Australian Government

Department of Education, Employment and Workplace Relations

ICAI5174B Install high-end switches in multi-switched local area networks

Release: 1

ICAI5174B Install high-end switches in multi-switched local area networks

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit defines the competency required to install, configure and test high end switches, in an extended star network. The following units are linked and form an appropriate cluster: • ICAA5144B Determine best fit topology for a local network • ICAB5159B Build a security shield for a network • ICAB5160B Build and configure a server • ICAI4188B Install and maintain a server • ICAI5172B Implement backbone technologies in a local area network • ICAI5176C Install and configure router

Application of the Unit

Application of the unit	

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
	ICAI5173B	Install and configure a single-segment local area network switch

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. Identify required switch specifications	1.1. Gather relevant data to identify and document ***network*** architecture 1.2. Select an appropriate hierarchical model for the ***network*** 1.3. Identify switch fabric and the type and number of switches 1.4. Determine switch ***network topology*** to be installed, with reference to ***network*** architecture and network protocol types 1.5. Develop an implementation plan for new ***network*** processes 1.6. Select relevant ***hardware*** and ***software*** with reference to ***equipment*** specifications/limitations 1.7. Evaluate switch purchasing options and determine most appropriate
2. Install and configure switches and routers	2.1. Install switches according to vendor guidelines, ***network*** architecture and ***client*** requirements 2.2. Configure switches to a basic level 2.3. Configure switches for VLAN operation 2.4. Configure a VLAN trunking protocol (VTP) for the switches 2.5. Configure a router to run inter-VLAN routing for the selected VLANs 2.6. Document switch configuration according to ***client*** requirements
3. Test switches	3.1. Assess the impact of the changes on the ***network*** 3.2. Prepare, schedule and execute tests 3.3. Troubleshoot the ***network*** to track, resolve, document and report errors 3.4. Make changes and resolve problems to ensure that the ***network*** is functioning properly 3.5. Back-up final switch configuration, to reflect changes 3.6. Ensure documentation and reporting meets requirements

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- Installing and configuring simple computer components
- Ability to record testing results
- Ability to critically analyse details
- Ability to understand specification sheets
- Ability to organise, and assess importance and relevance of, product information
- Ability to analyse and synthesise information
- Ability to diagnose performance deviations

Required knowledge

- The operation of switches in relation to the open systems interconnect (OSI) layer (i.e. protocol stack) model. (switches operate at layer two of the OSI model.)
- Functions and features of network interface card (NIC) (e.g. MAC and IP) addresses
- Network design in relation to physical constraints and role of switches, and how to overcome constraints in terms of traffic isolation and network utilisation (e.g. microsegmentation, VLANs)
- Operation of a relevant network operating system (e.g. UNIX, Linux, Novell, Microsoft
- Functions and features of switches, including various filtering and forwarding modes (e.g. store-and-forward, cut-through, fast-forward), switching tables, bridge learning, spanning tree algorithm (STA) and spanning tree protocol (STP)
- Advantages and disadvantages of switches in relation to network architecture and client requirements (e.g. switches offer dedicated, full-bandwidth service to users)
- Basic functions of checksums (i.e. cyclic redundancy check [CRC])
- Functions and features of transparent switching
- Australian Computer Society Code of Ethics
- Networks bridges and switches

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 following is essential: • Assessment must confirm the ability to install, configure and test network switches. To demonstrate competency in this unit the person will require access to: • Network devices, including configurable (Ethernet LAN) switches (needed to support features such as STP, VLANs and frame forwarding modes), PCs, routers
Context of and specific resources for assessment	Generally, switches have replaced bridges in modern network design. The high port density of a switch (e.g. 24 to 48 ports), offers much more value than the few ports available in a typical bridge. Furthermore, switches offer many other performance- and security-enhancing features. The main focus of this unit is on installing and configuring LAN, not WAN switches. Although both LAN and WAN switches are used extensively in many networked environments, the predominant use lies with LAN switches. WAN switches usually operate at the edge of a LAN and as such, are mainly installed and configured by telecommunications service providers. A current trend is the use of Virtual LANs (VLANs). VLANs logically segment a network (as opposed to physically segmenting the network, via simple, non-programmable switches or hubs). The benefits of VLANs include increased network security and a more convenient method for grouping an organisation's employees into logical workgroups, even though they may work in separate physical locations of the company. High-end switches in a multi-switched LAN imply the use of trunking, where traffic from many users flows up

EVIDENCE GUIDE	
	major arterial connections in the LAN hierarchy. Thus, a trunking protocol must be implemented. The breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and coordination would be characteristic. Assessment must ensure: • The demonstration of competency may also require self-directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others. • Applications involve participation in development of strategic initiatives as well as personal responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team coordination may also be involved.

EVIDENCE GUIDE	
Method of assessment	The purpose of this unit is to define the standard of performance to be achieved in the workplace. In undertaking training and assessment activities related to this unit, consideration should be given to the implementation of appropriate diversity and accessibility practices in order to accommodate people who may have special needs. Additional guidance on these and related matters is provided in ICA05 Section 1. • Competency in this unit should be assessed using summative assessment to ensure consistency of performance in a range of contexts. This unit can be assessed either in the workplace or in a simulated environment. However, simulated activities must closely reflect the workplace to enable full demonstration of competency. • Assessment will usually include observation of real or simulated work processes and procedures and/or performance in a project context as well as questioning on underpinning knowledge and skills. The questioning of team members, supervisors, subordinates, peers and clients where appropriate may provide valuable input to the assessment process. The interdependence of units for assessment purposes may vary with the particular project or scenario.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: • ICAA5144B Determine best-fit topology for a local network • ICAB5159C Build a security shield for a network • ICAB5160B Build and configure a server • ICAI4188B Install and maintain a server • ICAI5172B Implement backbone technologies in a local area network • ICAI5176B Install and configure router An individual demonstrating this competency would be able to: • Demonstrate understanding of a broad knowledge

EVIDENCE GUIDE	
	base incorporating theoretical concepts, with substantial depth in some areas • Analyse and plan approaches to technical problems or management requirements • Transfer and apply theoretical concepts and/or technical or creative skills to a range of situations • Evaluate information, using it to forecast for planning or research purposes • Take responsibility for own outputs in relation to broad quantity and quality parameters • Take some responsibility for the achievement of group outcomes • Maintain knowledge of industry products and services Additionally, an individual demonstrating this competency would be able to: • Demonstrate theoretical knowledge of bridges and switches • Apply solutions to a variety of problems • Perform processes that require a range of skills • Interpret available information

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.	
Software may include but is not limited to:	• commercial software applications • organisation-specific software • packaged software • in-house or customised software.
Equipment may include but is not limited to:	• workstations • personal computers • modems and other connectivity devices

RANGE STATEMENT	
	• printers • DSL modems • hard drives • monitors • switches • hubs • personal digital assistant (PDA) • other peripheral devices

RANGE STATEMENT	
Network may include but is not limited to:	• large and small LANs • national WANs • the internet • VPNs • the use of the PSTN for dial-up modems only • private lines • data • voice
Client may include but is not limited to:	• internal departments • external organisations • clubs • individual people • internal employees
Network topology may include:	• star • extended star campus networks • ring • bus • hierarchical • hybrid

Unit Sector(s)

Unit sector	Implement

Co-requisite units

Co-requisite units		

Competency field

Competency field	