



Australian Government

Department of Education, Employment and Workplace Relations

ICTOPN5123A Analyse and integrate specialised optical devices in the network

Release: 1

ICTOPN5123A Analyse and integrate specialised optical devices in the network

Modification History

Not Applicable

Unit Descriptor

<p>Unit descriptor</p>	<p>This unit describes the performance outcomes, skills and knowledge required to analyse and integrate specialised optical devices into existing optical networks to support the higher bandwidths associated with Next Generation Networks (NGN).</p> <p>Carriers and service providers regularly upgrade existing infrastructures and extend the length of their networks' optical links due to expansion of NGN services such as voice, data and video.</p> <p>Performance testing of specialised optical devices is covered in a separate unit ICTOPN5122A Test the performance of specialised optical devices.</p> <p>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.</p>
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Application of the Unit

<p>Application of the unit</p>	<p>Technical staff from telecommunications carriers, service providers or other private and public organisations who have experience in optical transmission apply the skills and knowledge in this unit.</p> <p>They combine technical expertise with a range of analytical, research and planning skills to develop integration solutions for particular business needs.</p> <p>Relevant job roles include design and planning of networks using emerging technology.</p>
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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. Analyse specialised optical device and prepare for integration in the network	1.1. Obtain <i>relevant legislation, codes, regulations and standards</i> and follow occupational health and safety (<i>OHS</i>) and <i>environmental requirements</i> for the project work 1.2. Work safely according to relevant safety legislation and company work practices identifying <i>hazards</i> and using <i>personal protective equipment</i> 1.3. Obtain plans and drawings of existing <i>optical network</i> from <i>appropriate person</i> and review potential locations for suitability of integrating additional hardware 1.4. Analyse and evaluate a range of integration options using device <i>specifications</i> which satisfy the customer's network requirements 1.5. Prepare and submit the business case for adopting the recommended integration solution 1.6. Prepare design plan with interconnection details to existing system and <i>installation options</i> and seek approval to proceed from customer 1.7. Undertake an impact risk assessment of the hardware integration with the network operations centre (NOC) and prepare for contingencies using contingency plan
2. Integrate the specialised optical device in the network	2.1. Install and integrate <i>specialised optical devices</i> into existing network according to design plan 2.2. Test the network and evaluate the results to <i>verify optical network performance</i> with the integrated specialised optical devices in operation
3. Document the integration of the specialised optical device in dense wavelength division multiplexing (DWDM) network	3.1. Produce an updated design plan and submit to customer with copies filed for later reference according to organisation's policies 3.2. Prepare an evaluation report on the performance of the network with specialised optical devices with recommendations for future enhancements 3.3. Notify NOC of job completion and obtain sign off from appropriate person

Required Skills and Knowledge

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 technical information and develop integration options
- 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:
 - interpret technical documentation, such as equipment manuals, specifications and service orders
 - write reports using standard formats
- numeracy skills to interpret results and 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 especially when dealing with infra-red laser light
 - 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:
 - backup and restore
 - clean optical fibre connector
 - examine optical fibre connector for contamination and assess whether cleaning is required
 - install software
 - measure optical power using handheld optical power meter
 - measure DC and AC voltages
 - select and use appropriate test equipment
 - setup internet protocol (IP) addresses and subnet masks

Required knowledge

- attenuation characteristics of optical fibres
- DWDM principles of operation

REQUIRED SKILLS AND KNOWLEDGE

- features and operating requirements of test equipment, including:
 - hand-held optical power meter
 - optical spectrum analyser
 - transmission test set
- dispersion characteristics of optical fibres
- dispersion compensation devices
- electrostatic discharge precaution
- functions of optical add drop multiplexer (OADM) and reconfigurable optical add-drop multiplexer (ROADM)
- gain equalisation
- International Telecommunications Union (ITU) wavelength grid for DWDM
- measurement of dispersion
- optical amplifier operation
- optical fibre connector types and characteristics
- optical fibre types and characteristics
- optical return loss (ORL)
- path protection and protection switching
- protocols used on optical DWDM systems
- reflectance
- ring topologies and linear network topologies
- specific OHS requirements that impact on the safe inspection of optical connectors and the safe measurement of optical power from laser transmission systems
- tunable laser sources and their characteristics

Evidence Guide

EVIDENCE GUIDE	
<p>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.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> analyse a specialised optical device and prepare a design to integrate it with a network integrate and test the device document the integration to the network and recommend enhancements comply with all related OHS requirements and work practices.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> sites on which specialised optical device can be integrated use of test equipment currently used in industry manufacturer's technical documentation, legislation, codes and standards.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> direct observation of the candidate performing integration review of test documentation and reports completed by the candidate oral or written questioning to assess required knowledge and skill.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> ICTOPN5118A Plan and configure dense wavelength division multiplexing systems ICTOPN5119A Perform acceptance and commissioning test on optical network ICTOPN5120A Plan for an optical system upgrade and cut over ICTOPN5122A Test the performance of specialised

EVIDENCE GUIDE

	<p>optical devices.</p> <p>Aboriginal people and other people from a non-English speaking background may have second language issues.</p> <p>Access must be provided to appropriate learning and assessment support when required.</p> <p>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.</p> <p>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.</p> <p>Where applicable, physical resources should include equipment modified for people with special needs.</p>
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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 legislation, codes, regulations and standards may include:

- Australian Communications Industry Forum (ACIF) standards and codes
- AS Communications Cabling Manual (CCM) Volume 1
- Australian building codes and regulations
- compliance with appropriate Australian Communications and Media Authority (ACMA) technical standard requirements for underground, aerial, Category 5 or Category 6,

RANGE STATEMENT

	<p>6A, 7 or 7A, and unshielded twisted pairs (UTP)</p> <ul style="list-style-type: none">• Environmental Protection Acts• fire regulations• Institute of Electrical and Electronics Engineers (IEEE) standards• OHS• relevant international standards• technical standards AS/ACIF S008:2006 and AS/ACIF S009:2006.
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RANGE STATEMENT	
<p><i>OHS and environmental requirements</i> may relate to:</p>	<ul style="list-style-type: none"> • decommissioning and isolating work site 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: <ul style="list-style-type: none"> • asbestos • chemicals • materials • tools and equipment • work platforms • special access requirements • suitable light and ventilation • trench guards • warning signs and tapes • woggles hats • environmental considerations: <ul style="list-style-type: none"> • clean-up protection • noise, dust and clean-up management • stormwater protection • waste management.
<p><i>Hazards</i> may include:</p>	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • air pollution • damage to natural or heritage precincts • dangerous gases • ground water contamination • heavy or noxious metals pollution • noise • petrochemical spillage

RANGE STATEMENT

- release of hydrochlorofluorocarbons (HCFC)
- flammable cleaning chemicals fluids and solvents
- fibre offcut damage to eyes and skin
- health hazards:
 - dangerous or harmful substances
 - handling of optic fibres and lasers
 - risk of infection
 - risk of sustained injury from repetitive tasks
- inhalation of fibre offcuts and particles from vacuum cleaning of worksite
- laser damage to eyes.

RANGE STATEMENT	
<i>Personal protective equipment</i> may include:	<ul style="list-style-type: none"> inspection microscope with integral laser safety filter safety glasses video microscope.
<i>Optical network</i> may include:	<ul style="list-style-type: none"> coarse wavelength division multiplexing (CWDM) DWDM Hybrid fibre coaxial (HFC).
<i>Appropriate person</i> may include:	<ul style="list-style-type: none"> customer network manager project engineer project manager.
<i>Specifications</i> may include:	<ul style="list-style-type: none"> bandwidth insertion loss operating wavelength optical return loss (ORL) ripple.
<i>Installation options</i> may include:	<ul style="list-style-type: none"> location at intermediate location location at OADM site location at terminal site location underground.
<i>Specialised optical devices</i> may include:	<ul style="list-style-type: none"> Bragg grating coupler dispersion compensation device (DCD) DWDM multiplexer erbium doped fibre amplifier (EDFA) gain equaliser Raman amplifier ROADM.
<i>Verify optical network performance</i> may include:	<ul style="list-style-type: none"> stability test bit error ratio test (BERT).

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Optical networks
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