



Australian Government

ICTNPL406 Evaluate core network architectures

Release: 1

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Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

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

It applies to individuals with a range of telecommunications skills and extensive knowledge of core and access network capabilities of the service provider, and prepares them for entry level planning and design for network additions and implementations to accommodate network growth and new technologies within the industry.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Unit Sector

Telecommunications – Network Planning

Elements and Performance Criteria

Element	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Evaluate basic IP network architecture	1.1 Produce a layout of the topology of an IP network showing network elements and application of the 7-layer open system interconnect (OSI) model 1.2 Determine purpose of routers and switches and use of routing protocols 1.3 Determine different types of generic resiliency and redundancy that can be applied in network architectures and when they should be applied 1.4 Evaluate 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 structure and role of rings in the networks 2.2 Determine 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 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 customer 3.2 Determine purpose of point-to-point protocol (PPP) and 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 arrangement of carrier channels connecting the HFC cable customer 3.4 Determine the function of the CMTS and the purpose of DOCSIS, and 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 benefits of providing cable broadband access to wireless broadband from a network security 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 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 compatibility of IP and MPLS networking
5. Evaluate metropolitan	5.1 Produce a layout of the topology structure of a metropolitan

ethernet architectures	ethernet network showing optimum siting of the ethernet switch 5.2 Determine types and limitations of the varieties of ethernet transmission 5.3 Assess 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 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 a 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 design of voice networks 6.5 Evaluate 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 structure, elements and purpose of hosting networks in data centres and a content distribution network 7.2 Evaluate the impact of high speed broadband for 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

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Reading	1.2-1.4, 2.2-2.4, 3.2, 3.6, 4.2, 4.3, 4.5, 5.2,	Analyses and evaluates complex written and visual text in specialised workplace

	6.2-6.5, 7.1, 8.2	documentation to determine key information and specific requirements
Writing	2.1, 4.2, 8.2	Develops material for a specific audience using clear and detailed language and visuals employing expected forms and conventions
Oral Communication	1.2, 1.3, 2.2, 3.2, 3.4	Articulates technical information using an appropriate tone and vocabulary for the intended audience
Numeracy	1.1, 1.4, 2.3, 2.5, 3.1, 3.4, 4.4, 5.1, 5.3-5.5, 6.1, 6.4, 6.5, 7.2, 8.1	Employs mathematical calculations to interpret capabilities and limitations of different systems
Get the work done	1.2-1.4, 2.2-2.5, 3.2-3.6, 4.2-4.5, 5.2-5.5, 6.2-6.5, 7.1, 7.2, 8.1	- Takes responsibility for planning, sequencing and prioritising tasks and own workload for efficiency and effective outcomes - Makes routine decisions and implements standard procedures for routine tasks, using formal decision-making processes for more complex and non-routine situations - Addresses less predictable problems and initiates standard procedures in response, applying problem-solving processes in determining a solution

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTNPL406 Evaluate core network architectures	ICTNPL4112A Evaluate core network architectures	Updated to meet standards for Training Packages	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

Assessment Requirements for ICTNPL406 Evaluate core network architectures

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Performance Evidence

Evidence of ability to:

- determine first three layers of the open system interconnect (OSI) model
- determine the role of switches and routers in the core network and different types of routing protocols
- evaluate synchronous digital hierarchy (SDH) switching and transmission and its ability to create resiliency in the network through various redundant configurations
- evaluate benefits, purpose and structure of ADSL networks and other broadband products
- determine and compare data networks with specific reference to internet protocol (IP) and multiprotocol label switching (MPLS)
- evaluate the most important routing protocols of internal and external MPLS and the resilience built into them
- evaluate 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.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline the following features of core network architectures:
 - 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
- outline MPLS and IP architectures across a core network environment
- outline current industry-accepted hardware and software products
- identify and describe relevant protocols, such as routing information protocol (RIP), enhanced interior gateway routing protocol (EIGRP), open shortest path first (OSPF), and border gateway protocol (BGP) operations
- identify VLANs and VPN tunnels and describe how they may be implemented in an ethernet/MPLS environment.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the Telecommunications – Network Planning field of work and include access to:

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

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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