

Title	Demonstrate and apply knowledge of computer networking infrastructure principles		
Level	4	Credits	15

Purpose	<p>This unit standard covers the necessary introductory skills required to install, test, and document voice and data cabling in a commercial environment.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate and apply knowledge of basic cabling and related safety issues; – demonstrate knowledge of basic networking principles; – demonstrate knowledge of signal transmission concepts; – demonstrate and apply knowledge of structured cabling installation; and – demonstrate knowledge of international cabling standards.
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Classification	Electronic Engineering > Computer Engineering
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Available grade	Achieved
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Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level.
- 2 References
 - AS/NZS 3000:2007 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;
 - AS/NZS 3080:2013 *Telecommunications installations – Generic cabling for commercial premises*;
 - Fundamentals of Voice and Data Cabling Companion Guide (Cisco Networking Academy Program), Cisco Systems, Inc., ISBN: 1587130874 and all subsequent editions;
 - Health and Safety at Work Act 2015;
 - Health and Safety in Employment Regulations 1995;
 - and all subsequent amendments and replacements.
- 3 Definitions
 - Cable* – coaxial, copper, optical fibre.
 - Coaxial cable* – includes 10Mbps baseband coaxial cable (Thinnet) (10Base-2) and 10Mbps baseband coaxial cable (Thicknet) (10Base-5).
 - Ethernet* – a process called Carrier Sense, Multiple Access, Collision Detection (CSMA/CD), which has data collision detection, it is used to pass data across a physical media.

Finishing phase – testing, certification, and documentation of the structured cabling installation.

IEEE – Institute of Electrical and Electronic Engineers.

Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.

LAN – local area network.

MAN – metropolitan area network.

OSI – Open System Interconnect, a model developed by the International Standards Organisation.

PC – personal computer.

Rough-in phase – running of cables and installation of support equipment such as trays, runways and catenary wires.

SMA connector – SubMiniature version A threaded coaxial cable connector.

ST connector – straight tip half-twist bayonet lock plug and socket fibre optic cable connector.

STP – shielded twisted pair cable.

Trim-out phase – dressing and termination of cables on racks or distribution frames and at the telecommunication outlets.

UTP – unshielded twisted pair cable.

WAN – wide area network.

- 4 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.
- 5 All activities must comply with: any policies, procedures, and requirements of the organisations involved; the standards of relevant professional bodies; and any relevant legislative and/or regulatory requirements.
- 6 Range
 - a performance in relation to the outcomes of this unit standard must comply with the Health and Safety at Work Act 2015;
 - b laboratory and workshop safety practices are to be observed at all times.

Outcomes and performance criteria

Outcome 1

Demonstrate and apply knowledge of basic cabling and related safety issues.

Performance criteria

- 1.1 Standards and safety practices that apply to telecommunication and data cabling are identified and described.

Range	may include but is not limited to – AS/NZS 3000, AS/NZS 3080, building codes, TIA/EIA standards, IEEE 802 standards, IEEE 802.3 Ethernet standards.
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- 1.2 Cables are installed in accordance with standards, using safe practices.

Range	includes but is not limited to – AS/NZS 3080, electrical safety, ladder safety.
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- 1.3 Cabling tools are used in accordance with manufacturers' instructions and safe practice.

Range includes but is not limited to – crimp tools, punch down tools, cable stripping tools, electric drills.

Outcome 2

Demonstrate knowledge of basic networking principles.

Performance criteria

- 2.1 Types of networks and topologies and their relationship in the OSI model are described.

Range may include but is not limited to – LAN, MAN, WAN, bus, star, ring, network interface card (NIC), hubs, switches and routers.

- 2.2 PCs are connected using an Ethernet network and tested to show that a connection is established.

Range patch cables, peer-to-peer network, hubs and switches; two PCs are directly connected using a patch cable; three or more PCs are connected using a hub or switch; connectivity is confirmed using ping and sharing a file.

Outcome 3

Demonstrate knowledge of signal transmission concepts.

Performance criteria

- 3.1 Types of media used and how signals are transmitted and degraded during transmission are described in accordance with industry practice.

Range UTP, STP, coaxial cable, fibre optic cable, attenuation, crosstalk.

- 3.2 Types of cables, pairs, and types of terminations and connectors used on cables are identified in accordance with industry practice.

Range UTP, STP, 4 pair, 25 pair, modular jacks and plugs, 110 connectors, coaxial cable, BNC and F connectors, fibre optic cable, ST and SMA connectors.

Outcome 4

Demonstrate and apply knowledge of structured cabling installation.

Range may include but is not limited to – rough-in, trim-out, finishing phases; equipment racks; trays and runways; cable reels; testing; documentation.

Performance criteria

- 4.1 The processes, plant and equipment necessary to complete the installation of a structured cabling system are described in accordance with industry standards.
- 4.2 Cables are installed, terminated, and tested in accordance with structured cabling system and industry standards.

Outcome 5

Demonstrate knowledge of international cabling standards.

Performance criteria

- 5.1 Related international cabling standards are identified and the differences between these standards and those referred to in performance criterion 1.1 are explained.

Range may include but is not limited to – National Electrical Codes (NEC, USA), Underwriters Laboratories (UL), European Commission Standards (CE), Australian Communications Authority (ACA), International Organisation for Standards (ISO/IEC), Electrical Industry Association/Telecommunication Industry Association (EIA/TIA).

Planned review date	31 December 2021
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 December 2006	N/A
Rollover and Revision	2	28 June 2018	N/A

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.