

**1. Module details****Module name****Telecommunications Cable Testing & Reporting****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

**Module code**

NUE198

**Discipline code**

Electrotechnology - 0703225.

**2. Module purpose**

This module provides students with the knowledge and skills to safely carry out testing using appropriate equipment, and carry out reporting according to relevant standards, regulations and Occupational Health and Safety guidelines.

**3. Prerequisites**

NBB02 Occupational Health and Safety.  
NUE190 Telecommunications Standards and Regulations  
NUE191 Telecommunications Cables & Installation Methods

**4. Relationship to competency standards**

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from NUEITAB.

**5. Content****Cable performance parameters**

Short circuit, open circuit, foreign battery, DC continuity  
Characteristic impedance and impedance regularity  
NEXT (near end crosstalk)  
FEXT (far end crosstalk)  
Attenuation per unit length  
Shunt capacitance per unit length  
Loop resistance per unit length  
Impulse noise and average noise

**Range of tests and their purpose**

**Standard colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, coaxial cable and optical fibre**

**Equipment types-principles of operation**

Uses, self maintenance and reliability  
Cable and pair locator

Pair continuity testers  
Megger  
Analogue and digital multimeters  
CRO  
MTDR  
Category 5 or similar/higher performance cable, testers  
OTDR  
O/F light source and power meter  
Techniques to ensure accuracy and repeatability  
Temperature  
Batteries  
Patch cords or connecting leads  
Terminations  
Instrument suitability and accuracy  
Instrument calibration procedures  
Equipment handbook reference  
User training  
Calibration requirements  
Instrument zeroing or calibration  
Calibration requirements for conformity with quality assurance to Australian Standard - 3902

**Sampling to AS1199 or its replacement**

**Compliance testing**

Category 5 or similar/higher performance cable, compliance to standards - AS/NZS3080 IS11801 and TSB67 or their replacements  
Optical fibre cabling to standards - AS/NZS3080 and IS11801 or their replacements  
Coaxial cable to standards - IEEE802.3 or its replacements

**Third party testing**

**Documentation**

**6. Assessment strategy**

**Assessment methods**

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

<b>Conditions of assessment</b>	Learning and assessment will take place in an environment that is conducive to a learner's development.
<b>7. Learning outcome details</b>	
<b>Learning outcome 1</b>	<b>Define the range of cable performance parameters associated with copper cables, coaxial cables and optical cables.</b>
<b>Assessment criteria</b>	<p>1.1 Describe cable performance of structured cabling including, twisted pair cabling, shielded twisted pair (STP), unshielded twisted pair (UTP) and Category 5 cabling, in relation to:</p> <ul style="list-style-type: none"><li>– Open circuit, short circuit and pair continuity</li><li>– Split pair and crossed pair</li><li>– Attenuation</li><li>– Return loss</li><li>– Insulation Resistance (leakage)</li><li>– Near end cross talk (NEXT)</li><li>– Loop resistance</li><li>– Noise (Impulse noise and average noise)</li><li>– Characteristic impedance</li></ul>
<b>Learning outcome 2</b>	<b>Gather and analysis test results for compliance with required regulation, standards, and or codes for structured cabling including copper cables, coaxial; and optical fibre cables.</b>
<b>Assessment criteria</b>	<p>2.1 State the tests required to evaluate a given performance parameter for copper cable (UTP, STP or Cat 5 or similar/higher performance cable), coaxial cable and optical fibre cable.</p> <p>2.2 Select the appropriate test equipment and leads to evaluate a given performance parameter for STP, UTP Cat 5 or similar/higher performance cable, coaxial or optical fibre cable.</p> <p>2.3 Check and operate test equipment correctly for evaluation of specific cable performance parameters and obtain accurate and reliable results.</p>

	2.4	Define the standards that specify transmission performance of customer premises using optical fibre, coaxial cable and category 5 or similar/higher performance cable, twisted pair cable.
	2.5	Analyse, compare, and describe a set of given test results for optical fibre, coaxial or category 5 or similar/higher performance cable, twisted pair cable in relation to the appropriate standards.
<b>Learning outcome 3</b>		<b>Describe standard colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables.</b>
<b>Assessment criteria</b>	3.1	State the colour coding requirements for cables to conform with regulations, standards or codes
	3.2	State the colour coding requirements for sockets and termination modules to conform with the standard - AS 3080.96
	3.3	State the colour coding of standard connectors used with twisted pair, coaxial cable, Cat 5 or similar/higher performance cable, and optical fibre.
<b>Learning outcome 4</b>		<b>Test and certify customer premises optical fibre, category 5 and coaxial cabling installations to appropriate standards</b>
<b>Assessment criteria</b>	4.1	Compliance test and certify an optical fibre cabling installation according to the standard - AS 3080.96.
	4.2	Compliance test and certify a structured cable, including Category 5 or similar/higher performance cable twisted pair customer premises installation from a telecommunication closet or network termination device to a work station outlet in accordance with the standard - AS 2080.96.
	4.3	Compliance test and certify a customer premise coaxial cable terminated in relevant standard - IEEE802.3 specified connectors in accordance with the standards - IEEE802.5 or other appropriate regulation, standard or code.

**Learning outcome 5**

**State the requirements for third party testing of a customer premises cabling installation and follow correct validation and documentation procedures for conformity with the appropriate standards.**

**Assessment criteria**

- 5.1 State the requirements of the standard in relation to site certification for optical fibre and Category 5 or similar/higher performance cable twisted pair.
- 5.2 State the requirements of the standard - IEEE802.5 in relation to site certification for coaxial cable.
- 5.3 State the requirements of standard - AS1199 in relation to site certification for cables.
- 5.4 Determine from given set of test results whether it is a valid certification for the cabling medium against the relevant standard.
- 5.5 Identify the reporting requirements for the completion of work
- 5.6 Prepare relevant documentation for meeting compliance requirements

**Learning outcome 6**

**Describe the variety of test equipment, their principles of operation, and application.**

**Assessment criteria**

- 6.1 Describe the use and operation of Continuity and Insulation Resistance tester (Megger).
- 6.2 Describe the use of analogue and digital voltmeter.
- 6.3 Describe the use and operation of the Optical Time Domain Reflectometer (OTDR).
- 6.4 Describe the calibration procedures and self-diagnosis procedures for a range of standard test equipment used in testing of cabling installations.
- 6.5 State the Australian Standard quality assurance requirements for test equipment calibration, in particular for regularity and traceability.
- 6.6 Demonstrate the correct use of a range of test equipment including, a Megger, an analogue and a digital voltmeter and an OTDR.

## 8. Delivery of the module

### Delivery strategy

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports.

It is recommended that learning and assessment be facilitated in a holistic manner that may require learning outcome sequence other than that indicated in the module.

### Resource requirements

Resources should be sufficient for students to carry out learning activities on an individual basis. This will require a range of support equipment and reference material.

*Students will require access to the following reference material or their replacement:*

- TS008
- TS009
- AS/NZS 1668
- AS1199
- AS 1670
- AS1851
- AS 2220
- AS/NZS 3000 series and related sub-standards
- AS3902
- IS11801
- TSB67
- IEEE802 and related sub-standards
- Telecommunications Act 1997 - overview
- The Building Code of Australia Volumes 1-3
- Australian Communications Authority Cabling Provider Rules – Benchmark Cabler Competency Requirements - 2000
- Communication Cabling Manual BCL Package
- Certified Components List (CCL) or replacement
- Labelling

*Specialised facilities and equipment required by the training provider include:*

- Access to a range of industrial, commercial and domestic sites
- Range of test equipment

**Occupational health  
and safety requirements**

- Certification and related documentation

*In addition learners will require access to:*

- Standard workshops, equipment and tools should be available for practical exercises
- Approved telecommunication tools
- Approved safety equipment

A safe and healthy environment will be provided for students and teachers as well as the particular safety procedures followed as part of the learning / teaching activity and content.