



Australian Government

Department of Education, Employment and Workplace Relations

ICTTEN4076A Complete equipment and software upgrades

Release: 1

ICTTEN4076A Complete equipment and software upgrades

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to upgrade telecommunications equipment and software in service provider networks and customer premises. This unit may apply to switching, transmission, radio and computer networks using cable, optical fibre, radio, microwave and satellite transmission. Computer networks include local area networks (LAN) and wide area networks (WAN) and internet protocol (IP) based equipment of the Next Generation Networks (NGN). No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.
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Application of the Unit

Application of the unit	Technical staff who upgrade systems and equipment in customer networks and core and access networks apply the skills and knowledge in this unit. They are involved in maintenance, upgrades and cut overs of emerging technologies in IP based telecommunications networks. Relevant jobs roles include a supervisor in charge of installation and maintenance teams responsible for the new installations and upgrades of telecommunications networks.
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for the upgrade activity	1.1. Obtain relevant legislation, codes, regulations and standards for compliance when conducting work 1.2. Notify customer for site access, security arrangements and location details of equipment for upgrade 1.3. Identify site hazards and notify appropriate personnel to make site safe 1.4. Prepare an upgrade plan against work order and seek approval from customer 1.5. Organise system back up from support personnel 1.6. Obtain tools and test equipment and check for accuracy and safety 1.7. Allocate specific tasks according to the skill mix of staff involved 1.8. Run test plan on current equipment and identify and rectify problems in consultation with planners 1.9. Complete functional testing of new systems and equipment prior to upgrade to minimise system downtime 1.10. Analyse test results to predict compatibility and interoperability issues of equipment and systems prior to the upgrade work
2. Undertake upgrade	2.1. Implement upgrade according to design specification following occupational health and safety (OHS) and environmental requirements 2.2. Follow procedures for upgrade of network in sequential order as defined in instruction manuals 2.3. Monitor progress of upgrade periodically to ensure that plans in relation to time and duration are being met 2.4. Notify planner of problems encountered with detail as to the impact of the problem on the upgrade plan 2.5. Abort upgrade and implement contingency plan should an upgrade plan not be realised without major disruption to network 2.6. Monitor system response during upgrade and take action according to instructions provided
3. Test upgrade for acceptance	3.1. Undertake tests according to the predetermined test plan 3.2. Analyse test results and verify against specified

ELEMENT	PERFORMANCE CRITERIA
	performance levels 3.3. Escalate problems encountered according to enterprise policy 3.4. Invoke reversion procedure to pre-upgrade state, if directed by planners, according to enterprise policy 3.5. Record upgrade test results and provide to network management group 3.6. Run post-upgrade routines according to documented procedures
4. Monitor post-upgrade performance	4.1. Conduct ongoing tests to ensure success of upgrade 4.2. Monitor relevant alarms to measure impact of upgrade 4.3. Review customer complaints to assess impact of upgrade on customer satisfaction
5. Finalise administrative work and clean up worksite	5.1. Complete relevant work documentation and administrative tasks according to enterprise policy 5.2. Amend site records to show upgraded equipment layout 5.3. Organise customer training in the new or modified system 5.4. Clean up and restore site to customer satisfaction 5.5. Collect and dispose of waste material and debris according to environmental requirements 5.6. Declare asset ready for use 5.7. Notify customer of upgrade job completion to obtain sign off of work order and present with a copy of documentation

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- analytical skills to evaluate impact of upgrades on customer equipment and systems
- communication skills to:
 - provide advice and guidance to others and to liaise with other technical staff on

REQUIRED SKILLS AND KNOWLEDGE

- operational matters
 - respond to customer complaints
- literacy skills to read and interpret:
 - contingency plans
 - enterprise procedures, manuals and specifications
 - technical data, technical and non-technical information from a range of sources
 - test results
- numeracy skills to interpret technical data
- PC skills to monitor installed software
- planning and organisational skills to plan and prioritise own work
- problem solving skills to:
 - deal with unexpected situations on the basis of safety and specified work outcomes
 - prepare upgrade plan
 - troubleshoot common equipment and network problems
- safety awareness skills to:
 - apply precautions and required action to minimise, control or eliminate hazards
 - follow enterprise OHS procedures
 - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- technical skills to:
 - analyse the impact of applications on traffic flow in the network
 - determine customer requirements
 - determine the impact of upgrading hardware and software on network functionality
 - identify the technical requirements, constraints and manageability issues for a given customer network requirement
 - implement upgrade of equipment and software
 - use test equipment and monitoring tools
 - use tools and equipment to assemble and disassemble equipment

Required knowledge

- alarms
- backup systems
- upgrades and post-upgrade routines
- computer knowledge
- escalation and outage procedures
- network management systems
- overview knowledge of telecommunications networks and equipment

REQUIRED SKILLS AND KNOWLEDGE

- telecommunications monitoring tools
- telecommunications test equipment and test set-ups
- telecommunications wiring practices

Evidence Guide

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 ability to:

- analyse the implications of hardware and software upgrade on the remainder of the network
- plan and identify the components of the upgrade process
- prepare an upgrade plan and organise system backup
- run test plan and analyse test results
- implement upgrade and monitor progress of upgrade periodically using both vendor and enterprise specific monitoring tools
- implement contingency plan
- escalate problems encountered according to enterprise policy
- analyse alarms and alarm conditions
- review customer complaints to assess impact of upgrade.

Context of, and specific resources for assessment

Assessment must ensure:

- site where upgrade may be conducted
- use of equipment, software, test and monitoring equipment currently used in industry
- relevant regulatory, equipment, enterprise and vendor documentation that impacts on work activities.

Methods of assessment

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:

- direct observation of the candidate performing upgrade
- direct observation of the candidate performing tests and monitoring alarms
- review of documents prepared by the candidate providing upgrade plan and assessing impact of upgrade taking into consideration customer feedback
- oral or written questioning to assess knowledge of upgrade, testing and monitoring procedures.

Guidance information for

Holistic assessment with other units relevant to the

EVIDENCE GUIDE**assessment**

industry sector, workplaces and job role is recommended, for example:

- ICTTEN4073A Cut over customer premises equipment major upgrades
- ICTTEN4086A Undertake routine maintenance of the telecommunications network.

Aboriginal people and other people from a non-English speaking background may have second language issues.

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 required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.

Where applicable, physical resources should include equipment modified for people with special needs.

Range Statement**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.

RANGE STATEMENT	
<i>Relevant legislation, codes, regulations and standards</i> may include:	• Australian Construction Industry Forum (ACIF) standards and codes • AS Communications Cabling Manual (CCM) Volume 1 • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS IEC 61935.1:2006 • AS/NZS IEC 61935.2:2006 • AS/NZS ISO/IEC 14763.3:2007 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • cabling security codes and regulations • Environmental Protection Acts • OHS Acts • technical standards AS/ACIF S008:2006 and AS/ACIF S009:2006.
<i>Customer</i> may be:	• asset manager • contractor • network planner • nominated customer representative • project manager • service provider.
<i>Equipment</i> may include:	• Core and Access network: • cellular mobile network • dense wavelength division multiplexing (DWDM) network • gateway router • IP-Core Network • mesh network • multiprotocol label switching (MPLS) router • network server • optical network • satellite network • switching equipment • transmission equipment • worldwide interoperability for microwave access (WiMAX) network

RANGE STATEMENT	
	- customer network: - alarms systems - IP private branch exchange (PBX) - IP PBX server - IP security systems - Internet protocol TV (IPTV) - LAN: - data switch - router - server - network management addition - PBX - session initiation protocol (SIP)-enabled UC system - video conferencing equipment - voice over internet protocol (VoIP) gateway - WiMAX CPE.
Upgrade may include:	- network capacity upgrade - network major software upgrade - network services upgrade - network technology upgrade - system integration.
Hazards may include:	- building debris - earth potential rise (EPR): - event at a site, such as an electrical distribution substation, may expose telecommunications personnel, users or plant to hazardous voltages - glass fibre - live power lines - manual handling - mud and water - natural gas and other gas build up - optical fibre cable may contain hazardous light - radio frequency (RF) equipment emitting radiation - remote power feeding services which operate at above telecommunications network voltage (TNV)

RANGE STATEMENT	
	• vermin.
<i>Upgrade plan</i> may include:	• access and security arrangements • after hours access • contingencies • contingency plans • customers communication priorities • customers communications needs • downtime • installation of backup equipment • provision of temporary services • test plans • testing procedures • timing and disruption to services.
<i>Support personnel</i> may include:	• help desk • IT support • network operations support • vendor backup.
<i>Test equipment</i> may include:	• communication testers • frequency analysers • microwave link analysers • network analyser • protocol analyser • spectrum analysers • traffic analyser • transmission measuring sets.
<i>Test</i> may include:	• ability to make and receive a call • configuration tests • diagnostic tests • programme checks • routing tests • software tests • switching tests • traffic measurement test • transmission tests.
<i>Upgrade work</i> may include:	• commission of new system • installation of new additional equipment • installation of new software • integration of new equipment into existing system

RANGE STATEMENT	
	• provision of temporary service • removal of redundant equipment • test on new system.
<i>OHS and environmental requirements</i> may relate to:	• decommissioning and isolating worksite and lines prior to commencement • identifying other services, including power and gas • personal protective clothing: • earmuffs • gloves • head protection • kneepads • masks • protective suits • safety boots • safety glasses • safe working practices, such as the safe use and handling of: • asbestos • chemicals • materials • tools and equipment • work platforms • special access requirements • suitable light and ventilation • environmental considerations: • clean-up protection • stormwater protection • waste management.
<i>Progress of upgrade</i> may include:	• rate of deliverables against project timeline • risk management • timing.
<i>Contingency plan</i> may:	• be developed as part of the upgrade planning and design • be escalated and referred to more specialist team • invoke partial upgrade to be continued at later stage • invoke reversion procedure to pre-update

RANGE STATEMENT	
	condition.
Documentation may include:	• configuration details • implementation and testing procedures • network impact statement • software test results • system updates • test results and recommendations • upgrade details • vendor, equipment and enterprise specific details.

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Telecommunications networks engineering
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