Title	**Explain telecommunications transmission systems, services and network measurements**		
Level	**3**	**Credits**	**15**

Purpose	This unit standard is intended for people who require basic knowledge of telecommunications transmission networks. People credited with this unit standard are able to explain: – telecommunications bearer systems – the effects of electrical characteristics on a transmission circuit – transmission network measurements and their application in transmission networks – transmission control protocol internet protocol (TCP/IP) use and Ethernet in transmission networks.

Classification	Telecommunications > Telecommunications - Service Delivery

Available grade	Achieved

Guidance Information

1 Learning and assessment within this unit standard must be carried out in accordance with the following:
- Electricity Act 1992
- Health and Safety at Work Act 2015
- Privacy Act 2020
- Resource Management Act 1991
- Telecommunications Act 2001
- Building Regulations 1992, all available from http://legislation.govt.nz/
- New Zealand Telecommunications Forum Inc., Customer Complaints Code, available from https://www.tcf.org.nz/industry/resources/publications/industry-standards-guides/
- New Zealand Electrical Codes of Practice, available from www.worksafe.govt.nz and all subsequent amendments and replacements.

2 Definitions
Basic knowledge refers to some operational and theoretical knowledge of the subject matter to interpret available information.
TCP/IP network refers to Transmission Control Protocol/Internet Protocol network.

Outcomes and performance criteria

Outcome 1

Explain telecommunications bearer systems.

Performance criteria

1.1 The characteristics and limitations of copper cable are explained in terms of their use in the plain old telephone systems (POTS), digital subscriber line (xDSL), and pulse code modulation (PCM) systems.

Range characteristics and limitations include – line constants, typical impedance, variation of loss with distance and conductor size, maximum effective distance, effect of cable multiples, electrical interference.

1.2 The operation of a digital subscriber line systems (xDSL) is explained in terms of the principles.

Range asynchronous digital subscriber line (ADSL), very high-speed digital subscriber line (VDSL).

1.3 The PCM bearer system is explained in terms of principles and practices.

Range line signal protocols, line terminal equipment, power feeding equipment, regeneration, permissible error rates, crosstalk limitations, distance limitations.

1.4 Major functions of a New Zealand digital fibre transport system are explained in terms of its operation.

Range course wavelength division multiplexing (CWDM), dense wavelength division multiplexing (DWDM), synchronous digital hierarchy (SDH), plesiochronous digital hierarchy (PDH).

Outcome 2

Explain the effects of electrical characteristics on a transmission circuit.

Performance criteria

2.1 Electrical characteristics are explained in terms of the effect on transmission systems and services.

Range cable pair resistance, capacitance and attenuation.

2.2 Ways to address the effects of electrical characteristics are explained in terms of logical and standard practices.

2.3 The effects of electrical characteristics on a transmission circuit transported on a copper cable are explained using a visual representation.

Outcome 3

Explain transmission network measurements and their application in transmission networks.

Performance criteria

3.1 Common transmission network measurement are explained in terms of the type and units of measurement.

3.2 Non-standard or out of range test results for transmission network measurements are explained in terms of why they are caused.

3.3 Acceptable ranges and variations for each type of transmission network measurements are explained in terms of the tolerances allowed.

Outcome 4

Explain transmission control protocol internet protocol (TCP/IP) use and Ethernet in transmission networks.

Performance criteria

4.1 Protocols used in core networks are explained in terms of their use.

Range TCP/IP, Ethernet, TCP, user datagram protocol (UDP), broadcast.

4.2 Hardware used in TCP/IP and Ethernet networks is explained in terms of the function.

Range Router, Switch, Hub, wireless access point (WAP).

4.3 Software used to configure transmission hardware is explained in terms of the relevant features.

Range craft terminal, telnet, secure shell protocol (SSP), file transfer protocol (FTP), web interface.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 October 2019	N/A
Rollover and Revision	2	25 January 2024	N/A

Consent and Moderation Requirements (CMR) reference	0101

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.