commercial or industrial premises.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Prepare for cable installation.	1.1 Identify cable installation requirements from plan and recognise constraints.
	1.2 Set up cable installation equipment according to manufacturer requirements, ***industry standards*** and enterprise guidelines.
	1.3 Make site safe and secure for cable installation.
	1.4 Select suitable ***protective clothing***, ***tools and equipment*** and required ***safety equipment***.
	1.5 Check cable route for obstructions and make clear using suitable methods.
	1.6 Assess ***support structures*** as safe for normal working conditions.

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2	**Install aerial cable.**	2.1 Determine type of cable bearer to identify need for separate catenary wire installation.
		2.2 Secure catenary wire or bearer wire permanently to support structure and tension to meet relevant height and minimum sag requirements to required specifications using ***aerial fixing devices***.
		2.3 Secure cable to catenary wire.
		2.4 Ensure cable loop on support structure is sufficient for jointing and maintenance, and water drip point requirements.
3	**Install underground cable.**	3.1 Run push rod through pipe/conduit to enable cable hauling.
		3.2 Attach cable to push rod in a manner appropriate to cable type in accordance with manufacturer specifications.
		3.3 Employ cable slippers or rollers to ensure no sheath damage when hauling into and out of enclosures.
		3.4 Lubricate and haul cable evenly at correct tension to reduce risk of cable damage.
		3.5 Provide sufficient cable allowance in enclosures for jointing and maintenance requirements.
4	**Seal and secure aerial cable.**	4.1 Seal cable ends to prevent ingress of foreign material.
		4.2 Secure cable loop on support structure to reduce damage to conductors and enable ease of access for maintenance.
		4.3 Weather seal building entry points where appropriate.
		4.4 Fit over voltage protection devices to all cables with metallic component where required.
		4.5 Accurately complete reports on installation and design amendments and file according to enterprise requirements.
5	**Complete administrative and end-of-job tasks.**	5.1 Complete ***appropriate records*** and update administration systems according to enterprise policy.
		5.2 Record test results and store in the appropriate database, leaving copies on site in accordance with enterprise policy.

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5.3 Advise ***customer*** and relevant enterprise personnel of work completion in accordance with enterprise policy.

5.4 Clean, adjust, store and transport tools and test equipment in suitable protective casing.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context.

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA280 Soil types
- CA282 Cable installation and securing – Underground
- CA283 Cable termination and coding – Underground
- CA284 Cable sealing techniques – Underground
- CA290 Pole types and aerial service identification
- CA292 Cable installation and securing – aerial
- CA293 Cable termination and coding – aerial
- CA294 Cable sealing techniques – aerial
- CA295 Cable testing – aerial
- CS210 Customer relations
- OH214 Safe work practices – underground
- OH215 Safe work practices – aerial
- OH250 Pole top rescue
- OH251 Working at heights
- PS217 Plan reading, specifications and Records – Underground
- PS218 Plan reading, specifications and records – aerial
- RE224 Building standards, regulations and Codes – Underground
- RE226 Building standards and regulations – aerial
- TO219 Cable hauling equipment operation skills: aerial

Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Industry standards:	• may include regulated or industry codes of practice • include appropriate Australian Communications and Media Authority (ACMA) and Australian/New Zealand technical standards.
Protective clothing may include:	• protective suits • masks • safety boots • head protection • safety glasses • knee pads • gloves (plastic, rubber or leather) • ear muffs.
Tools and equipment may be mechanical or hand tools and may include:	• hammers • augers • cherry pickers • scissor lifts • ladders • drills • spanners • nails • fixing brackets • cable tensioner • height measuring device.
Safety equipment may include:	• witches hats • flashing lights • guards • warning signs and tapes • aerial safety belts and lines • traffic signs.
Support structures may be identified by:	• checking for condemned pole status markings • checking for visible signs of decay or stress • using industry accepted testing methods.

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Aerial fixing devices may include:	• screw hooks • pig rings • hooks • riser pipes • clamps.
Appropriate records may include:	• connection records • equipment user guides • invoices.
Customer:	• may be internal or external to the enterprise • may include the public.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:

- installation of at least one type of aerial cable and one type of underground cable, which may be either optical fibre or coaxial
- identification of safe support structures from pole status markings, visual inspection or approved testing procedures
- work practices associated with hauling cable, and cable securing and sealing processes
- application of all related OHS requirements and work practices associated with installing aerial and underground cable, including protective clothing, personal safety items, adequate warning signs and safety devices
- correct interpretation and application of regulations and standards related to the installation of aerial and underground cable
- interpersonal skills related to work associates, supervisors, team members and clients.

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Context of and specific resources for assessment	Assessment must ensure: • a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor OR • a simulated environment with similar provisions, which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC163A Install a satellite antenna

Unit descriptor

This unit applies to digital reception equipment for satellite subscription services or open television services received via satellite.

Antennas may be installed on a mast, tower, pole or building.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC011D	Place, secure and terminate coaxial cable
ICTTC140B	Use hand and power tools
ICTTC156A	Install digital reception equipment
ICTTC157A	Locate and rectify digital reception equipment faults
ICTTC170A	Follow OHS and environmental policy and procedures

Application of the unit

This unit is for installation technical staff working on buildings or infrastructure.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan for assembly.	1.1 Consider all ***legislative requirements*** and ***technologies*** in planning process. 1.2 Organise and obtain/contract ***resources*** with the required skills to be available when required. 1.3 Identify other antennas at locations and make arrangements for their outage where required. 1.4 Notify ***customers*** and other affected parties of works to be undertaken, where appropriate.
2 Obtain tools, test equipment and installation materials.	2.1 Obtain tools and equipment necessary for installation and check that they are in safe working order and adjusted to manufacturer specifications. 2.2 Locate tools and materials to ensure ready access to the installation.

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3 Assemble antenna/ wave guide.	3.1	***Assemble*** satellite antenna on site in sequence and according to plans, specifications and enterprise guidelines.
	3.2	Sweep satellite antenna area to ensure line of sight is achievable.
	3.3	Make cable connections according to plans, specifications and enterprise guidelines.
	3.4	Conduct work in a manner which is safe to self, fellow workers and the public.
4 Mount satellite antenna.	4.1	Ensure maintenance, correct allocation and usage of ***personal protective equipment*** required for the job in accordance with enterprise and OHS guidelines and manufacturer specifications.
	4.2	Ensure tools, equipment and machinery to be used comply with relevant standards and requirements.
	4.3	Identify all hazards and take action to minimise hazards to installer, fellow operatives and the public.
	4.4	Install all ***cables***, including earth bond/drip points according to plans and specifications.
	4.5	***Mount*** satellite antenna onto installed mounting arrangements according to plans, specifications and enterprise guidelines.
	4.6	Conduct work in a manner which is safe to self, fellow workers and the public.
5 Align/realign antenna.	5.1	***Pan*** satellite antenna to maximise functional signal strength and consider both elevation and azimuth.
	5.2	***Adjust*** satellite antenna low noise block (LNB) skew to optimise signal strength and quality.
6 Test antenna/wave guide operation.	6.1	Set up appropriate ***test equipment*** for satellite antenna and use in accordance with manufacturer specifications and enterprise guidelines.
	6.2	Conduct test in accordance with technical manuals and specifications.
	6.3	Interpret test results and compare with manufacturer and design specifications and make adjustments as necessary.
	6.4	Check drip points on both coaxial cable and wave guides against specification and initiate action where specification limits are not met.

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7 Complete administrative and end-of-job tasks.	7.1 Complete ***appropriate records*** and update administration systems in accordance with enterprise policy.
	7.2 Record test results and store in the appropriate database, leaving copies on site in accordance with enterprise policy.
	7.3 Advise customer and relevant enterprise personnel of work completion in accordance with enterprise policy.
	7.4 Clean, adjust, store and transport tools and test equipment in suitable protective casing.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context.

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA360 Coaxial cabling
- CI310 Communication 3
- CS310 Customer relations 3
- EL320 Earthing 3
- EN320 Enterprise information systems 3
- MA310 Basic mathematics 3
- NE310 Network equipment 3
- OH310 Occupational health and safety 3
- OH320 Safe handling
- PE320 Remote work
- PS310 Plans and specifications 3
- PS320 Basic building trades 3
- RA310 Radio frequency theory and hazards 3
- RC310 Riggers certificate 3
- RE310 Working on non-enterprise land 3
- TC310 Tower climbing 3
- TF310 Test equipment 3
- TO310 Use of tools 3
- TO320 Anti-static procedures 3
- TO330 Installation practices 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Legislative requirements may include:	• OHS • heritage • national parks • Telecommunications Act • historical buildings and sites • telecommunications codes of conduct.
Technologies can be described in broad terms as:	• terrestrial free to air TV • satellite subscription • cable subscription • satellite free to air.
Resources may be:	• company staff or contract staff.
Customers:	• may be internal or external to the enterprise • may include the public.
Assemble, mount, pan, adjust and test factors may include:	• signal type • frequency • height of installation • ownership of site.
Personal protective equipment may include:	• asbestos precautions • dust protection • ear muffs • eye protection • gas monitoring equipment • gloves (plastic, rubber or leather) • gumboots • hard hats • overalls • personal reflecting jackets

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- riggers gloves
- safety boots
- vests
- radiation protection clothing.

Cables may be:	• optic fibre or coaxial.
Test equipment may include:	• multimeter • spectrum analyser • signal level meter.
Appropriate records may include:	• connection records • equipment user guides • invoices.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:

- assessing hazard levels, including site and radio frequency and application of safety precautions for self, fellow workers and the public
- interacting with enterprise personnel, customers and other contractors, keeping a customer focus and considering customer needs
- obtaining and checking tools, test equipment and materials, and using relevant test equipment
- installing assembly according to plans and specifications
- mounting, connecting and aligning two satellite antennas under normal industry supervision and according to plans and specifications
- correctly interpreting and applying relevant regulations and standards and all related OHS requirements and work practices
- reading, interpreting and using equipment and system manuals and specifications and relevant enterprise policy and documentation.

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Context of and specific resources for assessment	Assessment must ensure: • a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor OR • a simulated environment with similar provisions, which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC164A Install a terrestrial antenna

Unit descriptor

This unit applies to digital reception equipment for open television services received via terrestrial signals.

Antennas may be installed on a mast, tower, pole or building.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC011D Place, secure and terminate coaxial cable

ICTTC140B Use hand and power tools

ICTTC156A Install digital reception equipment

ICTTC157A Locate and rectify digital reception equipment faults

ICTTC170A Follow OHS and environmental policy and procedures

Application of the unit

This unit is for installation technical staff working on buildings or infrastructure.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan for assembly.	1.1 Consider ***legislative requirements*** and ***technologies*** in the planning process. 1.2 Organise and obtain/contract ***resources*** with the required skills to be available when required. 1.3 Identify other antennas at location and make arrangements for their outage where required. 1.4 Notify ***customers*** and other affected parties of works to be undertaken, where appropriate.
2 Obtain tools, test equipment and installation materials.	2.1 Obtain tools and equipment necessary for the installation, check that they are in safe working order and adjusted to manufacturer specifications. 2.2 Locate tools and materials to ensure ready access to the installation.

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3 Assemble antenna/ wave guide.	3.1 ***Assemble*** antenna on site in sequence and according to plans, specifications and enterprise guidelines.
	3.2 Check aerial prior to installation, identify problems and arrange replacement parts as necessary.
	3.3 Make cable connections according to plans, specifications and enterprise guidelines.
	3.4 Conduct work in a manner that is safe to self, fellow workers and the public.
4 Mount antenna/ wave guide.	4.1 Ensure maintenance, correct allocation and usage of ***personal protective equipment*** required for the job in accordance with enterprise and OHS guidelines and manufacturer specifications.
	4.2 Check that tools, equipment and machinery to be used comply with relevant standards and requirements.
	4.3 Identify all hazards and take action to minimise hazards to the installer, fellow operatives and the public.
	4.4 Install all ***cables***, including earth bond and drip point according to plans and specifications.
	4.5 ***Mount*** antenna onto installed mounting arrangements according to plans, specifications and enterprise guidelines.
	4.6 Conduct work in a manner which is safe to self, fellow workers and the public.
5 Align/realign antenna.	5.1 ***Pan*** antenna to maximise functional signal strength and consider both elevation and azimuth.
	5.2 Undertake polarisation of antenna considering both specifications and site/alignment conditions.
6 Test antenna/wave guide operation.	6.1 Set up appropriate ***test equipment*** for antenna and use in accordance with manufacturer specifications and enterprise guidelines.
	6.2 Conduct tests in accordance with technical manuals and specifications.
	6.3 Interpret test results and compare with manufacturer and design specifications and make adjustments as necessary.
	6.4 Check drip points on both coaxial cable and antenna against specification and initiate action where specification limits are not met.

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7 Complete administrative and end-of-job tasks.	7.1 Complete ***appropriate records*** and update administration systems in accordance with enterprise policy.
	7.2 Record test results and store in the appropriate database, leaving copies on site as required by enterprise policy.
	7.3 Advise customer and relevant enterprise personnel of work completion in accordance with enterprise policy.
	7.4 Clean, adjust, store and transport tools and test equipment in suitable protective casing.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Select from the following list to suit the learning and assessment context.

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CA360 Coaxial cabling
- CI310 Communication 3
- CS310 Customer relations 3
- EL320 Earthing 3
- EN320 Enterprise information systems 3
- MA310 Basic mathematics 3
- NE310 Network equipment 3
- OH310 Occupational health and safety 3
- OH320 Safe handling
- PE320 Remote work
- PS310 Plans and specifications 3
- PS320 Basic building trades 3
- RA310 Radio frequency theory and hazards 3
- RC310 Riggers certificate 3
- RE310 Working on non-enterprise land 3
- TC310 Tower climbing 3
- TF310 Test equipment 3
- TO310 Use of tools 3
- TO320 Anti-static procedures 3
- TO330 Installation practices 3

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Required knowledge

The relevant required knowledge is articulated in the above guidelines contained in the Skills and Knowledge Register included in this Training Package.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Legislative requirements may include:	• OHS • heritage • national parks • Telecommunications Act • historical buildings and sites • telecommunications codes of conduct.
Technologies can be described in broad terms as:	• terrestrial free to air TV • satellite subscription • cable subscription • satellite free to air.
Resources may be:	• company staff or contract staff.
Customers may be:	• internal or external to the enterprise and may include the public.
Assemble, mount, pan and test factors may include:	• signal type • frequency • height of installation • ownership of site • ownership of support structure.
Personal protective equipment may include:	• asbestos precautions • dust protection • ear muffs • eye protection • gas monitoring equipment • gloves (plastic, rubber or leather) • gumboots • hard hats • overalls • personal reflecting jackets

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- riggers gloves
- safety boots
- vests
- radiation protection clothing.

Cables may be:
- optic fibre or coaxial.

Test equipment may include:
- multimeter
- spectrum analyser
- signal level meter.

Appropriate records may include:
- connection records
- equipment user guides
- invoices.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:
- assessing hazard levels, including site and radio frequency and application of safety precautions for self, fellow workers and the public
- interacting with enterprise personnel, customers and other contractors, keeping a customer focus and considering customer needs
- obtaining and checking tools, test equipment and materials, and using relevant test equipment
- installing assembly according to plans and specifications
- mounting, connecting and aligning two antennas under normal industry supervision and according to plans and specifications
- correctly interpreting and applying relevant regulations and standards and all related OHS requirements and work practices
- reading, interpreting and using equipment and system manuals and specifications and relevant enterprise policy and documentation.

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Context of and specific resources for assessment	Assessment must ensure: • a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor OR • a simulated environment with similar provisions, which conforms to the Assessment Guidelines.
Guidance information for assessment	Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC165A Install a complex digital reception system

Unit descriptor	This unit applies to installing digital reception services supporting various services to five or more points. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	This unit contains employability skills.
Prerequisite units	ICTTC162A Install a cable lead in ICTTC163A Install a satellite antenna ICTTC164A Install a terrestrial antenna
Application of the unit	The unit is applied when an installer is working on large scale, complex radio frequency (RF) and digital distribution systems in a commercial or multi-dwelling unit (MDU) environment.

ELEMENT	**PERFORMANCE CRITERIA**
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate site for installation requirements.	1.1 Identify ***customer premises*** and consequent constraints on installation according to ***client specifications***. 1.2 Identify OHS issues by completing a job safety analysis (JSA). 1.3 Identify ***by-laws, standards and regulations*** relating to installation. 1.4 Establish site access.
2 Interpret design and relate to site characteristics.	2.1 Read drawing and recognise ***drawing symbols***. 2.2 Interpret plan as a set of functions to be implemented. 2.3 Adapt plan to suit specific features of site.
3 Build cable system.	3.1 Select and obtain ***materials*** for installation. 3.2 Identify ***cable runs*** from plans and site evaluation. 3.3 Run cable along identified runs. 3.4 Terminate cable.

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4 Install and configure passive and active devices.	4.1 Select ***devices*** for installation. 4.2 Make provision for installation of devices. 4.3 Install devices according to plan. 4.4 Configure devices to operate. 4.5 Test operation of devices.
5 Commission system.	5.1 Activate system. 5.2 Take ***signal measurements*** using test equipment. 5.3 Record initial test results. 5.4 Analyse test results for quality of service. 5.5 Document test results and analysis. 5.6 Identify ***faults*** or ***optimisation*** options. 5.7 Rectify faults and adjust system to optimal operation. 5.8 Retest and readjust as required. 5.9 Record final commissioning test results and settings.
6 Complete administrative and end-of-job tasks.	6.1 Complete ***appropriate records*** and update administration systems in accordance with enterprise policy. 6.2 Record test results and store in the appropriate database, leaving copies on site in accordance with enterprise policy. 6.3 Advise ***customer*** and relevant enterprise personnel in accordance with enterprise policy. 6.4 Clean, adjust, store and transport tools and ***test equipment*** in suitable protective casing.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer relations 4
- IN410 Interpersonal relationships 4
- OH410 Occupational health and safety 4
- PS410 Plans and specifications 4
- PS420 Basic building trades 4

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- RA410 Antennas 4
- RA420 Radio frequency theory and hazards 4
- TF420 Test analysis and diagnosis 4
- TO410 Use of tools 4
- TR460 Spectrum management 4

Required knowledge

Mandatory:

- recognition of equipment types – amplifiers, taps, splitters and couplers
- performance of tests – continuity, ingress, egress, signal level and signal quality
- performance of adjustments – tuning, balancing and replacing components
- spectrum appreciation for RF channels.

Contextual:

- select other items from the Skills and Knowledge Register included in Volume 3 of this Training Package according to training needs.

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer premises are building types including:	• domestic brick or timber dwelling • concrete construction multi-level construction • alternative construction types, such as mud brick.
Client specifications may include:	• policy, procedures and practices • equipment types • standards and quality requirements • service level agreements (SLAs).
By-laws, standards and regulations may include:	• council by-laws for siting equipment and cables • electrical safety factors • Australian/New Zealand standards and cabling regulations.
Drawing symbols may include:	• common electrical circuit features and audiovisual system features.

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Materials may include:	• cables • joiners • plugs and other connectors • antennas • support fittings.
Cable runs:	• may include routes followed by cables, which may be optic fibre or coaxial • include consideration of other wiring and factors likely to cause interference.
Devices may include:	• antennas • TV receivers • recorders – disk and hard drive • audio equipment – amplifiers and equalisers • speaker systems.
Signal measurements are:	• radio frequency (RF) signal measurements using RF meter.
Faults are cabling faults including:	• jointing • antenna placement • interference factors.
Optimisation may include:	• antenna orientation • signal amplification adjustment • picture quality • contrast • aspect ratio.
Appropriate records may include:	• connection records • equipment user guides • invoices.
Customer is:	• the individual or entity who is the final recipient of the service.
Test equipment may include:	• multimeter • spectrum analyser • signal level meter.

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:

- identification of installation requirements
- installation of equipment, including antennas, drop lines, cable runs, junctions and wall plates
- conduct of functionality tests and interpretation of results
- handover to customer, including functionality demonstration, training customers on equipment use, provision of appropriate literature, and completion of all financial and other documentation
- application of all related OHS requirements and work practices, including JSA, protective clothing and personal safety items.

Context of and specific resources for assessment

This unit is appropriate to individuals who install complex digital audiovisual systems. It could be assessed in either:

- a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor

  or

- a simulated environment with similar provisions, which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC166A Integrate customer digital reception equipment

Unit descriptor

This unit applies to maintaining an awareness of emerging audiovisual technologies and applying it in the integration of customer systems.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC162A Install a cable lead in

ICTTC163A Install a satellite antenna

ICTTC164A Install a terrestrial antenna

Application of the unit

The unit is applied when an installer works with a wide range of customer equipment types, in a variety of customer premises and requires current knowledge of equipment capabilities and connection types. The unit is contextually limited to radio frequency (RF) signal services.

Note: The unit ICTTC167A Integrate data delivery modes, extends this concept into multiple service delivery modes such as voice, data communication, wireless networks and others as they emerge.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate existing customer equipment.	1.1 Identify ***customer equipment*** to be connected and check that customer equipment is operational. 1.2 Analyse equipment capabilities and connection types. 1.3 Interpret equipment specifications and connectivity options. 1.4 Analyse ***customer premises*** to suit installation plan according to ***client specifications*** and ***by-laws, standards and regulations***. 1.5 Document customer system with block diagram using appropriate ***drawing symbols***.

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2 Design a solution.	2.1 Determine connection pathways for ***optimal performance*** of system equipment.
	2.2 Confirm compatibility for proposed connections.
	2.3 Document final design with block diagram.
3 Build the system.	3.1 Select and connect ***cables*** to suit connectivity using appropriate ***materials***.
	3.2 Activate equipment to check for operation.
4 Provide enterprise equipment.	4.1 Determine best method of connection to service source according to client specifications.
	4.2 Ensure that contact details of ***service provider*** are available.
	4.3 Connect service to system.
	4.4 Confirm success of connection.
	4.5 Contact service provider in the event of unresolvable barriers to success.
5 Configure services and optimise customer system.	5.1 Conduct ***client*** specific set-up operations.
	5.2 Conduct ***customer*** set-up operations.
	5.3 Test performance of enterprise and customer equipment across a range of settings.
	5.4 Record, analyse and document test results.
	5.5 Tune customer equipment for optimal performance.
	5.6 Contact ***service provider*** in the event of unresolvable barriers to success.
6 Educate customers.	6.1 Ensure relevant equipment functions are explained and demonstrated to customer.
	6.2 Provide opportunities for customer to operate equipment functions.
	6.3 Provide constructive feedback to customer on their operation of equipment functions.
	6.4 Explain operating functions with customer, as provided in relevant product literature.

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7 Complete administrative and end-of-job tasks.	7.1 Complete ***appropriate records*** and update administration systems in accordance with enterprise policy.
	7.2 Record and store test results in the appropriate database, leaving copies on site in accordance with enterprise policy.
	7.3 Advise customer and relevant enterprise personnel of work completion in accordance with enterprise policy.
	7.4 Clean, adjust, store and transport tools and ***test equipment*** in suitable protective casing.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.

- CI410 Communication 4
- CS410 Customer relations 4
- IN410 Interpersonal relationships 4
- OH410 Occupational health and safety 4
- PS410 Plans and specifications 4
- PS420 Basic building trades 4
- RA410 Antennas 4
- RA420 Radio frequency theory and hazards 4
- TF420 Test analysis and diagnosis 4
- TO410 Use of tools 4
- TR460 Spectrum management 4

Required knowledge

Mandatory:

- recognition of equipment types – amplifiers, taps, splitters and couplers
- performance of tests – continuity, ingress, egress, signal level and signal quality
- performance of adjustments – tuning, balancing and replacing components
- connectors – analogue and digital
- modulation techniques
- video and audio fundamentals.

Contextual:

- select other items from the Skills and Knowledge Register included in Volume 3 of this Training Package according to training needs.

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer equipment may include:

- video player
- hard disk recorder
- simulation consoles
- digital free to air (FTA)
- high definition (HD) TV
- media centre
- video/audio distribution systems
- LCD TV
- plasma TV
- security systems
- home automation
- devices:
  - antennas
  - TV receivers
  - recorders – disk and hard drive
  - audio equipment – amplifiers and equalisers
  - speaker systems.

Customer premises are building types including:

- domestic brick or timber dwelling
- concrete construction multi-level construction
- alternative construction types, such as mud brick.

Client specifications may include:

- policy, procedures and practices
- equipment types
- standards and quality requirements
- service level agreements (SLAs).

By-laws, standards and regulations may include:

- council by-laws for siting equipment and cables
- electrical safety factors
- Australian/New Zealand standards and cabling regulations.

Drawing symbols may include:

- common electrical circuit features and audiovisual system features.

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Optimal performance may include:	• antenna orientation • signal amplification adjustment • picture quality • contrast • aspect ratio.
Cables may be:	• optic fibre or coaxial.
Materials may include:	• cables • joiners • plugs and other connectors • antennas • support fittings.
Client is:	• the organisation providing services or contracting the work.
Customer is:	• the individual or entity who is the final recipient of the service.
Service provider may be:	• a registered telecommunications carrier • an internet service provider or a delegated organisation acting on their behalf.
Appropriate records may include:	• connection records • equipment user guides • invoices.
Test equipment may include:	• multimeter • spectrum analyser • signal level meter.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment candidates should produce evidence of the following: • identifying the modulation and other signal characteristics of a range of contemporary products • installing equipment and services, including at least three of: video player, hard disk recorder, games consoles, digital FTA, HD TV, media centre, video/audio distribution systems, LCD TV, plasma

TV, security systems and home automation

- conducting functionality tests and interpreting results
- handing over to customer, including functionality demonstration, training customers on equipment use, provision of appropriate literature and completion of all financial and other documentation
- applying all related OHS requirements and work practices, including job safety analysis (JSA) and personal protective clothing and safety items.

Context of and specific resources for assessment

This unit is appropriate to individuals who install complex digital audiovisual systems. It could be assessed in either:

- a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor

OR

- a simulated environment with similar provisions, which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC167A Integrate data delivery modes

Unit descriptor

This unit applies to connecting and configuring a media centre, i.e. a device that receives signals from radio frequency (RF) sources and at least one other source (telephone or data) and co-ordinates these signals for a variety of devices.

Restricted Cabling Provider registration is required to undertake work.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICTTC136C	Install, maintain and modify customer premises communications cabling: ACMA Restricted Rule
ICTTC162A	Install a cable lead in
ICTTC163A	Install a satellite antenna
ICTTC164A	Install a terrestrial antenna
ICTTC166A	Integrate customer digital reception equipment

Application of the unit

The unit is applied when an installer working in a digital reception sector integrates services from multiple sources and in multiple formats – RF, digital, data, voice – for both inward and outbound signals into complex customer systems.

Note: This unit builds on the unit ICTTC166A Integrate customer digital reception equipment, and extends the concept of system integration by adding a new dimension – multiple services and multiple delivery modes.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate existing customer equipment.	1.1 Identify and check ***customer equipment*** for operational status. 1.2 Evaluate and interpret equipment specifications, capabilities and connectivity options. 1.3 Identify equipment features critical to building a multiple service system.

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	1.4 Analyse suitability of ***customer premises*** for installation plan in accordance with ***client specifications*** and ***by-laws, standards and regulations***.
	1.5 Document customer system with block diagram using appropriate ***drawing symbols***.
2 Design a multiple service customer system solution.	2.1 Identify connection requirements and each ***service*** to be connected.
	2.2 Locate a signal source for each service.
	2.3 Identify connection pathway options for the signal from each service.
	2.4 Analyse pathway options for compatibility and ***optimal performance***.
	2.5 Design a connection plan to optimise system performance.
	2.6 Identify any ***local spectrum management issues*** arising from multiple service connection plan design.
	2.7 Amend design to eliminate local spectrum management issues as they arise.
	2.8 Document final design with block diagram.
3 Build the system.	3.1 Select and connect ***cables*** according to connection plan.
	3.2 Activate equipment to check for operation.
	3.3 Identify additional connection issues that arise during the build phase.
	3.4 Resolve connection issues by modifying connection plan.
4 Provide enterprise equipment with multiple services.	4.1 Determine optimal method of connection to each service source in accordance with client specifications.
	4.2 Ensure that contact details of each ***service provider*** are available.
	4.3 Connect each service to the system.
	4.4 Confirm success of each connection.
	4.5 Identify and, where possible, resolve connection issues as they arise.
	4.6 Escalate unresolvable connection issues to the relevant service provider.

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5 Configure services and optimise customer system across multiple services.	5.1 Conduct ***client*** specific set-up operations for each service. 5.2 Conduct ***customer*** set-up operations for each service. 5.3 Test performance of enterprise and customer equipment across a range of settings. 5.4 Test integrated performance of system across multiple services. 5.5 Record, analyse and document test results. 5.6 Tune customer equipment for optimal integrated performance across multiple services. 5.7 Contact service provider in the event of unresolvable barriers to success.
6 Educate customers.	6.1 Ensure relevant equipment functions are explained and demonstrated to customer. 6.2 Provide opportunities for customer to operate equipment functions. 6.3 Provide positive feedback to customer on their operational ability. 6.4 Explain operating functions with customer, as provided in relevant product literature.
7 Complete administrative and end-of-job tasks.	7.1 Complete ***appropriate records*** and update administration systems in accordance with enterprise policy. 7.2 Record and store test results in the appropriate database, leaving copies on site in accordance with enterprise policy. 7.3 Advise customer and relevant enterprise personnel of work completion in accordance with enterprise policy. 7.4 Clean, adjust, store and transport tools and ***test equipment*** in suitable protective casing.

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Note: Some topics may be covered in prerequisite units of competency

- performance of tests – continuity, ingress, egress, signal level and signal quality
- performance of adjustments – tuning, balancing and replacing components
- digital home technology integration (DHTI) and trouble shooting
- network configuration

Required knowledge

- recognition of equipment types – amplifiers, taps, splitters and couplers
- modulation techniques
- video and audio fundamentals
- principles of at least three of:
  - home theatre systems
  - telephone service
  - wireless technology
  - home automation
  - security systems
  - wireless local area networks (WLANs)

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customer equipment may include:

- video player
- hard disk recorder
- simulation consoles
- digital free to air (FTA)
- high definition (HD) TV
- media centre
- video/audio distribution systems
- LCD TV
- plasma TV
- security systems

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	• home automation
	• devices:
	  - antennas
	  - TV receivers
	  - recorders – disk and hard drive
	  - audio equipment – amplifiers and equalisers
	  - speaker systems.

Customer premises are building types including:	• domestic brick or timber dwelling • concrete construction multi-level construction • alternative construction types such as mud brick.
Client specifications may include:	• policy, procedures and practices • equipment types • standards and quality requirements • service level agreements (SLAs).
By-laws, standards and regulations may include:	• council by-laws for siting equipment and cables • electrical safety factors • Australian/New Zealand standards and cabling regulations.
Drawing symbols may include:	• common electrical circuit features • audiovisual system features.
Services may include:	• telephone services via cable • data services cable – ADSL, ADSL 2 • wireless services • satellite telephony and data services • other service delivery modes as they emerge.
Optimal performance may include:	• antenna orientation • signal amplification adjustment • picture quality • contrast • aspect ratio.
Local spectrum management issues include:	• issues concerning bandwidth overlap for remote control devices and local wireless communication devices.
Cables may be:	• optic fibre or coaxial.

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Service provider may be:	• a registered telecommunications carrier • an internet service provider or a delegated organisation acting on their behalf.
Client is:	• the organisation providing services or contracting the work.
Customer is:	• the individual or entity who is the final recipient of the service.
Appropriate records may include:	• connection records • equipment user guides • invoices.
Test equipment may include:	• multimeter • spectrum analyser • signal level meter.
Materials may include:	• cables • joiners • plugs and other connectors • antennas • support fittings.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment candidates should produce evidence of the following: • identifying service requirements of a range of contemporary products • installing and integrating at least two services to a customer system comprised of at least three equipment components • activating and optimising customer equipment using two or more signal sources • conducting functionality tests and interpreting results • identifying policies and procedures for issues requiring escalation • handing over to customer, including functionality demonstration, training customers on equipment use, providing all appropriate literature and completing all financial and other documentation

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- applying all related OHS requirements and work practices, including job safety analysis (JSA), protective clothing and personal safety items.

Context of and specific resources for assessment

This unit is appropriate to individuals who install complex digital audiovisual systems using multiple services. It could be assessed in either:

- a workplace conducting the operations covered by this unit of competency, equipment and resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor

OR

- a simulated environment with similar provisions, which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC168A Design and implement an enterprise VoIP and unified communications network

Unit descriptor

This unit applies to designing and implementing the infrastructure for enterprise voice over internet protocol (VoIP) and unified communications (UC) systems to meet business requirements using converging network technologies.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICAB5160B	Build and configure a server
ICAI3101B	Install and manage network protocols
ICAI4029C	Install network hardware to a network
ICAS3120B	Configure and administer a network operating system

Application of the unit

This unit is for staff working to design and implement the infrastructure to enable enterprises to use VoIP and other packet-based services.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan and design VoIP infrastructure to meet business requirements.	1.1 Select VoIP infrastructure in line with business and ***end-user requirements***, within budget limitations. 1.2 Evaluate the VoIP infrastructure for satisfactory performance and confirm that the infrastructure meets business and end-user requirements. 1.3 Ensure that ***hardware***, ***software***, ***network*** and security ***requirements*** are in accordance with agreed business and end-user specifications. 1.4 Undertake research to source suppliers, technologies, delivery schedules and replacement parts and ***document*** findings. 1.5 Compare circuit-switched and packet-switched technologies, including ways that packets pass through multiple wide area network (WAN) links.

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2 Describe and evaluate network traffic protocols and bandwidth considerations.	2.1 Define real-time protocol (RTP) and real-time transport control protocol (RTTCP). 2.2 Identify the components of session initiation protocol (SIP) and describe the format of an SIP uniform resource identifier (URI). 2.3 Identify the functions of signalling protocols for ***converged networks***. 2.4 Compare SIP, H323 and media gateway control protocol (MGCP)/media gateway control (Megaco). 2.5 Evaluate and implement SIP trunking to connect enterprise internet protocol (IP)-based communications systems over long distances. 2.6 Identify common G.7xx codes and describe the impact of compression on voice quality. 2.7 Calculate and estimate bandwidth usage for various codecs, including considerations of overhead, connection quality and connection speeds. 2.8 Define latency, jitter and wander and implement methods for reducing or eliminating them using jitter buffer, quality of service (QoS), traffic shaping and virtual local area networks (VLANs). 2.9 Investigate ***factors*** that affect the bandwidth of voice calls on convergent networks.
3 Install and configure VoIP infrastructure to meet business requirements.	3.1 Implement telephone number mapping (ENUM), number portability, end point addressing, path selection, calling classes and overlapping number ranges. 3.2 Install, configure and test ***gatekeepers***. 3.3 Install and test ***convergent terminal equipment*** and software. 3.4 Install software and configure and test VoIP services. 3.5 Configure security access levels to safeguard data, making use of appropriate tools.

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4 Configure a UC network.	4.1 Obtain the topology and components of a UC network.
	4.2 Analyse the potential of IP multimedia subsystem (IMS) network architecture to enable the convergence of voice, video and data applications and various mobile network technologies over IP-bases layer.
	4.3 Incorporate the use of a communications server to provide ***real-time multimedia communications***.
	4.4 Identify common videoconferencing codecs, standards and practices.
	4.5 Describe fundamentals of internet protocol television (IPTV) including set-top box, video on demand (VoD) and accepted codecs.
	4.6 Identify the purpose and function of ***voice and video conferencing hardware***.
	4.7 Compare traditional and IP-based private branch exchange (IP-PBX) and implement IP-PBX functionalities in the UC network.
	4.8 Describe power issues including redundancy, power over ethernet (PoE), power sourcing equipment and powered devices.
5 Assess the performance of convergent networks and test and verify the security access levels.	5.1 Identify common network congestions and possible ***network congestion solutions*** to meet QoS specified.
	5.2 Identify problems in contacting emergency services.
	5.3 Analyse network traffic and resolve problems using packet sniffer, monitoring software and hardware solutions.
	5.4 Troubleshoot convergent communications over wireless networks.
	5.5 Identify types and effects of ***attacks***, including ***man-in-the-middle attacks***.
	5.6 Identify ways to counteract denial of service (DoS) and distributed DoS (DDoS) attacks.
	5.7 Identify types of intrusion detection.
	5.8 Identify the impact of VLAN hopping, media access control (MAC) address movements, additions and changes.
	5.9 Test and verify security access level.

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5.10 Monitor and evaluate capability and reliability of security systems.

5.11 Make changes to system to ensure protection against known and potential threats.

5.12 Verify user settings to ensure that they conform to security policies.

5.13 Back-up, upgrade and scan systems to minimise attacks.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- ability to plan, design and implement VoIP infrastructure
- ability to evaluate network traffic protocols and bandwidth considerations
- ability to configure a UC network
- ability to assess the performance of convergent networks and test and verify security access levels
- research skills for identifying, analysing and evaluating broad features of a particular business domain and best practice in networking technologies (e.g. when network components, both hardware and software that are required to be installed, are identified)
- project planning skills in relation to set benchmarks and identified scope
- problem solving skills in a predictable range of network problems

Required knowledge

- broad knowledge of current industry-accepted hardware and software products
- broad knowledge of the client business domain, business function and organisation (e.g. when confirming client requirements and network equipment)
- broad knowledge of networking technologies incorporating substantial depth in some areas (e.g. network operating systems and cabling standards)
- broad knowledge of transmission technologies and protocols

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

End-user requirements may include:

- how and what the organisation wants in regard to:
  - work environment
  - problem solution processes
  - preventative maintenance and diagnostic policy
  - roles and technical responsibilities in the IT department
  - vendor and product service level support agreements.

Hardware may include:

- servers
- workstations
- personal computers
- modems
- IP phones
- routers
- switches
- multi-layer switches
- other connectivity devices
- wireless devices
- networks
- cable/DSL modems
- remote sites.

Software may include:

- commercial software applications
- organisation-specific software
- packaged software
- in-house or customised software
- networking device operating systems
- communications software.

Network may include:

- large and small LANs
- virtual private networks (VPNs)
- national WANs
- the internet
- the use of the public switched telephone network (PSTN) for dial-up modems only

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- private lines
- data and voice.

Requirements:

- may vary from a simple addition or upgrade to a major new installation
- may be in reference to the business, system, application, network or people in the organisation.

Document may follow:

- ISO, IEC and AS standards
- audit trails
- naming standards
- version control
- project management templates and report writing
- maintaining equipment inventory
- client training and satisfaction reports.

Converged networks may include:

- SIP
- H323
- H225
- H320
- H450
- MGCP
- Megaco.

Factors may include:

- latency
- protocol incompatibility
- codec choice
- compression
- QoS issues
- packet reordering.

Gatekeepers may include:

- media gateway
- media gateway controller (call agent)
- signalling gateway (SG)
- call manager.

Convergent terminal equipment may include:

- analogue telephone adapter (ATA)
- single line adapter
- soft phones, such as WiFi, PDA, etc.
- IP phones.

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Real-time multimedia communications may include:	• instant messaging (IM) • presence • directory look-up • file exchange • email • video conferencing.
Voice and video conferencing hardware may include:	• multi-point control unit (MCU) • set-top box, Session Border Controller (SBC).
Network congestion solutions may include:	• monitoring network traffic and protocols • changing configurations • upgrades.
Attacks may include:	• man-in-the-middle attacks • voicemail compromises • viruses • brute force and dictionary attacks • illicit servers • unsolicited calls.
Man-in-the-middle attacks include:	• packet sniffing • TP connection hijacking • registration hijacking.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment must confirm the ability to: • design and implement the infrastructure for enterprise VoIP and UC systems to meet business requirements using converged networks • plan, design and implement VoIP infrastructure, evaluate network traffic protocols and bandwidth considerations, configure a UC network, assess the performance of convergent networks and test and verify security access levels.

The breadth, depth and complexity of skills and knowledge in this unit would cover a broad range of varied activities or application in a wider variety of contexts, most of which are complex and non-routine. Leadership and guidance would be involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications, including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills would be characteristic.

Applications may involve responsibility for, and limited organisation of, others.

Assessment candidates should produce evidence of the following:

- demonstrating understanding of a broad knowledge base incorporating some theoretical concepts
- applying solutions to a defined range of unpredictable problems
- identifying and applying skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identifying, analysing and evaluating information from a variety of sources
- taking responsibility for own outputs in relation to specified quality standards
- taking limited responsibility for the quantity and quality of the output of others.

Additionally, an individual demonstrating competency in this unit would be able to:

- select appropriate software
- configure network components
- select a network component for a particular task
- interpret available information and request clarification where needed
- take responsibility for outputs in work and learning.

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Context of and specific resources for assessment

To demonstrate competency in this unit the person will require access to:

- network design documentation
- equipment specifications
- network components (routers, switches, multi-layer switches and VoIP devices)
- live network
- organisational guidelines
- networked computers.

Networks may include LANs, simulated WANs, as well as wireless networks.

It is essential that this unit covers both skills and knowledge aspects of a broad variety of network components both hardware and software, ranging for example from small office home office (SOHO) LANs and business requirements, such as:

- servers
- routers
- switches
- multi-layer switches
- VoIP devices
- firewalls
- gateways to large country-wide WLANs.

Guidance information for assessment

The purpose of this unit is to define the standard of performance to be achieved in the workplace. In undertaking training and assessment activities related to this unit, consideration should be given to the implementation of appropriate diversity and accessibility practices in order to accommodate people who may have special needs. Additional guidance on these and related matters is provided in ICA05 Information and Communications Technology Training Package.

Competency in this unit should be assessed in a range of contexts to ensure consistency of performance. However, simulated activities must closely reflect the workplace to enable full demonstration of competency.

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Assessment of this unit will usually include:

- observation of LAN and WAN configuration and equipment selection for a variety of scenarios
- observation of real or simulated work processes and procedures and/or performance in a project context, as well as questioning on underpinning knowledge and skills.

The questioning of team members, supervisors, subordinates, peers and clients where appropriate may provide valuable input to the assessment process. The interdependence of units for assessment purposes may vary with the particular project or scenario.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC169A Produce and evaluate architecture designs for convergent cellular mobile networks

Unit descriptor

This unit applies to specifying the design of the required mobile cellular general packet radio service (GPRS), third-generation (3G) and fourth-generation (4G) network architectures.

The following units may be linked with any of the following to form an appropriate cluster:

- ICAA5044C Develop system infrastructure design plan
- ICAI5098C Install and manage complex networks
- ICAS5123C Manage network security
- ICAS5122C Identify and resolve network problems
- ICAA5056B Prepare disaster recovery and contingency plans.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICAA5044C	Develop system infrastructure design plan
ICAA5144B	Determine best fit topology for a local network
ICAA5145B	Identify best fit topology for a wide area network
ICAD4217B	Create technical documentation

Application of the unit

This unit is for technical staff designing mobile wireless systems.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Design a GPRS (2.5G) cellular network.	1.1 Review GPRS (2.5G) structure for packet-switched domain in addition to the circuit-switched domain of 2G and identify ***requirements*** of the ***network***.
	1.2 Examine ***technical characteristics*** of the GPRS ***system***.
	1.3 Develop network architecture for a GPRS network and explain functions of the network elements.

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	1.4 Identify how GPRS overlays over the GSM network to transmit and receive transmission control protocol (TCP)/ internet protocol (IP)-based data to and from GPRS mobile devices.
	1.5 Establish positioning and types of antennas, terminals, processors, required protocols and ***architecture*** based on technical ***specifications*** and requirements.
2 Design a 3G cellular network.	2.1 Review 3G structure and identify requirements of the network to provide a wide variety of services ranging from voice and paging services to interactive multimedia, including teleconferencing and internet access.
	2.2 Examine the technical characteristics, data rates, operating frequencies and multiplexing schemes of the 3G system.
	2.3 Develop the network architecture for a 3G network and explain the functions of the network elements.
	2.4 Identify how 3G network/device can integrate with a wireless local area network (WLAN).
	2.5 Establish the positioning and types of antennas, terminals, processors, required protocols and architecture, based on technical specifications and requirements.
3 Research and evaluate design features of a proposed 4G cellular network.	3.1 Explain how a fully IP-based 4G system will provide an end-to-end IP integrated solution for voice, data and streamed multimedia to end users anytime and anywhere.
	3.2 Investigate access schemes of a 4G network.
	3.3 Investigate implication for IPv6 as an enabler to read, 4G to support greater number of IP-based wireless devices with applications such as improved multicast, security and route minimisation capabilities.
	3.4 Investigate the use of ***advanced antenna systems*** to enable 4G with high rate, high reliability and long range communications.
	3.5 Research and determine the impact of ***competing technologies*** on each other and ***document*** findings.
	3.6 Investigate the potential interoperability and global roaming issues that may be faced by the cellular technologies considered in this unit.

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REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- project planning skills in relation to scope, time, cost, quality, communications and risk management, for example when reviewing network requirements, and for documenting network design and presenting it to senior managers, client users and sponsors for approval
- research skills for specifying, analysing and evaluating broad features of current security issues and best practice in security devices, products and procedures, for example when obtaining latest technical specifications and pricing by contacting possible vendors, for specifying the likely performance profile (best/worst) and for reviewing its effect on other systems
- financial modelling skills for specifying, analysing and evaluating a range of different solutions, for example when documenting GPRS (2.5G), 3G network design and presenting it to senior managers, client users and sponsors for approval
- plain English literacy and communication skills in relation to analysis, evaluation and presentation of information, for example when documenting network design and presenting it to senior managers, client users and sponsors for approval
- problem solving skills for a defined range of unpredictable problems, for example when predicting traffic and the impact on input/output devices and processors from current and future demand requirements
- group facilitation and presentation skills in relation to transferring and collecting information and gaining consensus on concepts, for example when documenting network design and presenting it to senior managers, client users and sponsors for approval

Required knowledge

- detailed knowledge of current industry accepted cellular mobile network protocols, for example when designing network
- broad knowledge base incorporating current industry accepted network hardware and software products and their general features and capabilities, and detailed knowledge in some areas, for example when designing a GPRS (2.5) and 3G network
- broad knowledge base incorporating current industry security products, devices and procedures and their general features and capabilities, and detailed knowledge in some areas, for example when finalising GPRS (2.5) and 3G network design
- broad knowledge base incorporating theoretical concepts of three or more current industry network development and design methodologies, for example when designing networks
- detailed knowledge of management systems, for example when evaluating roaming features

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- broad knowledge of the client business domain, for example when designing network
- detailed knowledge of remote user issues, for example when establishing siting and types of antennas, terminals, processors, required protocols and GPRS (2.5) and 3G network architecture, based on technical specifications and user requirements

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Requirements may be in reference to:	• the business • system • application • network • people in the organisation.
Network may include:	• cellular mobile networks • national WANs • the internet • data and voice.
Technical characteristics may include:	• capability classes and multi-slot classes • coding schemes • data rates • operating frequencies and modulation schemes.
System may include:	• hardware and software components that run a cellular mobile networks.
Architecture may include:	• configuration: GPRS (2.5G), 3G and 4G topologies • network management: interoperability and global roaming issues that may be faced by cellular technologies.
Specifications may include:	• technical requirements • user problem statement • current system functionality.
Advanced antenna systems may include:	• multiple input multiple output (MIMO).

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Competing technologies may include:	• worldwide interoperability for microwave access (WiMAX) • 4G.
Document may follow:	• ISO, IEC and AS standards • audit trails • naming standards • version control • project management templates and report writing • maintaining equipment inventory • client training • satisfaction reports.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessment must confirm sufficient knowledge of cellular mobile networks communication architecture, hardware, protocols and networking systems. It must confirm the ability to design viable GPRS (2.5) and 3G network solutions and to research design features of 4G cellular networks. An individual performing at this standard will display self-directed application of knowledge and skills, with substantial depth in database design and development where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others. The learner will demonstrate participation in development of strategic initiatives, as well as personal responsibility and autonomy in performing complex technical operations (organising others is less important to this unit of competency). A depth of knowledge and skills (rather than breadth of knowledge) is important for this unit.

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Context of and specific resources for assessment

To demonstrate competency in this unit the person will require access to:

- cellular mobile network structures
- client requirements
- technical specifications
- expected traffic volume
- vendors and vendor offerings and pricing
- information on a range of IT business solutions
- future organisational business processes
- budget for designs for convergent cellular mobile networks.

Guidance information for assessment

This unit of competency can be assessed in the workplace or in a simulated environment.

Assessment of the unit will usually include observation of real or simulated work processes and procedures, quality projects, and questioning on underpinning knowledge and skills.

Competency in this unit should be assessed in a range of contexts to ensure consistency of performance.

Simulated activities must closely reflect the workplace to fully demonstrate competence.

The interdependence of units of competency for assessment will vary with a particular project or scenario. This unit may be assessed in a holistic manner with any of the following:

- ICAA5044C Develop system infrastructure design plan
- ICAI5098C Install and manage complex networks
- ICAS5123C Manage network security
- ICAS5122C Identify and resolve network problems
- ICAA5056B Prepare disaster recovery and contingency plans.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC170A Follow OHS and environmental policy and procedures

Unit descriptor

This unit applies to OHS competencies for employees without supervisory responsibility. This includes school-based workers, entry-level workers, trainees and apprentices. This unit complements, and is applicable in combination with, other industry or enterprise-specific units.

The unit incorporates the consideration of environmental issues in the management of workplace tasks.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

Application of the unit

This unit is for staff working under supervision in a technical environment.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Follow workplace procedures for hazard identification and risk control.	1.1 Recognise and report ***hazards*** in the work area to ***designated personnel*** according to workplace procedures. 1.2 Follow accurately ***workplace procedures*** and work instructions for ***controlling risks***. 1.3 Follow whenever necessary and within scope of responsibilities and competencies, workplace procedures for dealing with accidents, fires and emergencies. 1.4 Complete accurately ***job safety analysis (JSA)*** sheets in accordance with work requirements, including ***hazard identification*** and ***risk assessment***. 1.5 Use and maintain ***personal protective equipment (PPE)*** in accordance with work requirements.

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2 Contribute to the management of OHS.	2.1 Raise OHS issues with designated personnel in accordance with workplace procedures and relevant ***OHS legislation***. 2.2 Contribute to ***participative arrangements*** for OHS management in the workplace within organisational procedures and scope of responsibilities and competencies.
3 Contribute to the management of workplace environmental issues.	3.1 Raise environmental issues with designated personnel in accordance with workplace procedures and relevant ***environmental requirements*** and legislation. 3.2 Contribute to participative arrangements for environmental management in the workplace within organisational procedures and scope of responsibilities and competencies.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Codes refer to the Skills and Knowledge Register in Volume 3 of this Training Package that has detailed content guidelines for each code outlined.:

- AA210 Joint use construction
- CA290 Pole types and aerial service identification
- CA296 Pole testing
- EL210 AC/DC basic theory
- EL222 Earthing and EPR
- EL230 Electric shock
- EL231 Limits of approach
- FA220 First aid – emergency response
- OH210 Occupational health and safety 2
- OH215 Safe work practices – aerial
- OH230 Hazard management
- OH240 Personal safety equipment
- OH250 Pole top rescue
- OH260 Manual handling
- RA210 Radio frequency theory and hazards
- TO220 Ladder handling

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Required knowledge

- rights and responsibilities of the workplace parties under environmental and Occupational Health and Safety Acts, regulations and codes of practice
- ways in which OHS is managed in the workplace, and activities required under OHS legislation, for example:
  - plant and equipment maintenance
  - hazard identification
  - risk assessment and control
  - OHS instruction
  - training and provision of OHS information
- hazards that exist in the workplace
- preferred order of ways to control risks (known as the hierarchy of control)
- workplace environmental and OHS procedures relevant to the work being undertaken, including procedures for:
  - recognising and reporting on hazards, for example, work area inspections
  - work operations to control risks, for example, permit to work systems and isolation procedures
  - responding to accidents, fires and emergencies
  - raising OHS issues
  - employee participation in OHS management, for example, consultative or OHS committees and joint employer/employee inspections
- meaning of OHS symbols found on signs and labels in the workplace
- designated personnel responsible for OHS
- environmental control processes:
  - stormwater and materials spillage
  - disposal and handling of hazardous and dangerous substances
  - waste disposal
  - air quality management
  - noise pollution

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards:

- may include both health and safety hazards and environmental hazards
- specific types of hazard will vary with the type of work, examples of which include:
  - safety hazards – lifting, working at heights, biomechanical, potentially harmful procedures, such as welding

- health hazards – dangerous or harmful substances, risk of infection, risk of sustained injury from repetitive tasks
- environmental hazards – petrochemical spillage, ground water contamination, air pollution, noise, dangerous gases, heavy or noxious metals pollution, release of hydrochlorofluorocarbons (HCFC), damage to natural or heritage precincts.

Designated personnel includes:

- supervisors
- managers
- team leaders
- management
- OHS personnel
- other persons authorised or nominated by the enterprise or industry to:
  - perform specified work
  - approve specified work
  - inspect specified work
  - direct specified work.

Workplace procedures may be formally documented or verbally communicated. They may a general approach or philosophy or defined procedures, such as:

- identifying hazards, for example inspections
- assessing risks
- controlling hazards
- using personal protective equipment
- emergency responses
- consultation and participation
- reporting OHS issues
- resolving OHS issues.

Controlling risks are:

- typically controlled using a three steps in risk management process:
  - identify hazard
  - assess risk
  - implement control methods.

Job safety analysis (JSA):

- includes sheets to record the steps in the risk management process – identification, assessment and control
- both health and safety and environmental hazards can be documented on a JSA
- a JSA should be completed for each new workplace or work-site situation.

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Hazard identification:	• should be a continuous process embedded in all work activities • examples of explicit identification processes include: – checking equipment or the work area before work commences and during work – workplace inspections – housekeeping – reviewing accident or incident records.
Risk assessment:	• a simple scale – low, medium or high – is sufficient at this level of operation • this will be used in completing a typical JSA – the primary application of assessment • awareness of likelihood and consequence factors is sufficient.
Personal protective equipment (PPE) includes any clothing or device used to control a hazard. Examples include:	• clothing – boots, gloves, overalls, protective jackets or pants • breathing apparatus – dust masks and respirators • face and head protection – helmets, goggles and face masks • radiation – radiation detectors.
OHS legislation includes:	• state, territory and commonwealth OHS and environmental protection Acts, regulations and codes of practice, including regulations and codes of practice relating to hazards present in the workplace or industry • general duty of care under OHS legislation and common law • provisions relating to roles and responsibilities of health and safety representatives and/or OHS committees • provisions relating to OHS issue resolution.
Participative arrangements include:	• OHS formal and informal meetings • OHS committees • other committees, for example, consultative, planning and purchasing • health and safety representatives • suggestions, requests, reports and concerns put forward by employees to management.
Environmental requirements are to include:	• waste management • noise, dust and clean-up management.

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:

- demonstrated ability to recognise and report hazards to designated personnel
- demonstrated ability to accurately follow workplace procedures relevant to controlling risks in the workplace
- demonstrated ability to communicate.

Context of and specific resources for assessment

Assessment of this unit requires access to:

- relevant Occupational Health and Safety Acts, regulations and codes of practice
- enterprise OHS policies and procedures
- personal protective equipment
- relevant work areas for identification of hazards and control measures.

To assess this unit, the following information and/or documents should be provided to the person being assessed:

- details of the established organisational OHS system
- relevant policies, procedures and programs for health, safety and the environment
- information about the rights and responsibilities of the workplace parties under Occupational Health and Safety Acts, regulations and codes of practice
- information on hazards and risks relevant to the workplace.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC171A Produce and evaluate architecture designs for WiMAX networks

Unit descriptor

This unit applies to specifying the design of the required worldwide interoperability for microwave access (WiMAX) network architecture. It defines the competency required to specify the design of the required WiMAX network architecture.

The following units may be linked with any of the following to form an appropriate cluster:

- ICAA5044C Develop system infrastructure design plan
- ICAI5098C Install and manage complex networks
- ICAS5123C Manage network security
- ICAS5122C Identify and resolve network problems
- ICAA5056B Prepare disaster recovery and contingency plans.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

ICAA5044C	Develop system infrastructure design plan
ICAA5144B	Determine best fit topology for a local network
ICAA5145B	Identify best fit topology for a wide area network
ICAD4217B	Create technical documentation

Application of the unit

This unit is for staff working on WiMAX network architecture designs.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Investigate design concepts of wireless broadband access technology.	1.1 Review WiMAX specification 802.16 protocol structure for point-to-point (backhaul) and point-to-multipoint (end user) topologies and identify ***requirements*** of the ***network***.
	1.2 Examine ***technical characteristics*** in a WiMAX network.

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		1.3 Identify types of modulation techniques used in wireless access technologies and their advantages.
		1.4 Identify characteristics and principles of operation of ***multiplexing techniques*** used at the physical layer of wireless access technologies.
		1.5 Incorporate cell planning, link budget and capacity planning in the design concepts.
2	**Design architectures for a proposed fixed and a mobile WiMAX network.**	2.1 Describe functions and purpose of wireless broadband ***network elements***.
		2.2 Develop proposed network topology for a fixed (802.16d) WiMAX network showing the relationship of network elements.
		2.3 Develop proposed network topology for a mobile (802.16e) WiMAX network showing the relationship of network elements.
		2.4 Compare and evaluate design considerations between a fixed and a mobile WiMAX network in terms of standards, multiplexing techniques, channel sizes, duplex methods, convergence layer, modulation techniques, uploads and downloads and antenna ***systems***.
		2.5 Establish positioning and types of antennas, terminals, processors, required protocols and architecture, based on technical specifications and requirements.
3	**Investigate the use of multiple-antenna systems in WiMAX design.**	3.1 Identify types of ***multiple-antenna*** techniques used.
		3.2 Identify the benefits of multiple-antenna systems in terms of diversity gain, array gain, power combination, interference reduction and spatial multiplexing.
4	**Evaluate network management products.**	4.1 Research, analyse and evaluate effectiveness of ***network management*** products that could be used to manage WiMAX network elements.
5	**Evaluate network designs and plan for possible implementation.**	5.1 Compare WiMAX to other ***competing wireless technologies*** and their interoperability.
		5.2 Investigate inclusion of WiFi in the design architectures as a complementary technology.
		5.3 Obtain latest technical ***specifications*** and pricing by contacting possible vendors.

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5.4 Determine support and training requirements needed.

5.5 ***Document*** WiMAX ***architecture*** designs and present to ***appropriate person*** for approval.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- project planning skills in relation to scope, time, cost, quality, communications and risk management, for example when reviewing client user requirements and network requirements, and for documenting network design and presenting it to senior managers, client users and sponsors for approval
- research skills for specifying, analysing and evaluating broad features of current security issues and best practice in security devices, products and procedures, for example when obtaining latest technical specifications and pricing by contacting possible vendors, for specifying the likely performance profile (best/worst) and for reviewing its effect on other systems
- financial modelling skills for specifying, analysing and evaluating a range of different solutions, for example when documenting WiMAX network design and presenting it to senior managers, client users and sponsors for approval
- plain English literacy and communication skills in relation to analysis, evaluation and presentation of information, for example when documenting network design and presenting it to senior managers, client users and sponsors for approval
- problem solving skills for a defined range of unpredictable problems, for example when predicting line traffic and the impact on input/output devices and processors from current and future demand requirements
- group facilitation and presentation skills in relation to transferring and collecting information and gaining consensus on concepts, for example when documenting network design and presenting it to senior managers, client users and sponsors for approval

Required knowledge

- detailed knowledge of current industry-accepted WiMAX network protocols, for example when designing network
- broad knowledge base incorporating current industry accepted network hardware and software products and their general features and capabilities, and detailed knowledge in some areas, for example when evaluating WiMAX network traffic
- broad knowledge base incorporating current industry security products, devices and procedures and their general features and capabilities, and detailed knowledge in some areas, for example when finalising WiMAX network design
- broad knowledge base incorporating some theoretical concepts of three or more current industry network development and design methodologies, for example when designing network
- detailed knowledge of the management systems, for example when evaluating network traffic

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- broad knowledge of client business domain, for example when designing network
- detailed knowledge of remote user issues, for example when establishing the siting and types of antennas, terminals, processors, required protocols and WiMAX network architecture, based on technical specifications and user requirements, and for predicting line traffic and the impact on input/output devices and processors from current and future demand requirements

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Requirements may be in reference to:	• the business • system • application • network • people in the organisation.
Network may include:	• LANs • WANs • wireless networks • the internet • the use of the public switched telephone network (PSTN) for dial up modems only • private lines • data and voice.
Technical characteristics may include:	• data rate • frequency bands and classes • range of coverage • power requirements • modulation techniques.
Multiplexing techniques refer particularly to:	• orthogonal frequency division multiplexing (OFDM) • scaleable OFDM access (SOFDMA).
Network elements may include elements such as:	• gateways • base stations • antenna arrays • access points • USB adapters.

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Systems may include:	• hardware and software components that run a WiMAX network.
Multiple-antenna may include:	• diversity schemes • smart antenna systems (SAS), also known as adaptive antenna and multiple input multiple output (MIMO) systems.
Network management may include:	• vendor or open source (e.g. Netspan) products that could be used to manage WiMAX network elements.
Competing wireless technologies may include:	• 3G/4G cellular networks • WiFi and mobile broadband wireless access (MBWA – IEEE 802.20).
Specifications may include:	• technical requirements • user problem statement • current system functionality.
Document may follow:	• ISO standards • audit trails • naming standards • version control • project management templates and report writing • maintaining equipment inventory • client training • satisfaction reports.
Architecture configurations may include:	• point-to-point (backhaul) • point-to-multipoint (end user) topologies.
Appropriate person may include:	• supervisor • teacher • authorised business representative • client.

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment must confirm sufficient knowledge of WiMAX communication architecture, hardware, protocols and networking systems.

Assessment must confirm the ability to design viable WiMAX network solutions and to assess network performance, information that forms the basis of the professional judgment of the assessor.

An individual performing at this standard will display self-directed application of knowledge and skills, with substantial depth in database design and development where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

The learner will demonstrate participation in development of strategic initiatives, as well as personal responsibility and autonomy in performing complex technical operations (organising others is less important to this unit of competency). A depth of knowledge and skills (rather than breadth of knowledge) is important for this unit.

Context of and specific resources for assessment

To demonstrate this unit of competency the learner will require access to documents detailing:

- IEEE 802.16 standard for WiMAX
- client requirements
- technical specifications
- expected traffic volume
- vendors and vendor offerings/pricing
- information on a range of IT business solutions
- future organisational business processes
- budget for architecture designs for WiMAX networks.

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Guidance information for assessment

This unit of competency can be assessed in the workplace or in a simulated environment. Simulated activities must closely reflect the workplace to fully demonstrate competence.

Assessment of this unit of competency will usually include observation of real or simulated work processes and procedures, quality projects, and questioning on underpinning skills and knowledge.

Competency in this unit should be assessed in a range of contexts to ensure consistency of performance.

The interdependence of units of competency for assessment will vary with a particular project or scenario.

This unit may be assessed in a holistic manner with any of the following:

- ICAA5044C Develop system infrastructure design plan
- ICAI5098C Install and manage complex networks
- ICAS5123C Manage network security
- ICAS5122C Identify and resolve network problems
- ICAA5056B Prepare disaster recovery and contingency plans.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge

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ICTTC172A Install and configure an MPLS network with VPN tunnelling

Unit descriptor

This unit applies to constructing a multi-protocol label switching (MPLS) network, examine MLPS data flow and virtual private network (VPN) tunnelling.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

NB. Acknowledgement is given to TAFE NSW for their assistance in association with industry in the development of this unit of competency.

Employability skills

This unit contains employability skills.

Prerequisite units

ICAI3101B	Install and manage network protocols
ICAI4029C	Install network hardware to a network
ICAI5173B	Install and configure a single-segment local area network switch
ICAI5174B	Install high-end switches in multi-switched local area networks
ICAI5176B	Install and configure a router
ICAS3120B	Configure and administer a network operating system

Application of the unit

This unit is for staff working on MPLS and VPNs.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Describe and implement routing protocols.	1.1 Configure and verify routing information protocol (RIP) operations. 1.2 Describe how enhanced interior gateway routing protocol (EIGRP) uses the diffusing-update algorithm (DUAL) to determine the most efficient (least cost) route to a destination. 1.3 Configure and verify EIGRP routing. 1.4 Define an autonomous system (AS). 1.5 Describe open shortest path first (OSPF) calculation, operation, features and benefits. 1.6 Configure and verify OSPF routing.

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	1.7 Configure and verify OSPF area parameters including backbone, stubby (STUB), totally stubby, not so stubby (NSSA), and virtual links.
	1.8 Describe an AS in relation to a border gateway protocol (BGP).
	1.9 Describe the foundational concepts of external border gateway protocol (eBGP) and internal border gateway protocol (iBGP).
	1.10 Describe the properties of an external gateway protocol (EGP).
	1.11 Describe how a router uses BGP to create a routing table.
	1.12 Configure and verify a router to perform basic BGP operations.
2 Configure and verify an MPLS network.	2.1 Examine ***need*** and benefits of MPLS in computer networking and telecommunications.
	2.2 Define the topology of a basic MPLS ***network*** to include label edge routers (LER) and label switch routers (LSR).
	2.3 Define and describe the purpose of the four fields of the 32-bit MPLS header and their effect on traffic control.
	2.4 Determine the router layout topology to provide an MPLS network.
	2.5 Configure a router to perform basic MPLS operations.
	2.6 Verify basic MPLS operations.
	2.7 Describe the swap, push (impose) or pop (dispose) operations performed by an MPLS router based on the topmost label.
	2.8 Describe the functional differences between a provider edge and a core MPLS router.
3 Verify traffic engineering (TE) considerations.	3.1 Classify traffic in MPLS terms and configure the LER to sort traffic into forward equivalent classes (FECs).
	3.2 Include two FECs in the above topology.
	3.3 Describe how FECs can be assigned label switch paths (LSP) to perform traffic engineering.

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	3.4 Install and remove the two standardised signalling protocols for managing MPLS paths for traffic engineering (CR-LDP and RSVP-TE) and briefly describe the principle characteristics of each.
	3.5 Explain how MPLS-TE allows the implementation of source and destination routing while removing the major scaling limitation of overlay networks (i.e. the 'Fish Problem').
4 Configure a basic VPN and provide a virtual private LAN service (VPLS).	4.1 Configure a basic MPLS VPN tunnel for a customer network to demonstrate multipoint-to-multipoint VPN connectivity.
	4.2 Describe how VPLS can be used as a VPN method for wide area network (WAN) multipoint-to-multipoint ethernet connectivity spanning across multiple metro areas.
	4.3 Produce a VPLS topology using an internet protocol (IP)/MPLS cloud with provider edge (PE) routers connecting VPLS domains associated with each ***enterprise customer***.

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- ability to implement and verify RIP, EIGRP, OSPF, BGP operations
- ability to implement MPLS architecture across a WAN environment
- ability to implement secure VPN tunnels across the MPLS network
- ability to deploy multipoint-to-multipoint VPLS domains via IP/MPLS cloud
- research skills for identifying, analysing and evaluating broad features of a particular business domain and best practice in networking technologies (e.g. when network components, both hardware and software that are required to be installed, are identified)
- project planning skills in relation to set benchmarks and identified scope
- problem solving skills in a predictable range of network problems

Required knowledge

- broad knowledge of current industry-accepted hardware and software products
- broad knowledge of the client business domain, business function and organisation (e.g. when confirming client requirements and network equipment)
- broad knowledge of networking technologies incorporating substantial depth in some areas (e.g. network operating systems and cabling standards)
- broad knowledge of transmission technologies and protocols

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RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Need:	• may be in reference to: the business, system, application, network or people in the organisation • may include: how and what the organisation wants in regard to work environment, problem solution processes, preventative maintenance and diagnostic policy, roles and technical responsibilities in the IT department, vendor and product service-level support agreements.
Network may include:	• large and small LANs • VPNs • national WANs • the internet • the use of the public switched telephone network (PSTN) for dial-up modems only • private lines • data and voice.
Enterprise customer may include:	• internal departments • external organisations • clubs • individuals • internal employees.

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment must confirm knowledge of MPLS networking technologies and how relevant hardware and software are installed and configured.

Assessment must confirm the ability to create and follow implementation plans, install relevant network hardware and software, and configure and test the MPLS network according to specified guidelines, produce appropriate documentation, and implement secure VPN tunnelling.

Performance of a broad range of skilled applications, including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills, would be characteristic.

Applications may involve responsibility for, and limited organisation of, others.

Assessment candidates should produce evidence of the following:

- demonstrating understanding of a broad knowledge base incorporating some theoretical concepts
- applying solutions to a defined range of unpredictable problems
- identifying and applying skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identifying, analysing and evaluating information from a variety of sources
- taking responsibility for own outputs in relation to specified quality standards
- taking limited responsibility for the quantity and quality of the output of others.

The scope and complexity of knowledge and skills are dependent on the tasks undertaken.

Additionally, an individual demonstrating competency in this unit would be able to:

- select appropriate software
- configure network components
- select a network component for a particular task
- interpret available information and request clarification where needed
- take responsibility for outputs in work and learning.

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Context of and specific resources for assessment

To demonstrate competency in this unit the person will require access to:

- network design documentation
- equipment specifications
- network components (routers, switches and multi-layer switches)
- live network
- organisational guidelines
- networked computers.

Networks may include LANs, simulated WANs, as well as wireless networks.

It is essential that this unit covers both skills and knowledge aspects of a broad variety of network components both hardware and software, ranging for example from small office home office (SOHO) LANs and business requirements, such as:

- servers
- routers
- switches
- multi-layer switches
- firewalls
- gateways to large country-wide wireless local area networks (WLANs).

Guidance information for assessment

The purpose of this unit is to define the standard of performance to be achieved in the workplace. In undertaking training and assessment activities related to this unit, consideration should be given to the implementation of appropriate diversity and accessibility practices in order to accommodate people who may have special needs.

Competency in this unit should be assessed in a range of contexts to ensure consistency of performance. However, simulated activities must closely reflect the workplace to enable full demonstration of competency.

The assessment of this unit of competency will usually include observation of WAN configuration and equipment selection for a variety of scenarios.

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Assessment will usually include observation of real or simulated work processes and procedures and/or performance in a project context as well as questioning on underpinning knowledge and skills. The questioning of team members, supervisors, subordinates, peers and clients where appropriate may provide valuable input to the assessment process. The interdependence of units for assessment purposes may vary with the particular project or scenario.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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ICTTC173A Plan, organise and undertake work activities

Unit descriptor

This unit deals with the skills and knowledge required to Plan, organise and undertake the work activities of an individual.

This competency is based on the competency UEPOPS439A – Plan and organise work, from the UEP06 Electricity Supply Industry – Generation Sector Training Package.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability skills

This unit contains employability skills.

Prerequisite units

Nil

Application of the unit

This unit is for technical staff required to plan, organise and undertake work on customer premises.

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan and prepare for work	1.1 Identify work ***requirements*** from request/work orders or equivalent and clarify/confirm with appropriate parties or by site inspection.
	1.2 Identify, apply and monitor Occupational Health and Safety standards, statutory requirements, ***relevant legislation codes, regulations and standards***, ***environmental*** requirements and ***enterprise procedures*** throughout the work procedure.
	1.3 Identify, requisition, obtain and inspect materials, equipment and ***resources*** required to satisfy job plan for compliance with job specifications.
	1.4 Resolve coordination requirements, including requests for isolation(s), with others involved or affected by the work in accordance with enterprise/site requirements.
	1.5 Plan work in accordance with job requirements, appropriate plans, drawings and standards and, if necessary, by site inspection

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2 Co-ordinate and undertake work.	2.1 Request/ receive permits, interpret, clarify and sign and convey to appropriate parties in accordance with enterprise procedures and job requirements.
	2.2 Undertake and monitor tasks to ensure compliance with plans, work requirements and enterprise procedures.
	2.3 Make provision for the re-cycling or re-use of materials where possible.
	2.4 Modify job requirements to meet unforeseen requirements and promptly communicate the extent of change to all those affected in accordance with job requirements, where required.
3 Complete the work.	3.1 Finalise work and restore site in accordance with enterprise procedures and job requirements.
	3.2 Sign off permits and notify appropriate parties of work completion in accordance with enterprise procedures and job requirements.
	3.3 Prepare/finalise job records, costing data and necessary reports in accordance with enterprise procedures

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Skills include:

- Develop and implement work plan
- Co-ordinate/sequence work requirements
- Review job progress against agreed goals
- Communicate information to others
- Prepare and interpret work procedures
- Estimate materials and resource requirements
- Apply data analysis techniques and tools.

Required knowledge

Safe working practices of:

- Basic work planning and organisation theory
- Occupational Health and Safety
- Team goals
- Enterprise permit procedures
- Relevant plant and equipment

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- Relevant statutory requirements
- Appropriate engineering and design practices and procedures
- Enterprise recording procedures
- Appropriate tools, equipment and materials required to do the work
- Basic team communication process
- Time management techniques

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Requirements include:	that to which equipment and procedures and their outcomes must conform – includes statutory obligations and regulations and Standards called-up by legislation or regulations. Requirements may include: • codes of practice • job specifications • Standards called-up in specifications • procedures and work instructions • quality assurance systems • manufacturer specifications • design specifications • customer/client requirements and specifications • specified underpinning knowledge (specified in units' Evidence Guides) • National and State guidelines, policies and imperatives relating to the environment.
Relevant legislation codes, regulations and standards include:	• Australian Communications Industry Forum (ACIF) standards and codes • Australian standards AS3901 and AS3902 and any subsequent updates • International standards ISO9000 and ISO9001 • OHS • Environmental Protection Act • Trade practices legislation • relevant building and electrical codes • enterprise-specific policies, procedures and standards.

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Environmental covers	the area surrounding the work site which can be directly or indirectly affected by occurrences at the work site – includes the atmosphere, soils, drains, underground water tables and the ecosystem. Protection of the environment would require the proper disposal of waste materials, restriction of burning off, the correct handling of toxic substances, the containment of CFCs and the like. The protection of the environment would also include the minimisation of those factors that contribute, directly or indirectly, to the production of greenhouse gases. These contributing factors might include the minimisation of construction waste materials, the correct use of enterprise vehicles and machinery, the re-use or recycling of trade materials where possible and the overall reduction of energy usage through general awareness and the use of appropriate technologies
Enterprise procedures include:	formal arrangements of an organisation, enterprise, or statutory authority of how work is to be done and by whom. Note. Examples of enterprise procedures are documented in quality management systems, safety management systems, work clearance systems, work instructions, reporting systems and arrangements for dealing with emergencies.
Resources may include:	materials, plant, equipment and personnel
Isolation covers	a safety device system that includes devices such as isolating switches, locks, safety bars, shields, full pressure blanks, spectacle blanks to lock controls, especially moving parts, equipment, systems or devices with stored energy, to an 'off' position while a worker is in a vulnerable position such as carrying out maintenance. Isolation systems generally use locking switches that need keys to open the lock and are used in conjunction with a danger tag system that promotes greater safety consciousness amongst the workforce for all situations in which danger to persons could arise from: • the operation of machinery, plant or equipment • the flow of steam, electricity, gases or liquids • the use of faulty or unsafe plant and equipment • include multiple locking systems and involve written • authorisation by a competent person Also called *lock-out* and *tag-out*.
Job records may include:	contract history file, plans, time sheets/cards and daily diary

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EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessment candidates should produce evidence of the following:

- Ability to read, interpret and use equipment and system manuals and specifications, and relevant enterprise policy and documentation
- Application of all related OHS requirements and work practices
- Demonstration of customer focus and consideration of customer needs.

Context of and specific resources for assessment

Assessment must ensure:

- a workplace conducting the operations covered by this unit of competency, resources relevant to the context of the work (see range statement) and support from a competent supervisor or mentor

  or

- a simulated environment with similar provisions, which conforms to the Assessment Guidelines.

Guidance information for assessment

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the verbal communication skill level, and language and literacy capacity of the candidate and the work being performed.

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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