



Australian Government

Department of Education, Employment and Workplace Relations

ICTTEN6091A Analyse and organise repair of highly complex telecommunications network faults

Release: 1

ICTTEN6091A Analyse and organise repair of highly complex telecommunications network faults

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to effectively manage the repair of highly complex network faults. It involves identification of faults across all network types with collaboration from the network operations centre (NOC). Highly complex network faults could comprise of interference, compatibility, compliance, interoperability and traffic congestion issues. 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	This unit applies to network engineers, telecommunications officers, installers, maintenance staff and manufacturers or equipment specialists. It also applies to NOC staff in advisory roles and technical rectification roles.
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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. Research fault background	1.1. Analyse the current relevant data and previous actions taken by other personnel 1.2. Research areas of similarity to network fault 1.3. Develop commercial and technical strategies with the equipment vendor and NOC for diagnosing the fault 1.4. Obtain appropriate clearance and access to network equipment, software and firmware codes where they apply
2. Diagnose fault	2.1. Apply a methodical approach to isolate and diagnose the problem 2.2. Simulate the fault in a workshop or laboratory environment if possible 2.3. Seek support from the vendor while the investigation progresses 2.4. Instruct on site technical staff to run appropriate tests and analyse results 2.5. Diagnose network fault using established methodical strategies in a timely fashion without undue disruption to other services 2.6. Develop a plan to rectify the fault
3. Organise fault rectification	3.1. Recommend the fault rectification plan to the NOC, including any outages, seek approval and adjust plans accordingly 3.2. Instruct on site repairers with clear and methodical instructions on how to proceed in rectifying the fault 3.3. Organise the replacement or repair of faulty equipment with appropriate advice from vendors and manufacturers 3.4. Reconfigure replaced or repaired equipment and test the rectified fault to ensure required performance 3.5. Notify the NOC, affected customers and on site staff of the rectification of the fault
4. Report and document fault details and rectification	4.1. Notify vendors of repair details and recommend changes to equipment design where appropriate 4.2. Conduct cause and effect studies and forward results to the appropriate area for necessary action 4.3. Complete all administrative tasks and prepare a report including deficiencies, analysis and recommendations

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- analytical skills to interrogate and evaluate complex information from multiple sources and to develop positions and recommendations
- communication skills to:
 - liaise with vendors, customers, and technical experts on technical and operational matters
 - negotiate with other repair and support staff
 - raise occupational health and safety (OHS) matters
- literacy skills to:
 - explain and justify faults and rectification actions
 - incorporate technical language into written tasks such as records and reports
 - interpret technical documentation and standards
- numeracy skills to interpret technical data, such as specifications of equipment
- problem solving skills to apply methodology in fault diagnosis
- research skills to access technical information and sources to assist fault identification
- safety awareness skills to adhere to all related OHS requirements and work practices
- technical skills to:
 - instruct site technical staff to run appropriate tests
 - diagnose network fault using methodical strategies
 - develop a plan to rectify fault

Required knowledge

- fault escalation procedures
- fault finding techniques and use of test equipment
- fault types and rectification
- integrated packet optical transport networks (P-OTNs)
- International Telecommunication Union (ITU) ITU-T G.709 standard
- network protocols
- safety requirements and standards
- service agreements
- synchronous digital hierarchy (SDH)
- transmission control protocol (TCP)-internet protocol (IP)
- types of networks and equipment:
 - Access

REQUIRED SKILLS AND KNOWLEDGE
• broadband deployment • cabling • customer premises equipment (CPE) • IP networks for enterprise and customer systems and installations • local area networks (LAN) • telephony • wide area networks (WAN) • workplace environment and 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.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: • diagnose network fault using established methodical strategies to rank likely causes without undue disruption to other services • recommend fault rectification plan to the NOC • instruct on site repairers • facilitate the replacement or repair of faulty equipment with appropriate advice from vendors and manufacturers • facilitate the final testing of the rectified fault to ensure required performance • prepare report including deficiencies, analysis and recommendations.
Context of and specific resources for assessment	Assessment must ensure: • a site where highly complex network faults may be demonstrated and analysed without jeopardising live traffic • equipment currently used in industry • design specifications and manufacturer's manuals and reference materials.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: • oral report and direct observation of the candidate establishing a test regime • direct observation of the candidate undertaking tests on equipment and systems • review of reports completed by the candidate for different equipment types, test results and situations, analysing results with recommendations and supporting reasons.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended,

EVIDENCE GUIDE

	for example: • ICTNPL6046A Undertake network performance analysis • ICTTEN6044A Coordinate fault rectification and restoration of service following network outages. 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.
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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.

Relevant data may relate to:

- alarm conditions
- client reports
- environmental factors
- historical
- industry and vendor

RANGE STATEMENT	
	• NOC • service level degradation • technical reports • test results from remote interrogation.

RANGE STATEMENT	
<i>Network fault</i> may include:	• compatibility • compliance • interference • intermittent performance problems • interoperability • network dropout • out of specification faults • software compatibility • system configuration problems • traffic congestion.
<i>Network Operations Centre</i> may include:	• engineering unit within a carrier responsible for: • coordinating repairs or changes to the network • monitoring the network • performing diagnostic tests.
<i>Simulate the fault</i> may include:	• circuit simulation software • computer modelling • equipment test bed.
<i>Tests</i> may include:	• bandwidth • bit interleaved parity (BIP-8) error detection • blocking • call rate • congestion • distortion • drop out rate • functionality • interference • intrusive through mode testing capability • latency • network tests • optical transmission • packet loss rate • quality of service (QoS) • radio transmission • recovery rate • redundancy • signal to noise ratio • transmitted power measurements • upload and download rates.

RANGE STATEMENT	
Methodical strategies may relate to:	• analysing test results • conducting tests • coordinating maintenance staff • isolating fault progressively to eliminate probable causes • monitoring path • reloading software • scheduling diagnosis for low traffic times • monitoring section • substituting hardware • trail trace identifier.
Outages may include:	• loss of service to customers due to a network fault or upgrade • planned outage in the case of network upgrade • unplanned outage in relation to faults.
On site repairers may include:	• carrier's engineers, technical officers and technicians • contractors • equipment vendors and manufacturers.
Administrative tasks may relate to:	• completing job orders and submitting to appropriate enterprise organisational unit • completing test sheets according to specification and logging test instrument usage • correct labelling of all equipment and amending where required • following quality control procedures • handing over installation briefs, documents and equipment manuals to operational staff • recording test results and updating appropriate databases • tasks that comply to enterprise requirements and policy • update fault history log with details of fault and details of repair • updating design specifications and returning to design area as required by enterprise requirements.

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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