Australian Government

Department of Education, Employment and Workplace Relations

ICTTEN4210A Implement and troubleshoot enterprise routers and switches

Release: 1

ICTTEN4210A Implement and troubleshoot enterprise routers and switches

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to implement and troubleshoot routers and switches. It involves configuring and programming routers and switches to establish voice and data services and applications over local area networks (LAN) and wide area networks (WAN) connections for enterprise networks.
	No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.

Application of the Unit

Application of the unit	This unit applies to medium to large enterprises requiring the use of internetwork services and applications. It also applies to networks employing virtual LAN (VLAN) connectivity and hierarchical addressing schemes and where access control will be used to achieve network security.
	Relevant job roles include installer of IP networks, enterprise network technician, network administrator and network support.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for implementation of network routers and switches	1.1. Prepare for given work according to occupational helath and safety (**OHS**) and **environmental requirements** with **appropriate personnel**
	1.2. Identify safety hazards and implement risk control measures in consultation with appropriate personnel
	1.3. Determine nature and scope of the network routers and network switches and **network resources** from job briefs or appropriate personnel
	1.4. Select and obtain network services and network application requirements according to **enterprise procedures**
	1.5. Obtain identified operating instructions, manuals, hardware and software testing methodologies
	1.6. Consult appropriate personnel to ensure the task is coordinated effectively with others involved at the worksite
2. Implement network switches and routers	2.1. Configure routers and switches according to manufacturer's specifications and enterprise procedures
	2.2. Determine **network addressing scheme** for network connectivity and verify using **calculations**
	2.3. Activate and verify network WAN links to provide network connectivity
	2.4. Enable **network services** and **network applications** to the network to complete network connectivity process
	2.5. Set up traffic access and filtering according to enterprise procedures
3. Troubleshoot network switches and routers	3.1. Monitor network performance and isolate faults using diagnostic and analysis tools
	3.2. Troubleshoot network and internet connectivity according to manufacturer's specifications and enterprise procedures
4. Document configuration and troubleshooting records	4.1. Restore work site to safe condition according to established safety procedures
	4.2. Record and store **essential implementation information** according to enterprise procedures
	4.3. Notify appropriate personnel about the completion of the task according to enterprise procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
- communication skills to liaise with technical staff   - literacy skills to read and interpret enterprise procedures, manuals and specifications   - numeracy skills to interpret technical data and perform calculations   - planning and organisational skills to plan and prioritise own work   - problem solving skills to: - deal with unexpected situations on the basis of safety and specified work outcomes   - troubleshoot common network problems   - safety awareness skills to: - apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities   - follow enterprise OHS procedures   - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment   - technical skills to :   - configure and activate network access and security measures   - configure switches and routers to enable LAN and WAN links   - connect enterprise networks using WAN services and applications   - connect the enterprise network to external services   - maintain enterprise network documentation   - troubleshoot network faults and implement recovery action   - use a hierarchical internet protocol (IP) network address scheme   - use tools and equipment to analyse enterprise network
Required knowledge
- access control lists   - correct use of tools and equipment   - enterprise: - features and applications   - OHS procedures   - record keeping procedures   - switching and routing protocols and strategies:

REQUIRED SKILLS AND KNOWLEDGE

- - hierarchical addressing
  - multilayer switching
  - routing protocols
  - VLAN routing
- implement enterprise WAN links
- network diagnostic and troubleshooting techniques
- network modelling

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: - determine customer networking requirements - configure routers and switches using hierarchical addressing over VLANs to meet network link requirements - enable and control access to network services and applications across the network - diagnose and rectify network hardware and device configuration faults - document configuration information, fault-finding history and remediation action.
Context of, and specific resources for assessment	Assessment must ensure: - a network facility and workstations - operating instructions, installation documents and manuals - hardware and software testing tools currently used in industry.
Methods of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: - direct observation of the candidate installing and troubleshooting routers and switches - review documentation of implementation and troubleshooting prepared by the candidate - oral or written questioning to assess required knowledge.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example with: - ICTTEN2207A Install and configure a home or small office network - ICTTEN2208A Install and configure a small to medium business network

EVIDENCE GUIDE	
	• ICTTEN2209A Build and maintain a secure network.
	Aboriginal people and other people from a non-English speaking background may have second language issues.
	Access must be provided to appropriate learning and assessment support when required.
	Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.
	In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.
	Where applicable, physical resources should include equipment modified for people with special needs.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
OHS may include:	• awards provisions • hazardous substances and dangerous goods codes • legislation • local safe operation procedures

RANGE STATEMENT

	• material safety management systems • protective equipment.
Environmental requirements may include:	• dust • excessive energy and water use • excessive noise • fumes • gas • liquid waste • smoke emissions • solid waste • vapour.
Appropriate personnel may include:	• customer • manager • network manager • site engineer • supervisor.
Network resources may include:	• domain name system (DNS) server • dynamic host configuration protocol (DHCP) server • files • software • web browser.

Enterprise procedures may include:	• instructions:
	  • designs
	  • drawings
	  • job sheets
	  • plans
	• manufacturer's specifications
	• operational procedures
	• reporting and communication
	• use of tools and equipment.

Network addressing scheme may include:	• dynamic • static • subnet.
Calculations may include:	• binary addition • binary conversion • binary division • binary multiplication • binary number system

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RANGE STATEMENT	
	• binary subtraction.
Network services may include:	• authentication servers
	• collaborative services
	• DHCP
	• directory services
	• DNS
	• email
	• network file system
	• printing
	• web services.
Network applications may include:	• media player
	• spreadsheet
	• word-processor.
Essential implementation information may include:	• fault history
	• installation software
	• IP addressing schemes
	• logical and physical diagrams
	• network administrator codes
	• network recovery actions
	• passwords
	• router configuration details
	• security access codes
	• switch configuration details.

Unit Sector(s)

Unit sector	Telecommunications

Co-requisite units

Co-requisite units	

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Competency field

Competency field	Telecommunications networks engineering

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