



Australian Government

ICTTEN4246A Design dense wavelength division multiplexing installations

Release 1

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Modification History

Release	Comments
Release 1	This version first released with <i>ICT10 Integrated Telecommunications Training Package Version 3.0</i> .

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to design a dense wavelength division multiplexing (DWDM) system in optical networks.

Application of the Unit

Telecommunications technical staff who design systems for the installation of long haul or metropolitan area DWDM equipment apply the skills and knowledge in this unit.

This unit is one in a sequence of units that cover network design activities, including:

- design drawings and specifications
- designing a DWDM system
- designing infrastructure
- estimating and quoting
- site survey.

Licensing/Regulatory Information

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.

Pre-Requisites

Nil

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements	Performance Criteria
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>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.</i>

Elements and Performance Criteria

<p>1. Obtain access to work site safely and with authority from site owner</p>	<p>1.1 Obtain and review DWDM installation brief</p> <p>1.2 Determine <i>site</i> access requirements</p> <p>1.3 Notify parties if necessary to arrange access to site to discuss DWDM installation requirements</p> <p>1.4 Assess site-specific safety requirements and enterprise work health and safety (WHS) processes and procedures</p>
<p>2. Prepare to install design DWDM units</p>	<p>2.1 Survey location for DWDM installation and scope the installation parameters</p> <p>2.2 Identify suitable location for DWDM <i>equipment racks</i></p> <p>2.3 Determine number and location of shelves and cards in the racks</p> <p>2.4 Determine capacity of the optical distribution frames (ODFs), patching and network management system (NMS) connections for the installation</p> <p>2.5 Determine <i>power feed options</i></p>
<p>3. Design DWDM units and associated cabling</p>	<p>3.1 Design DWDM racks, including locations and layout</p> <p>3.2 Examine standards, practices and requirements for designing DWDM systems</p> <p>3.3 Design DWDM shelf and card positions from customer and manufacturer documents</p> <p>3.4 Design supporting <i>patch panel</i> and jumpering schemes</p> <p>3.5 Include appropriate <i>ancillary equipment and connections</i> in design specifications</p> <p>3.6 Prepare detailed design drawings for racks, shelves and cards from manufacturer and carrier documents</p> <p>3.7 Prepare detailed design drawings for patching, jumpering and power feeds from manufacturer and carrier documents</p>
<p>4. Review design for compliance with standards and legislation</p>	<p>4.1 Confirm that DWDM installation design meets the brief</p> <p>4.2 Review installation design to ensure compliance with requirements of federal, state and local regulations, relevant <i>legislation</i>, codes and standards</p>

Required Skills and Knowledge

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

Required skills

- communication skills to liaise with internal and external personnel on technical and operational matters
- literacy skills to interpret technical documentation
- technical skills to:
 - assemble and secure standard telecommunications equipment rack, associated ironwork and optical fibre support ducting
 - clean optical fibre connector
 - examine optical fibre connector for contamination and assess whether cleaning is required
 - prepare and connect power and ground wires
 - use a digital multimeter to measure DC and AC voltage and to check continuity.
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Required knowledge

- DWDM principles of operation
- electrostatic discharge: implications and precautions
- optical fibre connector: types and characteristics
- optical fibre: types and characteristics
- principles of safe measurement of optical power from laser transmission systems
- specific WHS requirements that impact on the safe inspection of optical connectors.

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	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> • design a DWDM installation and associated cabling according to installation brief and installation site conditions • design DWDM system power and ground connections • complete and confirm installation design report.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • suitable site for DWDM equipment installation • access to tools and equipment required for installation • a range of optical fibres to suit the installation.
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 preparing designs for DWDM systems • review of DWDM designs prepared by the candidate • oral or written questioning of the candidate to assess knowledge of DWDM design practices.
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"> • ICTBWN3088B Install optical fibre splitters in fibre distribution hubs • ICTTEN3056A Install telecommunications network equipment. <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

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.

<i>Site</i> may include:	<ul style="list-style-type: none"> • optical add drop multiplexer (OADM) site • terminal site.
<i>Equipment racks</i> may include:	<ul style="list-style-type: none"> • 19 inch type • 23 inch type • 535 mm (ETSI rack) type.
<i>Power feed options</i> may include:	<ul style="list-style-type: none"> • battery options • earthing requirements • primary power sources • rectifier and transformer requirements • separations form other services.
<i>Patch panels</i> may include:	<ul style="list-style-type: none"> • rack mounted • wall mounted.
<i>Ancillary equipment and connections</i> may include:	<ul style="list-style-type: none"> • air filter • alarm connections • C/L band splitter tray • cooling fan assembly • coupler tray • craft terminal • data communications connections • equaliser tray • ethernet hub • fibre management trays • optical attenuators • optical fibre patch cords • optical multiplexer • optical service channel tray • telemetry connections • variable optical attenuators.
<i>Legislation</i> may include:	<ul style="list-style-type: none"> • AS Communications Cabling Manual (CCM) Volume 1 • AS/NZS – relevant codes • Australian building codes and regulations • cabling security codes and regulations • Comms Alliance (CA) standards and codes

	<ul style="list-style-type: none">• relevant international standards where they are enforced• technical standards AS/ACIF S008:2006 and AS/ACIF S009:2006• Telecommunications Act and code of practice• WHS Acts and relevant codes and standards.
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Unit Sector(s)

Telecommunications - Telecommunications networks engineering