



Australian Government

Department of Education, Employment and Workplace Relations

ICANWK604A Plan and configure advanced internetwork switching solutions

Release: 1

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Modification History

Release	Comments
Release 1	This Unit first released with <i>ICA11 Information and Communications Technology Training Package version 1.0</i>

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to plan, configure and support advanced enterprise switching. The unit also covers secure integration of virtual local area networks (VLANs), wireless local area networks (WLANs), voice and video into campus networks.

Application of the Unit

This unit applies to an information and communications technology (ICT) network specialist, network engineer, network infrastructure engineer, senior network administrator, network and systems manager, ICT security specialist, security engineer, communications engineer, and communications manager.

Licensing/Regulatory Information

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.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Element	Performance Criteria
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>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.</i>

Elements and Performance Criteria

1. Plan, configure and test a VLAN-based solution	1.1 Determine network resources required for implementing a VLAN-based solution for a given network design and requirements 1.2 Produce an implementation plan and a verification plan for the VLAN-based network solution 1.3 Configure and verify switch-to-switch connectivity, loop prevention and access ports for the VLAN-based solution using network tools 1.4 Document results of the VLAN implementation and verification plans
2. Plan, configure and test a secure layer 2 network solution and a switch-based layer 3 services solution	2.1 Determine network resources required for implementing a secure layer 2 network solution and a switch-based layer 3 solution against vulnerabilities with organisational security policies 2.2 Produce an implementation plan and a verification plan for each of the layer 2 and layer 3 network solution 2.3 Configure and verify a private VLAN, and features for port security and general switch security for the layer 2 network solution using network tools 2.4 Configure and verify routing interfaces and layer 3 security for the switch-based layer 3 network solution using network tools 2.5 Document results of security implementation and verification plans for each of the layer 2 and the layer 3 network solution
3. Prepare infrastructure to support advanced services	3.1 Implement a wireless extension of a layer 2 solution 3.2 Implement a support solution for a voice over internet protocol (VoIP) and a video application
4. Plan, configure and test high-availability networks using multilayer switches solution	4.1 Determine network resources needed for implementing high-availability solution for a given network design and requirements 4.2 Produce an implementation plan and a verification plan for the high-availability network using multilayer switches 4.3 Configure, verify and manage first hop redundancy protocols (FHRP) 4.4 Implement switch supervisor redundancy and use network tools to verify the high-availability solution 4.5 Document results of high-availability implementation and verification plans

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- analytical skills to identify functional, performance and management features associated with the operation of complex switched networks
- communication skills to:
 - communicate complex concepts and issues technically and in plain language
 - liaise with diverse clients
- literacy skills to:
 - develop and prepare operational documentation, such as policies and procedures, and technical and management reports
 - interpret and prepare technical documentation
 - prepare project-management documentation
- problem-solving skills suitable for complex and dynamic environments with demanding service level
- technical skills to:
 - design, implement and maintain availability of complex switched networks to industry standards and best practice
 - identify viable complementary and emerging technologies
 - use network tools.

Required knowledge

- benefits of formal or structured approach to network management
- business justifications for having integrated and unified enterprise networks
- current wireless regulations, standards and certifications
- emerging viable business and social technologies
- external developments or factors that affect switched network design
- maintenance and management tools and practices suitable for complex networks to achieve availability and resilience
- network topologies
- organisational policies for internetworking
- risk management strategies and practices suitable for a complex switched network environment
- security for an enterprise-switched environment
- security standards and technologies for switched network environments
- switching and routing technologies for an enterprise-switched environment.

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: • design, configure and support advanced switched network infrastructure • implement wireless extension solution with multi-layered (layer 3) switches • prepare infrastructure to support advanced services • use network tools.
Context of and specific resources for assessment	Assessment must ensure access to: • site where network installation may be conducted • hardware and software • organisational guidelines • computers • LAN and WAN systems, including voice and video (hardware or software) • appropriate learning and assessment support when required • modified equipment for people with special needs.
Method 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, configuring and testing a new or updated network • evaluation of documentation prepared by the candidate outlining testing procedures, test results, recommendation to network changes and completion records • verbal or written questioning of required knowledge.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate. Assessment processes and techniques must be culturally appropriate, and suitable to the communication skill level, language, literacy and numeracy capacity of the candidate and the work being performed. Indigenous people and other people from a non-English speaking background may need additional support.

	In cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.
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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.

Network may include:	- integrated network - internet - intranet - local area network (LAN) - router-based network - switch-based network - virtual private network (VPN) - wide area network (WAN) - WLAN.
Network tools may include:	- baseline network - bridge protocol data unit (BPDU) guard - debug commands - port analysers: - remote switched port analyser (RSPAN) - switched port analyser (SPAN) - virtual local area network switched port analyser (VSPAN) - embedded event manager (EEM) - show commands - simple network management protocol (SNMP) - SNMP version 3 - syslog.
Vulnerabilities may include:	- media access control (MAC) attacks - multi or unicast attacks - spoofing attacks - unauthorised access - VLAN attacks.
Organisational security policies may include:	- access control list types: - access control list (ACL) - port-based access control list (PACL) - virtual local area network access control list (VACL) - dynamic address resolution protocol inspection (DAI) - device hardening

	• dynamic host configuration protocol (DHCP) snooping • IEEE 802.1x Port security measures • internet protocol (IP) source guard.
<i>First hop redundancy protocols</i> may include:	• gateway load balancing protocol (GLBP) • hot standby router protocol (HSRP) • virtual router redundancy protocol (VRRP).

Unit Sector(s)

Networking