

Title	Demonstrate knowledge of complex networks in telecommunications		
Level	4	Credits	20

Purpose	<p>This standard is intended for technicians who work on complex telecommunications networks.</p> <p>People credited with this unit standard are, for complex networks in telecommunications, able to demonstrate knowledge of: components; electrical principles; technologies and architectures; and TCP/IP networks.</p>
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Classification	Telecommunications > Telecommunications - Service Delivery
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Available grade	Achieved
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Guidance Information

- 1 Learning and assessment within this unit standard must be carried out in accordance with the following legislation, guidelines, and codes of practice, as relevant to role, and any subsequent amendments:
 - New Zealand Telecommunications Forum Inc., Customer Complaints Code, available from <https://www.tcf.org.nz/industry/resources/publications/industry-standards-guides/>;
 - Health and Safety at Work Act 2015;
 - Privacy Act 1993;
 - Resource Management Act 1991;
 - Telecommunications Act 2001, all available from <http://legislation.govt.nz/>.
- 2 Definitions

Complex refers to three or more components and/or services used together in networks or enterprise solution systems.

Industry practice refers to practices that competent technicians within the industry recognise as current industry best practice.

TCP/IP network refers to Transmission Control Protocol/Internet Protocol network.
- 3 For the purpose of this unit standard, assessment can take place in a core network, access network, or wireless technology telecommunications work environment.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of components of complex networks in telecommunications.

Performance criteria

- 1.1 Telecommunications hardware and services are explained in terms of the Open Standard Interface (OSI) model and applications network.
- 1.2 Transmission media employed in telecommunications is explained in terms of the general characteristics and applications.
- 1.3 Digital and analogue data transmission is explained in terms of bandwidth requirements, latency, errors, noise tolerance, cross talk and impedance matching.
- 1.4 Network services and network topologies are explained in accordance with industry practice.
- 1.5 A digital network is explained in terms of components.

Range services provided, equipment, multi-plexing functions and features, operation.
- 1.6 A TCP/IP network is explained in terms of hardware, configuration, interface, functions and features.

Outcome 2

Demonstrate knowledge of electrical principles of complex networks in telecommunications.

Performance criteria

- 2.1 Electrical conductors, insulators and semiconductors are explained in terms of atomic structure, use, insulator materials, resistance, and cable length.
- 2.2 Electromotive force is explained in terms of achieving the relative magnitude of the voltage produced and method of generation.
- 2.3 Batteries are explained in terms of electrical principles, applications, and safety requirements.
- 2.4 Construction and operation of the battery back-up system is explained in terms of industry practice.
- 2.5 Magnets and magnetism are explained in terms of applications, alternative and direct current, magnetic field, use in devices, and the transformer principle.
- 2.6 The purpose and application of magnetic screening are explained in terms of protecting sensitive meters and circuitry from magnetic interference.
- 2.7 Resistors and capacitors are explained in terms of construction, symbols, markings, connections, and applications.

- 2.8 Charged capacitors are explained in terms of safety precautions to prevent electric shock.
- 2.9 Semi-conductor diodes are explained in terms of type, terminals, behaviours, related terminology, and applications.
- 2.10 Diode testing is explained in terms of industry practice, interpreting results and potential for damage.

Outcome 3

Demonstrate knowledge of technologies and architectures for complex networks in telecommunications.

Performance criteria

- 3.1 The New Zealand transmission system is explained in terms of power station to consumer, and in accordance with industry practice.
- 3.2 Technologies and architectures for complex networks are explained in terms of function and operation, network configurations and network addresses.
- 3.3 Technologies and architectures for complex networks are explained in terms of connectivity.
- 3.4 Technologies and architectures to provide complex network services are explained in terms of specialist service entrance equipment and termination practices.
- Range cable management, frames, cabinets, enclosures and terminals.
- 3.5 Complex network technologies are explained in terms of methods of providing redundancy.
- 3.6 Complex network technologies are explained in terms of their use in cellular radio systems.

Outcome 4

Demonstrate knowledge of TCP/IP networks for complex networks in telecommunications.

Performance criteria

- 4.1 The hardware to permit connection to an existing network is explained in terms of features provided.
- Range hardware may include but is not limited to – router, switch, hub, wireless, modem, access point.

- 4.2 Configuration of TCP/IP hardware to permit connection to an existing network is explained in terms of industry practice.
- Range hardware may include but is not limited to – IPv4, IPv6, address, netmask, subnet prefix, gateway, DNS server, DHCP, MAC address, WEP, WPA, SSID.
- 4.3 Physical data interfaces used for IP connections are identified in terms of connector used, application and transfer speeds.
- Range interfaces may include but are not limited to – RJ11, RJ45, LC, SC, USB, DB9, DB25, GE, SFP port.
- 4.4 IP addresses are described in terms of host and network portions for a given netmask (IPv4) or subnet prefix (IPv6).
- 4.5 Network Address Translation is described in terms of the function of a border router.
- 4.6 Methods for establishing communication with equipment behind a firewall are described in terms of fixed IP, port forwarding, and IP forwarding.

Planned review date	31 December 2023
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 May 2019	N/A

Consent and Moderation Requirements (CMR) reference	0101
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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 Connexis Infrastructure ITO qualifications@connexis.org.nz if you wish to suggest changes to the content of this unit standard.