

Title	Describe and apply advanced knowledge of computer network engineering techniques to set up a WAN		
Level	6	Credits	15

Purpose	<p>This unit standard covers the configuration and setting up of wide area networks (WANs) including the setting up of routers to interface to a WAN.</p> <p>People credited with this unit standard are able to demonstrate and apply knowledge of:</p> <ul style="list-style-type: none"> – NAT, PAT, and DHCP engineering; and – PPP, ISDN, DDR, and FR engineering technologies to networks.
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Classification	Electronic Engineering > Computer Engineering
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Available grade	Achieved
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Prerequisites	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 11583, *Demonstrate and apply advanced knowledge of local computer network engineering principles*.
- 3 References
CCNA 3 and 4 Companion Guide (Cisco Networking Academy Program), 3rd Edition, Cisco Systems, Inc., ISBN: 1587131137;
WAN Technologies CCNA 4 Companion Guide, Allan Reid, ISBN: 1587131722;
 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.

ARP – address resolution protocol.

BRI – Basic Rate Interface.

DDR – dial-on-demand routing.

DHCP – dynamic host configuration protocol.

FR – frame relay.

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

ISDN – integrated services digital network.

LMI – Local Management Information.

NAT – network address translation.

PAT – port address translation.

PPP – point-to-point 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 to be observed at all times.

Outcomes and performance criteria

Outcome 1

Demonstrate and apply knowledge of NAT, PAT, and DHCP engineering.

Performance criteria

- 1.1 Concepts, applications, and technologies of NAT, PAT, and DHCP are explained in accordance with industry practice.
- 1.2 NAT and PAT are configured on a router in accordance with industry practice.
- 1.3 DHCP is configured and verified in accordance with industry practice.
Range DHCP configuration, DHCP relay.

Outcome 2

Demonstrate and apply knowledge of PPP, ISDN, DDR, and FR engineering technologies to networks.

Performance criteria

- 2.1 Concepts of PPP, ISDN, DDR, and FR technologies are explained and applications identified in accordance with industry practice.

- 2.2 Routers and workstations are configured to use the PPP technology in accordance with industry practice.
- 2.3 ISDN and DDR are configured on two routers in accordance with industry practice.

Range may include but is not limited to – BRI ISDN, static routes, intersecting traffic.

- 2.4 FR is configured on two router interfaces in accordance with industry practice.

Range may include but is not limited to – inverse ARP and LMI, basic FR, static FR map, subinterfaces.

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	27 April 2000	31 December 2021
Review	2	18 December 2006	31 December 2021
Rollover and Revision	3	28 June 2018	31 December 2021
Review	4	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>.