



Australian Government

Department of Education, Employment and Workplace Relations

ICTNPL4112A Evaluate core network architectures

Release: 1

ICTNPL4112A Evaluate core network architectures

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to assess the roles and evaluate the benefits of competing core network architectures. Core networks use convergent internet protocol (IP) based technologies with conventional technologies. 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.
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Application of the Unit

Application of the unit	Technical officers or engineers from private and public organisations apply the skills and knowledge in this unit. They combine technical design skills with organisational skills to evaluate core architectures in a telecommunications network used by service providers such as major carriers or asset owners. Technical officers or engineers may be responsible for small projects or parts of larger projects, and for the operational and engineering of the telecommunications network in general.
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements Determine the essential outcomes of a unit of competency.	Performance criteria Determine 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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate basic IP network architecture	1.1. Produce a layout of the topology of an IP network showing the network elements and the application of the 7-layer open system interconnect (OSI) model 1.2. Determine the purpose of routers and switches and the use of routing protocols 1.3. Determine the different types of generic resiliency and redundancy that can be applied in network architectures and when they should be applied 1.4. Evaluate the benefits of IP networks compared to circuit-based networks and the impact on modern telecommunications networks
2. Evaluate synchronous digital hierarchy (SDH) transport architectures	2.1. Produce a layout of the topology of SDH transport networks showing the structure and the role of rings in the networks 2.2. Determine the purpose of SDH switching and its function within the transport architecture 2.3. Assess key capacity and distance limitations in SDH networks 2.4. Assess resiliency and redundancy techniques that can be used within SDH transport networks 2.5. Evaluate the compatibility of SDH transport architectures with other transport architectures
3. Evaluate broadband architectures	3.1. Produce a layout of the topology structure of the asymmetrical digital subscriber line (ADSL) edge network and the hybrid fibre coaxial (HFC) cable edge network in providing broadband access to the customer 3.2. Determine the purpose of point-to-point protocol (PPP) and the function of the digital subscriber line access multiplexer (DSLAM), broadband remote access server (BRAS) and layer2 network protocol network server (LNS) in the ADSL network 3.3. Assess the arrangement of carrier channels connecting the HFC cable customer 3.4. Determine the function of the CMTS and the purpose of DOCSIS, and the key capabilities of its different versions in the HFC network 3.5. Assess resiliency considerations for ADSL and HFC Cable network architectures 3.6. Evaluate the benefits of providing cable broadband access to wireless broadband from a network security

ELEMENT	PERFORMANCE CRITERIA
	aspect
4. Evaluate data architectures	4.1. Produce a layout of the topology of key structures of a data network showing the IP network and multiprotocol label switching (MPLS) structures 4.2. Determine the purpose of internal and external routing protocols in an IP network outlining the reasons for the creation of a virtual private network (VPN) 4.3. Determine the purpose of label distribution protocol (LDP) in an MPLS network 4.4. Assess resiliency and redundancy techniques that can be used within data networks 4.5. Evaluate the compatibility of IP and MPLS networking
5. Evaluate metropolitan ethernet architectures	5.1. Produce a layout of the topology structure of a metropolitan ethernet network showing the optimum siting of the ethernet switch 5.2. Determine the types and limitations of the varieties of ethernet transmission 5.3. Assess the scaling limitations of ethernet networks 5.4. Assess resiliency and redundancy techniques that can be used within metropolitan ethernet networks 5.5. Evaluate the need for the creation of virtual local area networks (VLAN) in metropolitan Ethernet architecture for improved performance
6. Evaluate voice architectures	6.1. Produce a layout of the topology of a voice over internet protocol (VoIP) network and a wireless voice network showing the network elements 6.2. Determine the function of local exchange and transit exchange switches in the public switched telephone network (PSTN) 6.3. Determine the function of an secure broadband connection (SBC) and the purpose of session initiation protocol (SIP) in wireless networking 6.4. Assess resiliency and redundancy techniques that can be applied in the design of voice networks 6.5. Evaluate the benefits of VoIP networks compared to circuit based networks and the impact on modern telecommunications networks
7. Evaluate media and content architectures	7.1. Determine the structure, elements and purpose of hosting networks in data centres and a content

ELEMENT	PERFORMANCE CRITERIA
	distribution network 7.2. Evaluate the impact of high speed broadband for the wide deployment of media and content architectures
8. Prepare evaluation report	8.1. Assess compatibility and interoperability of competing core network architectures 8.2. Prepare an evaluation report outlining core network solutions using emerging technologies

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- communication skills to analyse, evaluate and present information
- financial modelling skills to specify, analyse and evaluate a range of different solutions
- group facilitation and presentation skills to transfer and collect information and gain consensus on concepts
- problem solving skills to:
 - address a defined range of unpredictable problems, for example, when predicting line traffic and the impact on input and output devices and processors from current and future demand requirements
 - address a predictable range of network problems
- project planning skills to:
 - scope, time and cost work when reviewing client user requirements and network requirements
 - set benchmarks and identified scope
- research skills to specify, analyse and evaluate broad features of current security issues and best practice in security devices, products and procedures
- technical skills to:
 - evaluate and compare a range of complex technical data
 - research and identify, analyse and evaluate features of a particular core network architecture

Required knowledge

- broad knowledge of:

REQUIRED SKILLS AND KNOWLEDGE

- client business domain, business function and organisation
- networking technologies
- theoretical concepts of three or more current industry network development and design methodologies
- transmission technologies and protocols
- MPLS and IP architectures across a core network environment
- overview knowledge of current industry-accepted hardware and software products
- protocols, such as routing information protocol (RIP), enhanced interior gateway routing protocol (EIGRP), open shortest path first (OSPF), border gateway protocol (BGP) operations
- VLANs and VPN tunnels and how its is implemented in an ethernet/MPLS environment

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 the first three layers of the OSI model
- determine the role of switches and routers in the core network and the different types of routing protocols
- evaluate SDH switching and transmission and its ability to create resiliency in the network through various redundant configurations
- evaluate the benefits, purpose and structure of ADSL networks and other broadband products
- determine and compare data networks with specific reference to IP and MPLS
- evaluate the most important routing protocols of internal and external MPLS and the resilience that is built into them
- evaluate the limitations of an Ethernet network and how VLAN can be incorporated in them
- compare various voice protocols
- determine the purpose of various hosting in data centres and media and distribution platforms.

Context of and specific resources for assessment

Assessment must ensure:

- network design documentation and other site related documentation
- equipment specifications
- live network or training facilities
- organisational guidelines
- networked computers
- networked telecommunications components.

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 performing an evaluation of core network architectures
- review of evaluation report completed by the candidate outlining compatibility and interoperability

EVIDENCE GUIDE	
	of competing core network architectures oral or written questioning to assess knowledge of planning various core networks.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: ICTNPL4113A Plan the deployment of core 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

RANGE STATEMENT	
regional contexts) may also be included.	
<i>IP network</i> may include:	• gateways • routers • servers • switches.
<i>SDH transport networks</i> may include:	• add-drop multiplexers (ADM) • synchronous digital hierarchy (SDH) switch • synchronous transport module - level1 (STM-1).
<i>HFC cable edge network</i> may include:	• ADM • broadband amplifier • cable modems • DSLAMS • fibre network • multiplexer.
<i>Data network</i> may include:	• access • backbone • edge • MPLS protocols • routers • routing protocols • switches.
<i>Routing protocols</i> may include:	• BGP • EIGRP • interior gateway routing protocol (IGRP) • intermediate system-to-intermediate system (IS-IS) • OSPF • RIP.
<i>Ethernet network</i> may include:	• applications • gateways • LAN switch • routers • servers • switches • transmission equipment • VLAN.
<i>VoIP network and a wireless voice network</i> may include:	• access points • adapters

RANGE STATEMENT	
	• antennas • gateways • routers • servers • switches • voice managers.
<i>Media and content architectures</i> may include:	• central processing unit (CPU) • media managers • multiplexers • routers • servers.

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Network planning
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