



Australian Government

ICTOPN604 Analyse optical transmission systems

Release: 1

ICTOPN604 Analyse optical transmission systems

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to verify the characteristics of Next Generation Networks (NGN) to ensure they will support the new modulation requirements of the equipment.

It applies to individuals who are experienced technicians from telecommunications carriers, service providers, or other private and public organisations, who have experience in the optical transmission area.

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

Unit Sector

Telecommunications – Optical Networks

Elements and Performance Criteria

Element	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to conduct characterisation tests on existing optical network	1.1 Obtain relevant legislation, codes, regulations and standards and follow work health and safety (WHS) and environmental requirements for the given work 1.2 Identify hazards and work safely according to relevant safety legislation and company work practices using personal protective equipment 1.3 Construct test procedures for each test to be conducted 1.4 Notify customer and arrange for site access

2. Conduct link characterisation tests and analyse existing optical network	2.1 Perform optical tests to characterise existing fibre link 2.2 Analyse results of optical tests, and determine extent and nature of future upgrades based on the tests
3. Document analysis of optical network with recommendations	3.1 Produce final drawings and plans of proposed upgrade requirements for optical transmission and submit to project manager according to enterprise policy 3.2 Prepare report on measured performance of the network and recommendations on future upgrades

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.1, 3.1	Interprets textual information from relevant sources to identify and plan for all job requirements and adhere to procedures and standards
Writing	1.2, 1.4, 3.1, 3.2	Accurately prepares standard documentation using clear and technically specific language, numerical data, drawings and plans
Oral Communication	1.4	Uses listening and questioning skills to confirm technical and operational requirements and participates in a verbal exchange of ideas and solutions and uses appropriate, detailed and clear language to address team members, supervisors and customers
Numeracy	2.2	Uses mathematical equations to evaluate all relevant technical data
Navigate the world of work	1.1, 1.2, 3.1	- Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, with specific reference to workplace safety - Understands main tasks, responsibilities and boundaries of own work
Get the work done	1.3, 2.1, 2.2	Develops plans to manage relatively complex, non-routine tasks with an

		awareness of how they may contribute to longer term operational and strategic goals • Makes a range of critical and non-critical decisions in relatively complex situations, taking a range of constraints into account • Recognises and addresses complex problems involving multiple variables • Actively identifies systems, devices and applications with potential to meet current and/or future needs
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Range of Conditions

This field allows for different work environments and conditions that may affect performance. 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) should be included.

Measurements that must be conducted include:	• optical time-domain reflectometer (OTDR) testing from both ends • optical loss test set (OLTS) • optical return loss (ORL) • chromatic dispersion (CD) • polarisation mode dispersion (PMD) • non-linearity (four wave mixing) • optical signal-to-noise ratio (OSNR)
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Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTOPN604 Analyse optical transmission systems	ICTOPN6129A Analyse optical transmission systems	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

Assessment Requirements for ICTOPN604 Analyse optical transmission systems

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Performance Evidence

Evidence of ability to:

- conduct optical transmission measurements
- analyse complex optical measurement results
- liaise with the customer as required.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- list and describe legislative and regulatory frameworks that govern optical transmission systems
- list and describe work health and safety (WHS) and environmental issues associated with optical transmission systems
- describe attenuation characteristics of optical fibres
- summarise the chromatic dispersion (CD) test
- explain principles of operation of dense wavelength division multiplexing (DWDM)
- discuss dispersion and outline dispersion characteristics of various fibres and devices used for compensation
- discuss precautions required to minimise electrostatic discharge
- identify features and operating requirements of test equipment including:
 - a hand-held optical power meter
 - an optical spectrum analyser
 - a transmission test set
- identify functions of an optical add-drop multiplexer (OADM) and reconfigurable optical add-drop multiplexer (ROADM)

- explain gain equalisation
- describe the insertion loss test
- summarise the International Telecommunications Union (ITU) wavelength grid for DWDM
- discuss measurement of dispersion
- summarise methods to reduce dispersion
- discuss optical amplifier operation
- identify optical fibre connector types and characteristics
- identify optical fibre types and characteristics
- summarise the optical return loss (ORL) test
- outline the optical signal-to-noise ratio (OSNR) test
- discuss the optical time domain reflectometer (OTDR) test
- clarify path protection and protection switching
- explain performance qualification of 40 Gbit/s and 100 Gbit/s transceivers
- summarise the polarisation mode dispersion (PMD) test
- outline protocols used on optical DWDM systems
- explain reflectance in fibre optic systems
- discuss ring topologies and linear network topologies
- explain specific work health and safety (WHS) requirements and environmental constraints that impact safe inspection of optical connectors and safe measurement of optical power from laser transmission systems.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the Telecommunications – Optical Networks field of work and include access to:

- test equipment currently used in industry
- test equipment and manufacturer's technical documentation.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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