ICTRFN5148A Test and measure cellular phone and network equipment performance

Release: 1

ICTRFN5148A Test and measure cellular phone and network equipment performance

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to test, measure and document the performance of cellular mobile phone and network equipment. It also involves analysing test results and recommending modifications to the network.
	The integration of specialised optical devices into existing networks may be required as part of an upgrade required by services and applications of Next Generation Mobile Networks (NGMN).
	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.

Application of the Unit

Application of the unit	Field officers and supervisors from telecommunications carriers, service providers, contractors and other public or private organisations apply the skills and knowledge of this unit. They perform measurements during equipment upgrades or during commissioning, acceptance testing and routine maintenance on cellular network equipment.
	The skills are mainly related to testing cellular sub-elements and subsystems. Field officers under supervision may be responsible for projects and for the coordination of projects in sites remote from the organisational headquarters. Technical officers also participate in design activities.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

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 to test cellular phone and network equipment	1.1. Obtain and follow *relevant legislation*, *codes*, *regulations and standards* 1.2. Scope the work by obtaining *work details* from *appropriate personnel* and arrange for site access to comply with security arrangements 1.3. Evaluate manufacturer's technical documentation and network procedures to plan a *test schedule* for the cellular network 1.4. Verify calibration of *test equipment* to ensure that tested cellular equipment is compliant 1.5. Prepare cellular equipment for testing according to manufacturer's test procedure 1.6. Notify operational staff of test and measurement schedule to ensure minimal impact on the cellular network
2. Test and measure cellular phone and network equipment	2.1. Work safely following occupational health and safety (*OHS*) *and environmental requirements* for the given work, identifying *hazards* and using *personal protective equipment* 2.2. Configure network equipment for testing and set *options* to record test results 2.3. Block or mask alarms that may be triggered and interfere with test programme 2.4. Run the performance measurement software with options set and record test results 2.5. Re-establish alarms and normal operational status at conclusion of tests and notify appropriate personnel of the completion of the test schedule
3. Analyse measurement and prepare an evaluation report	3.1. Analyse the results of the performance tests and measurements and determine the performance level of the cellular equipment and compatibility with the network 3.2. Prepare an evaluation report making recommendations on network modifications or changes to configurations settings for improved quality of service (QoS) 3.3. Present test results and evaluation report to appropriate personnel according to enterprise policy

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- analytical skills to interpret test results
- communication skills to:
  - liaise with internal and external personnel on technical and operational matters
  - relate to work associates, supervisors, team members and clients
- literacy skills to:
  - read and interpret technical documentation, such as equipment manuals, specifications and service orders
  - write reports using standard formats
- numeracy skills to:
  - interpret results
  - evaluate different types of technical data
- planning and organisational skills to plan, prioritise and monitor own work and that of others
- problem solving and contingency management skills to:
  - adapt testing procedures to requirements of particular situations
  - modify activities depending on operational contingencies, risk situations and environments
- safety awareness skills to:
  - apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities when dealing with radio frequency (RF) radiation
  - select and use required personal protective equipment conforming to industry and OHS standards
  - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- technical skills to:
  - confront typical issues and challenges that occur in cellular network testing
  - prepare and interpret technical documentation
  - recognise and interrogate the network element alarms and record fault conditions
  - select and use appropriate test equipment following industry practices

Required knowledge

- features and operating requirements of cellular test equipment, including the digital cellular test set, spectrum analyser and RF power meter
- network components, their functions and approved specifications
- overview knowledge of transmission lines, transmitter and receiver architecture

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REQUIRED SKILLS AND KNOWLEDGE

and associated cellular network

- specific knowledge related to cellular antenna and feedlines, and their impact on mobile spectrum interference
- testing network components
- types of adjustments that need to be made when measuring cellular transmission
- types of networks that will influence the transmission either on the radio path and/or transmission line

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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: - plan and coordinate test activities and equipment - test cellular phone and network equipment according to test procedure - analyse test results - report and make recommendations on performance.
Context of and specific resources for assessment	Assessment must ensure: - sites on which cellular network testing may be conducted - use of test equipment currently used in industry - manufacturer's and enterprise technical documentation - relevant regulations and standards.
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: - direct observation of the candidate performing tests - review of test documentation and reports completed by the candidate - oral or written questioning to assess knowledge of testing procedures and required knowledge.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: ICTRFN5097A Test cellular handset enhancements and international roaming agreements. 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.

EVIDENCE GUIDE	
	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.	
Relevant legislation, ***codes***, ***regulations and standards*** may include:	• Australian Communications Industry Forum (ACIF) standards and codes • AS Communications Cabling Manual (CCM) Volume 1 • Australia building codes and regulations • Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection standard - Maximum Exposure Levels to Radio Frequency Fields - 3 kHz to 300 GHz • ACIF C564:2004 Deployment of mobile phone network infrastructure • Environmental Protection Acts • fire regulations • OHS • relevant international standards • technical standards AS/ACIF S008:2006 and

RANGE STATEMENT	
	AS/ACIF S009:2006.

RANGE STATEMENT	

Work details **may include:**	• cellular equipment type:
	   • base station equipment
	   • location registers
	   • network management module
	   • switching
	   • transmitter
	• cellular network type:
	   • 3G
	   • 4G
	   • GPRS
	   • GSM
	   • WiMAX
	• reasons for tests
	• service level agreement (SLA) details.

Appropriate personnel **may refer to:**	• design engineer • network manager • network operations centre • planning engineer.

Test schedule **may include:**	• cellular network equipment tests:
	   • blockage
	   • congestion
	   • interference
	   • latency
	   • packet loss
	   • path loss
	   • QoS
	• cellular phone performance tests:
	   • firmware
	   • network connectivity
	   • roaming facilities
	   • SIM card test
	   • software
	   • transmitter tests.

Test equipment **may include:**	• built-in test equipment (BITE) • cable and antenna analyser • digital radio test set • E1 analyser • proprietary software

RANGE STATEMENT	
	• RF power meter • spectrum analyser • variable attenuator.

RANGE STATEMENT	
OHS and environmental requirements may relate to:	- decommissioning and isolating worksite and lines prior to commencement - flashing lights - gas and other hazard detection equipment - identifying other services, including power and gas - safety barriers - safety equipment - 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 - trench guards - warning signs and tapes - witches hats - environmental considerations: - clean-up protection - noise, dust and clean-up management - stormwater protection - waste management.
Hazards may include:	- activating equipment without notifying other staff who may be working remotely on the network - cleaning alcohol, epoxy resins and other solvents and chemicals may be carcinogenic, cause allergies or be dangerous to health in other ways - environmental hazards: - air pollution - dangerous gases - heavy or noxious metals pollution - noise - petrochemical spillage - release of hydrochlorofluorocarbons (HCFC)

RANGE STATEMENT	
	• flammable cleaning chemicals fluids and solvents • health hazards: 　• electromagnetic energy (EME) exposure 　• dangerous or harmful substances 　• risk of sustained injury from repetitive tasks • laser damage to eyes.
Personal protective equipment may include:	• personal protective clothing: 　• earmuffs 　• gloves 　• head protection 　• knee pads 　• mask 　• safety boots 　• safety glasses • safety harness • safety line.
Options may include:	• file setting • macro setting.

Unit Sector(s)

Unit sector	Telecommunications

Co-requisite units

Co-requisite units		

Competency field

Competency field	Radio frequency networks

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