Title	**Demonstrate knowledge of structured cabling systems**		
Level	**4**	**Credits**	**20**

Purpose	This unit standard is intended for service technicians and servicepersons who install, diagnosis and repair structured cabling systems and associated equipment. People credited with this unit standard are able to: – demonstrate knowledge of structured cabling systems; – read and interpret electrical diagrams to describe structured cabling systems functions; – demonstrate knowledge of cables and connections used in structured cabling systems; – demonstrate knowledge of associated equipment used with network systems; – demonstrate knowledge of the impact of an emerging or converging technology on network systems; and – describe professional development opportunities regarding new technologies for structured cabling systems.

Classification	Electrical Engineering > Electrotechnology

Available grade	Achieved

Guidance Information

1 Recommended unit standards for entry:
Unit 27912, *Demonstrate knowledge of electrical principles in an electrotechnology or telecommunications environment*.
Unit 30641, *Demonstrate knowledge of electromechanical engineering principles for technicians*.
Unit 30648, *Demonstrate knowledge of installation practices and procedures for customer premises systems*.

2 References
AS/NZS 1367:2016 *Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analog television signals in single and multiple dwelling installations,* available from https://www.standards.govt.nz/;
AS/NZS 3000 (version as cited in Electricity (Safety) Regulations), *Electrical Installations - known as the Australian/New Zealand Wiring Rules*, available from https://www.standards.govt.nz/;
AS/NZS 11801.1:2019 *Information technology - Generic cabling for customer premises Part 1: General requirements (ISO/IEC 11801-1:2017, MOD),* available from https://www.standards.govt.nz/;

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Consumer Guarantees Act 1993;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Fair Trading Act 1986;
Health and Safety at Work Act 2015;
TCF Premises Wiring Cable Installers Guidelines for Telecommunications Services, available from http://www.tcf.org.nz;
and all subsequent amendments and replacements.

3 Definitions

Company practice – those practices and procedures that have been circulated by the company for use by their employees.
Industry conventions – a set of agreed, specified, or generally accepted standards.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
Safe and sound practice – relating to the installation of electrical equipment as defined in AS/NZS 3000 (version as cited in Electricity (Safety) Regulations).
Service technicians and servicepersons – for the purposes of this unit standard means, people who hold or who are working towards electrical registration as an Electrical Service Technician, Electrical Appliance Serviceperson (endorsed to disconnect and connect), or Electrical Appliance Serviceperson.
Structured cabling systems – is also known as network systems.

4 Assessment

a Competence may be assessed on:
  i Structured cabling systems or installations for voice and/or data may include but are not limited to – home, office, industrial, data centre, distributed building services;
  ii Cabling may include but is not limited to – optical fibre, twisted-pair copper, coaxial copper, or some combination of these;
  iii Connecting hardware may include but is not limited to – connecting blocks, patch panels, interconnections, cross-connections, or some combination of these components;
  iv Associated equipment/support facilities may include but is not limited to – cable support hardware, fire stopping and grounding hardware.
b All measurements are to be expressed in Système Internationale (SI) units and multipliers.
c Mathematical proof of the subject matter covered by this unit standard is not required.

5 Range

All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with:
  i legislation;
  ii policies and procedures;
  iii ethical codes;
  iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;
  v safe and sound practice;
  vi applicable site, company and industry practice, and industry conventions;

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vii where appropriate or applicable, environmental requirements, manufacturer instructions, specifications, data sheets and manufacturer, supplier and company health and safety procedures.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of structured cabling systems.

Performance criteria

1.1 Compare the advantages and disadvantages of network types.

Range network types may include but are not limited to – PAN, LAN, CAN, WLAN, MAN, WAN, SAN, POLAN, EPN, VPN; evidence of five is required.

1.2 Describe network topologies and their applications.

Range topologies may include but are not limited to – bus, star, tree, mesh, token ring; evidence of three is required.

1.3 Describe system interfaces, explain how they work and identify the nature of the interface signals.

Range interfaces may include but are not limited to – hardware, human, electronic, optical, signal; evidence of three is required.

1.4 Describe typical configuration requirements for network systems.

Range description includes how the configuration is carried out; evidence of three is required.

1.5 Describe the use of test equipment required to take measurements, and perform adjustments in terms of configuration, commissioning, performance and restoration of operation of systems and hardware.

1.6 Identify hazards associated with installing or servicing systems and interfaces, and outline relevant safety procedures.

Outcome 2

Read and interpret electrical diagrams to describe structured cabling systems functions.

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Performance criteria

2.1 Describe structured cabling systems functions using electrical diagrams.

Range diagrams may include but is not limited to – block diagrams, functional flow block diagrams, signal flow graph, schematic; evidence of three different systems using at least two types of diagrams is required.

2.2 Explain the function and theory of operation of an identified segment or section.

2.3 Describe the expected values and identify the test points for expected signals associated with an identified segment or section.

2.4 Identify faults for a segment or section and describe symptoms for the fault conditions in terms of expected changes to signals attributable to the fault.

2.5 Describe the operation of equipment associated with the network systems.

Range evidence of associated equipment relevant to two systems is required.

2.6 Describe the expected measurements at given points of the associated equipment described for the network systems.

Outcome 3

Demonstrate knowledge of cables and connections used in structured cabling systems.

Performance criteria

3.1 Compare and contrast the types of cables used to form a network.

Range may include but is not limited to – construction, application, installation requirements, performance, interface between cable types.

3.2 Compare categories of Ethernet cables in terms of application and performance.

Range may include but is not limited to – Cat 5, Cat 5e, Cat 6, Cat 6a, crossover.

3.3 Describe the pinout and wiring when using Cat 5 and Cat 5e cabling.

3.4 Compare T568A and T568B colour codes for RJ45 modular plugs in terms of pinout.

Outcome 4

Demonstrate knowledge of associated equipment used with network systems.

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Performance criteria

4.1 Explain the operation of common interfacing methods used with the associated equipment in terms of method and expected data transfer.

Range method of data transfer may include but is not limited to – serial communications, parallel communications, wireless communications, IR communications, d.c. voltage control, a.c. voltage control, variable frequency control;
evidence of four types of interfaces is required.

4.2 Describe features and specifications of the identified interfaces between the associated equipment and the network systems.

4.3 Describe common human interface systems in terms of type, user friendliness, and reliability.

4.4 Identify typical faults in associated equipment, and describe typical symptoms for fault conditions in terms of expected changes to signals and voltages attributable to the fault.

Outcome 5

Demonstrate knowledge of the impact of an emerging or converging technology on network systems.

Performance criteria

5.1 Describe an emerging or converging technology that may impact on existing systems or hardware with reference to purpose, facilities or services offered.

Range selected technology should be one applicable to the New Zealand environment.

5.2 Explain how the emerging or converging technology will impact upon or integrate with existing technologies.

Range may include but is not limited to – customer benefit, business efficiencies, competitive advantage.

Outcome 6

Describe professional development opportunities regarding new technologies for structured cabling systems.

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Performance criteria

6.1 Describe professional development opportunities regarding new technologies in New Zealand.

Range may include but is not limited to – conferences, trades shows, internal and external training courses, product courses, meetings, books, brochures, manuals, surveys, webinars; evidence of three is required.

Planned review date	31 December 2027

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 January 2020	N/A
Rollover and Revision	2	28 August 2025	N/A

Consent and Moderation Requirements (CMR) reference	0120

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@waihangaararau.nz if you wish to suggest changes to the content of this unit standard.

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