Qualification details

Qualification number/Te nama o te tohu mātauranga	2600
English title/Rā whakamutunga kia uru ki ngā hōtaka	New Zealand Diploma in Networking (Level 6)
Māori title/Rā whakamutunga mō te aromatawai	

Version number/Te putanga	2	**Qualification type/Te momo tohu**	Diploma
Level/Te kaupae	6	**Credits/Ngā whiwhinga**	120

NZSCED/Whakaraupapa	020113 Information Technology > Computer Science > Networks and Communications
Qualification developer/Te kaihanga tohu	IT Professionals New Zealand (ITP) and NZQA National Qualifications Services
Review Date /Te rā arotake	N/A

This qualification has been reviewed and will be replaced.

Outcome statement/Te tauāki ā-hua

Strategic Purpose statement/ Te rautaki o te tohu

The purpose of this qualification is to provide Aotearoa New Zealand with people who have attained IT knowledge and specialist professional and technical skills in networking. It will prepare people to enter employment in roles such as a network professional in a service environment, or to proceed to further study.

Graduates will be capable of configuring, maintaining and monitoring networks, using internationally relevant skills and knowledge.

Graduates will also be able to operate within the applicable professional standards and practice, both independently and as part of a team, and may demonstrate self-management and some responsibility for the performance of others.

Businesses, organisations and communities will benefit from having IT Professionals who are qualified in the management of networks, in all sectors of the economy and society.

Graduate Profile/Ngā hua o te tohu

Graduates will be able to:

Technical Skills:

- Apply advanced wireless and switching configuration and troubleshooting techniques to resolve switching and routing issues for organisational networks.

- Apply routing configurations and troubleshooting techniques to implement and maintain networks.

- Analyse the impact of convergence on network infrastructure and implement unified communications to maintain acceptable organisation service levels.

- Apply specialised knowledge of networking protocols and technologies to configure, maintain and monitor networks.

- Analyse and implement advanced network security to protect and secure assets and to meet best practice and organisational requirements.

- Analyse networking performance scenarios and recommend remedial actions to maintain acceptable organisation service levels.

- Analyse and document requirements for routing, switching and server infrastructure to support IT infrastructure planning.

- Apply IT service management and change management processes and procedures to comply with organisational requirements.

Core Skills:

- Behave with integrity as a responsible Information Technology professional, to contribute positively to society.

- Apply communication, information design, personal, and interpersonal skills, clearly and professionally to enhance working effectiveness, efficiency, and quality outcomes in an organisational environment.

- Apply project management tools and techniques to an IT related project, to analyse and solve problems.

Education Pathway/ Ngā huarahi mātauranga

This qualification provides a pathway to further specialisation through industry specific training, for example, IT Security.

Other possible pathways include degree qualifications and this qualification may also equip learners to attempt optional industry certifications at the appropriate level and area of specialty.

This qualification provides an education pathway from:
- New Zealand Diploma in Information Technology Technical Support (Level 5) [Ref: 2596]

Employment, Cultural, Community Pathway/ Ko ngā huarahi ā-mahi, ā-ahurea, ā-whānau, ā-hapū, ā-iwi, ā-hapori anō hoki

Graduates of this qualification will have the skills and knowledge to gain employment in roles such as IT technician, service desk, desktop support, or entry level network administrator, network engineer, or network support roles.

Graduates also have the background to progress into more advanced roles including network engineer, manager or analyst.

Qualification Specifications/ Ngā tauwhāititanga o te tohu

Qualification Award/ Te whakawhiwhinga o te tohu	This qualification may be awarded by any education organisation with an approved programme towards this qualification accredited under section 250 of the Education Act 1989.
	The graduate will be awarded the qualification by the education organisation when the accredited and approved programme has been successfully completed.
	The formal document certifying the award of this qualification will display the full qualification title, date of award, the NZQF logo and may also include the name and/or logo of the qualification developer or programme owner or other awarding education organisation.
Evidence requirements for assuring consistency/ Ngā taunaki hei whakaū i te tauritenga	New Zealand qualifications can be obtained through different programmes, pathways, and education organisations. The process of 'assuring national consistency of graduate outcomes' will be coordinated by NZQA, with a focus on comparing graduates from different programmes and education organisations in relation to the qualification graduate outcomes.
	All programme owners and education organisations arranging training or delivering approved programmes leading to the qualification must engage with arrangements for assuring consistency, including participating in the relevant consistency review event and covering actual and reasonable related costs.
	Detailed information regarding arrangements for managing consistency will be published and updated via the NZQA website. For more information please visit: https://www.nzqa.govt.nz/providers-partners/consistency-grad-outcomes/ and download the guidelines.
	Evidence for consistency
	Each education organisation is responsible for preparing a summary self-assessment report which uses evidence to demonstrate how well its graduates meet the graduate profile outcomes at the appropriate threshold. Each education organisation decides what specific evidence it will provide.
	The core evidence requirements for assuring consistency **must** include:
	• Effective internal and external moderation systems and processes, including results relating to graduate outcomes. This may also include evidence of meeting requirements for external industry certifications and associated consistency demands where appropriate. e.g. Certified/Authorised Partner Program (such as Microsoft, CompTIA, etc.)
	• Results of end-user surveys and actions taken or proposed from feedback. This includes

consultation with graduates and employers to obtain destination information and end- user feedback specifically assessing the graduates against the graduate profile (e.g. employment, progression, further study)

- Samples of assessment materials and learners assessments/work (e.g. portfolios of work)

- Relevant External Evaluation and Review (EER) data, including programme/qualification completion data and course results

- Comparison of the application of credit transfer and recognition of prior learning arrangements to graduate outcomes and/or qualifications

- Documenting any action taken to improve quality and consistency of assessment.

The core evidence requirements for assuring consistency may include:

- Consultation with graduates and employers to obtain destination information and end-user feedback (e.g. employment, progression, further study)

- Evidence of any benchmarking activities.

- Consideration of internal quality assurance processes and external reviews, including relevant feedback from programme developers (i.e. may include reviewing, comparing, and evaluating the assessment process, tools and evidence contributing judgements made by a range of assessors against the same graduate outcomes; evidence of appropriate skills and knowledge of staff in relation to the teaching and assessment).

Minimum standard of achievement and standards for grade endorsements/ Te pae o raro e tutuki ai, ngā paerewa hoki hei whakaatu i te taumata o te whakatutukinga	The minimum standard of achievement required for the award of the qualification will be the achievement of all the graduate outcomes in the graduate profile. There are no grade endorsements for this qualification.
Other requirements for the qualification (including regulatory body or legislative requirements)/ Kō ētahi atu here o te tohu (tae atu hoki ki ngā here ā-hinonga whakamarumaru, ki ngā here ā-ture rānei)	***Entry requirements*** Learners enrolling are recommended to hold the New Zealand Diploma of Information Technology Technical Support (Level 5) [Ref: 2596], or equivalent knowledge, skills and experience. International students must have an appropriate level of English proficiency for the level at which they intend to study. Details of English language entry requirements are contained in the NZQF Programme Approval and Accreditation Rules 2013 (Appendix 2). E.g. IELTS Academic score of 6, with no band score lower than 5.5; or the New Zealand Certificate in English Language (Academic) (Level 5) [Ref: 1884].

General conditions for programme/ Ngā tikanga whānui o te hōtaka	**Conditions for programme structure**
	This qualification includes the common core of Level 6 skills and builds on the generalist IT Technical skills developed at Level 5, or equivalent relevant experience.
	Programmes towards this qualification will be designed for those seeking to develop and apply skills in networking, which may include a focus on managing virtual networks and providing a service environment.
	Programmes developed may include creating and managing protected networks across disparate cloud services, managing virtual networks across organisational boundaries and securing these between on-premise and cloud-based platforms.
	Professional practice must be an integral part of the curriculum and delivery. It is expected that all programmes have professionalism both purposefully taught and integrated with technical content. Here, professional practice includes the 'soft skills' of communication, team work, interpersonal skills, and ethical principles.
	Programmes must reflect industry best practice and maintain currency with amendments to, and replacements of, relevant legislation, regulations, Australia/New Zealand standards (AS/NZS), and security responsibilities.
	• Current legislation and regulations can be accessed at http://legislation.govt.nz
	• Current AS/NZS standards can be accessed at http://standards.co.nz
	• The *Information Technology Code of Practice - Guidelines of good and acceptable practice for IT professionals and organisations operating in New Zealand* can be accessed at http://iitp.nz/about/ethics, as can the Code of Professional Conduct.
	Conditions for programme context
	Learners are expected to adhere to professional standards for networking including documentation with version control. Where applicable, testing and troubleshooting will be applied throughout programme teaching and assessment, along with adhering to best practices that ensure consistency between systems, resiliency and clear documentation. For all routing protocols and management considerations, internet protocols IPv4 and IPv6 should be applied.
	Programme design, delivery, and assessment, where applicable, will be conducted in and for the context of real or realistic organisations and/or settings; and be

relevant to current and/or emerging practice. Programme design and delivery is expected to allow for multiple contexts and keep up with network paradigm changes.

Programmes leading to the award of this qualification must identify the context, and must justify the allocation of credits to graduate profile outcomes within the programme, in light of the requirements of the context and conditions.

The graduate's capabilities must clearly align with the definition of a Level 6 graduate on the NZQF. See the NZQF level descriptors for further information. All programmes are to be developed with level 6 descriptors in mind – specialised technical knowledge and skills in a field of work, applied in specialised/strategic contexts.

Consideration should be given to bicultural, multicultural, and gender issues when designing programmes, in relation to encouraging a greater diversity within the professional IT workforce.

Programmes may be developed based on Māori principles and values, and are intended to enable Wānanga to meet obligations under the Education Act (1989, section 162(4)(b)(iv)).

Other conditions

Some programme content could also be aligned with industry certifications.

There is a preference for including open and vendor neutral standards, protocols and technologies where possible.

Glossary:

- Authentication, Authorising and Accounting (AAA) – a framework for intelligently controlling access to computer resources, enforcing policies, auditing usage, and providing information necessary to bill for services

- Access Point (AP) – a device that allows devices to connect to a network

- Cloud services/cloud based platforms – A cloud platform is offered by a service provider as a hosted service. A cloud service is the general term for the delivery of hosted services provided over the Internet, rather than maintaining infrastructure.

- Internet protocols version 4 or 6 (IPv4/IPv6:) – the communications protocol that provides and identification and location system for devices requiring sender and receiver numeric addresses

- Intrusion prevention systems (IPS) – network security appliances

	- Information Technology (IT) – the common term for the entire spectrum of technologies for information processing and related to computing technology, such as networking, hardware, software, the internet or the people that work these technologies
	- Information Technology Infrastructure Library (ITIL) – a set of practices for IT service management
	- Local Area Network (LAN) – is a computer network that interconnects computers within a limited area such as home, school, or office
	- Network Address Translation (NAT) – provides a method of modifying network address information in IP, and represents how easily your device can talk to other devices across the internet
	- Networking: a computer or data network; the study and application of technical knowledge and skill to design, build, support, and manage infrastructure to connect computing devices which enables resource sharing and exchange of data
	- Network Time Protocol (NTP) – a networking protocol for clock synchronization between computer systems over packet-switched variable latency data networks
	- Open Systems Interconnection (OSI) – a standard for worldwide communications that defines a networking framework for implementing protocols in seven layers
	- Port Address Translation (PAT) – an extension of Network Address Translation (NAT), which allows a single public IP address to be used by many hosts within a private network
	- Quality of Service (QoS) – the overall performance of a telephony or computer network, particularly the performance seen by the users of the network.
	- Simple Network Management Protocol (SNMP) – protocol for network management, used to collect information from, and configuring network devices such as servers, printers, hubs, switches, and routers on an Internet Protocol (IP) network
	- Secure Shell (SSH) – cryptographic network protocol for secure data communication, remote command-line login, remote command execution and other secure network services between two networked computers
	- Syslog – a standard for computer system

- message logging – permits separation of the software that generates messages from the system that stores them and the software that reports and analyses them

- Virtualisation: the act of creating a 'simulated' rather than 'real' version of something, such as server, storage device or network resource.

- Virtual Local Area Network (VLAN) – a logical (as opposed to physical) local area network (LAN) that extends beyond a single traditional LAN to a group of LANs, which is created and configured completely in software

- Voice over IP (VOIP) – group of technologies for the delivery of voice communications and multimedia session over Internet Protocol (IP) networks such as the internet

- Virtual Private Network (VPN) – extends a private network across a public network such as the internet

- Wide Area Network (WAN) – a computer network that covers a broad area using media such as telephone lines, fibre-optic cable, microwaves, or radio waves, to span large distances such as across a city, or around the world

- Wireless Access Point (WAP) – a device which enables wireless devices to connect to a wired network (see AP)

- Wireless local area network (WLAN) – a wireless computer network that links two or more devices using a wireless distribution method within a limited area such as home, school, or office building

- Wireless LAN Controller (WLC) – a device that assumes a central role in a unified wireless network association, such as authentication of wireless clients

Conditions relating to the Graduate Profile /Ngā tikanga e hāngai ana ki nga hua o te tohu

Qualification outcomes/ Ngā hua	Credits/Ngā whiwhinga	Conditions/Ngā tikanga
Technical Skills (90 credits)		
1. Apply advanced wireless and switching configuration and troubleshooting techniques to resolve switching and routing issues for organisational networks.	20	Programmes must include areas such as: - Configuring and comparing various solutions to resolve issues with redundant switch topologies; - Traffic isolation - Configuring VLANs, trunking, and link aggregation using appropriate protocols; - Configuring Open Systems Interconnection (OSI) Layer 3 switches to provide both

			routing and switching services; - Configuring lightweight wireless access points (WAP) and wireless LAN controller (WLC) devices using a variety of methods.
2.	Apply routing configurations and troubleshooting techniques to implement and maintain networks.	15	Programmes must include contextually appropriate content such as: - Static and default routing techniques; - Commonly used dynamic routing protocols in the LAN and WAN environment; - Redistribution of LAN and WAN protocols; - Virtual private networks (VPNs) including tunnelling techniques.
3.	Analyse the impact of convergence on network infrastructure, and implement unified communications to maintain acceptable organisation service levels.	15	Programmes must include relevant contemporary convergence and unified communications content such as: - Voice over IP (VOIP), messaging, tele-presence, voicemail, end points; - Quality of Service (QoS) implementations on converged networks; - Enabling features such as extension mobility, intercom, and call coverage; - Generating and monitoring usage and capacity reports.
4.	Apply specialised knowledge of networking protocols and technologies to configure, maintain and monitor networks.	10	Programmes must include current and emerging networking protocols and technologies used in industry (such as LAN, WAN, WLAN).
5.	Analyse and implement advanced network security to protect and secure assets and to meet best practice and organisational requirements.	10	Programmes must include contextually relevant routing and security-related content: - Common security threats, attack vectors, and applying mitigation techniques such as Authentication, Authorising and Accounting (AAA) and lockdown security on network devices - Configuring, monitoring and troubleshooting traffic filtering to mitigate threats in the network; - Configuring firewalls and implementing various forms of Network Address Translation (NAT), Port Address Translation (PAT), Port overloading techniques
6.	Analyse networking performance scenarios and recommend remedial actions to maintain acceptable organisation service levels.	10	Programmes must include: contextually appropriate network content such as - Analyse and resolve performance issues at layers 1, 2 and 3 for routing, switching, and wireless, using recognised troubleshooting techniques; - Network monitoring, data collection and automated response using tools such as syslogs, and protocols such as SSH, NTP, SNMP, and IPS.

7.	Analyse and document requirements for routing, switching, and server infrastructure to support IT infrastructure planning.	5	Programmes must include contextually relevant infrastructure content such as: - Multiple LANs and WANs; - Network architectures, such as borderless networks, data centre virtualisation, and other modular solutions; - Creating technical network documentation.
8.	Apply IT service management and change management processes and procedures to comply with organisational requirements.	5	Programmes must include: - Reference to industry standard frameworks such as ITIL; - Licensing and compliance, as well as concepts related to business continuity in an IT context.
Core Skills (30 credits)			
9.	Behave with integrity as a responsible Information Technology professional, to contribute positively to society.	10	Programmes must include: - Application of professional and ethical practice, including sustainability, equity, social and contemporary cultural issues relevant to an IT organisational environment (e.g. Treaty of Waitangi and accessibility issues) - Organisational implications of managing and complying with legal and regulatory requirements (e.g. health and safety, contract management, licensing, privacy); observing security responsibilities and industry codes of practices, and codes of conduct (e.g. IITP), relevant to an organisational environment.
10.	Apply communication, information design, personal, and interpersonal skills, clearly and professionally to enhance working effectiveness, efficiency, and quality outcomes in an organisational environment.	10	Programmes must include: - Information representation design for multiple situations e.g. data visualisation; technical writing - help documents, user instructions, specifications; - Personal and interpersonal skills including customer service, leadership, teamwork, negotiating, self-management, social and multicultural awareness, relationship and conflict management.
11.	Apply project management tools and techniques to an IT related project, to analyse and solve problems.	10	Programmes must include: - Critical thinking, business logic, organisational processes, innovation and enterprise skills; - Project planning, management and control – cost, risk, quality, stakeholder, change, configuration, contracts, and maintenance management.

Transition information/ He kōrero whakawhiti

Replacement information/ He kōrero mō te whakakapi	This qualification and the New Zealand Diploma in Systems Administration (Level 6) [Ref: 2601] were replaced by the:
	• New Zealand Diploma in IT Infrastructure (Level 6), with strands in Networking and Systems Administration [Ref: 4129].
Additional transition information/ Kō ētahi atu kōrero mō te whakakapi	**Version Information**
	This qualification was reviewed in May 2020 and was replaced. Please refer to Qualifications and Assessment Standards Approvals for further information.
	People currently enrolled in programmes leading to this qualification may either complete its requirements by **31 December 2023** or transfer to the appropriate strand in the replacement qualification.
	The last date for entry into programmes leading to this qualification is 28 February 2023.
	The last date for assessment of the qualification will be 31 December 2023, when the qualification will be discontinued.
	It is the intention of the qualification developers that no existing learner be disadvantaged by these transition arrangements.
	Any person who considers they have been disadvantaged may contact their provider or the Qualification Developers - IT Professionals NZ (info@itp.nz) or NZQA National Qualifications Services (nqs@nzqa.govt.nz).