

Title	Demonstrate and apply advanced knowledge of local computer network engineering principles		
Level	6	Credits	15

Purpose	<p>This unit standard covers advanced knowledge of local area networks using routers, switches and hubs to provide a complex network.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – apply VLSM to a network; – use intermediate network routing protocols; – use a CLI to configure Ethernet switches; – demonstrate knowledge of and create VLANs; and – demonstrate the use of STP and VTP in networks.
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Classification	Electronic Engineering > Computer Engineering
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Available grade	Achieved
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Prerequisite	Unit 22717, <i>Demonstrate and apply intermediate knowledge of computer network engineering principles</i> , or demonstrate equivalent knowledge and skills.
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Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level.
- 2 This unit standard is one of four designed to cover knowledge of computer network engineering principles, the others being Unit 22712, *Demonstrate and apply introductory knowledge of computer network engineering principles*; Unit 22717, *Demonstrate and apply intermediate knowledge of computer network engineering principles*; and Unit 16989, *Describe and apply advanced knowledge of computer network engineering techniques to set up a WAN*.
- 3 References
CCNA 3 and 4 Companion Guide (Cisco Networking Academy Program), 3rd Edition, Cisco Systems, Inc., ISBN: 1587131137;
Switching Basics and Intermediate Routing CCNA 3 Companion Guide, Wayne Lewis, ISBN: 1587131706;
 Health and Safety at Work Act 2015;
 and all subsequent amendments and replacements.

4 Definitions

Advanced knowledge – means employing specialised knowledge, with depth in more than one area of the subject matter, to analyse, reformat, and evaluate a wide range of information.

CLI – command line interface.

EIGRP – enhanced interior gateway routing protocol.

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

ISL – interswitch link.

LAN – local area network.

OSPF – open shortest path first.

RIP Ver. 2 – internet routing.

STP – spanning tree protocol.

VLAN – virtual LAN.

VLSM – variable length subnet masking.

VTP – VLAN trunk protocol.

5 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.

6 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.

7 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 observed at all times.

Outcomes and performance criteria

Outcome 1

Apply VLSM to a network.

Performance criteria

1.1 Subnets are calculated and configured using VLSM in accordance with industry practice.

Range when to use, calculations, route aggregation, configuration.

Outcome 2

Use intermediate network routing protocols.

Performance criteria

2.1 A router is configured using intermediate routing protocols in accordance with industry practice.

Range RIP Ver. 2, single-area OSPF, EIGRP.

Outcome 3

Use a CLI to configure Ethernet switches.

Performance criteria

- 3.1 Ethernet switches are configured and tested in accordance with industry practice.
- 3.2 The LAN is tested in accordance with industry practice to confirm correct configuration of the switches.

Outcome 4

Demonstrate knowledge of and create VLANs.

Performance criteria

- 4.1 VLAN concepts are identified and configurations are explained in accordance with industry practice.
- Range may include but is not limited to – IEEE802.1q VLAN trunk protocol, ISL VLAN trunk protocol, router on a stick, static VLANs, geographic VLANs.
- 4.2 A router and switches are configured to create multiple VLANs in accordance with industry practice.
- 4.3 VLAN troubleshooting techniques are demonstrated in accordance with industry practice.
- Range may include but is not limited to – show VLAN configurations, VTP configurations.

Outcome 5

Demonstrate the use of STP and VTP in networks.

Range evidence of three networks is required.

Performance criteria

- 5.1 Network of at least three switches with at least three VLANs are configured and commissioned using STP and VTP in accordance with industry practice.
- Range STP, rapid STP, selecting root bridge, VTP client and server configurations.

This unit standard is expiring. Assessment against this standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 February 1998	31 December 2021
Revision	2	12 December 2000	31 December 2021
Review	3	18 December 2006	31 December 2021
Rollover and Revision	4	28 June 2018	31 December 2021
Review	5	28 January 2021	31 December 2021

Consent and Moderation Requirements (CMR) reference

0003

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