



Australian Government

Department of Education, Employment and Workplace Relations

ICTNPL4113A Plan the deployment of core network

Release: 1

ICTNPL4113A Plan the deployment of core network

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to plan the deployment of core network for a telecommunications service provider. It includes use and consideration of core network deployment data, technology, equipment, capacity management and network management information sources. Core networks use convergent internet protocol (IP) based technologies with conventional technologies. The plan may be for a new installation or upgrade of capacity or technology for existing network or subsystem for convergence to Next Generation Networks (NGN). 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 staff and their subcontractors from private and public organisations apply the skills and knowledge in this unit. They combine technical design skills with organisational skills to plan and deploy core network technologies for a service provider such as a major carrier or a rail service provider. Technical officers or engineers may be responsible for projects and for operational and engineering work in deployment or conversion to IP based technologies 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 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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Scope the project	1.1.Prepare for work according to site specific safety requirements and enterprise occupational health and safety (OHS) processes and procedures 1.2.Determine the type of core network by accessing and using network information sources 1.3.Produce a brief showing how core network architecture components relate to the larger network and their impact on the work 1.4.Evaluate the equipment type and technologies to be considered to determine availability and compatibility with existing network equipment 1.5.Obtain resources and equipment needed for the work according to enterprise procedures and check for correct operation and safety 1.6.Assess the capacity limitation of platforms in the context of the work to ensure maximum network performance 1.7.Determine product capability and calculate allowable capacity of the core network to allow for network growth
2. Produce deployment plan for a core network	2.1.Assess demand for the core network using key geographic, demographic, forecast and bandwidth data 2.2.Identify key parameters of the core network to be measured for capacity management 2.3.Produce a preliminary deployment plan for the core network using architectural principles and assessed demand to maintain integrity of the core network 2.4.Assess the additional planning requirements for voice over internet protocol (VoIP) and wireless voice networks from voice networks, and for hosting and content distribution networks from media and content network 2.5.Create a financial business case for the deployment of the core network based on assessed demand to justify a return on investment (RoI) and operational costs 2.6.Discuss unexpected situations with appropriate personnel, with consideration to job specifications, safety and enterprise procedures to establish a solution

ELEMENT	PERFORMANCE CRITERIA
3. Complete work and report its impact on network performance	3.1. Produce final deployment plan including recommendations agreed with the customer 3.2. Provide a report on network monitoring techniques used to manage the network to ensure the network is performing at optimum level

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- communication skills to analyse, evaluate and present information
- 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 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, identify, analyse and evaluate features of core network architecture

Required knowledge

- MPLS and IP architectures across a core network environment
- protocols such routing information protocol (RIP), enhanced interior gateway routing protocol (EIGRP), open shortest path first (OSPF), border gateway protocol (BGP) operations
- virtual local area networks (VLAN) and virtual private network (VPN) tunnels and how it is implemented in an ethernet and multiprotocol label switching (MPLS) environment

REQUIRED SKILLS AND KNOWLEDGE

- overview knowledge of:
 - client business domain, business function and organisation
 - current industry-accepted hardware and software products
 - networking technologies incorporating substantial depth in some areas
 - transmission technologies and protocols
 - theoretical concepts of three or more current industry network development and design methodologies

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:

- gather data from information sources and evaluate how the data relates to the core network
- source major equipment and technologies used in a core network and detail their compatibilities
- plan the deployment of a core network including management and monitoring techniques
- produce a deployment plan for a core network with recommendations for the customer.

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 planning the deployment of a core network
- review of reports completed by the candidate for different core networks
- review of final deployment plan prepared by the candidate outlining recommendations for the customer
- 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:

- ICTNPL4112A Evaluate core network architectures.

EVIDENCE GUIDE

	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.
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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.

Core network may include:

- billing
- broadband
- data
- Ethernet
- media and content
- network management

RANGE STATEMENT

	• NGN delivering multiple services: • broadband access • data transfer • IPTV • mobile data • mobile telephony • multimedia • video • VoIP • switching • transport - synchronous digital hierarchy (SDH) • voice.
<i>Core network architecture components</i> may include:	• Ethernet network: • gateways • LAN switch • layer 3 switches • routers • servers • transmission equipment • VLANS • HFC cable edge network: • ADM • broadband amplifier • cable modems • DSLAMS • fibre network • multiplexer • IP networks: • gateways • routers • servers • switches • media and content network: • central processing unit (CPU) • media managers • multiplexers • routers

RANGE STATEMENT	
	• servers • MPLS network: • access • backbone • edge routers • L2 and L3 switches • MPLS protocols • routing protocols • SDH transport: • add-drop multiplexers (ADM) • SDH switch • STM-1 • VoIP and wireless voice network: • access points • adapters • antennas • gateways • routers • servers • switches • voice managers.
Equipment type may include:	• IP based • IP networking • multiplexers • network management • optical • protocol analysers • switching • transmission • transport • virtual • wireless.
Technologies may include:	• adaptive • digital • IP technologies • NGN • optical • self healing • wireless.

RANGE STATEMENT	
<i>Resources</i> may include:	• diagnostic tools • equipment • hardware equipment • installation manuals • installation platforms • labour • materials • PC tools • safety equipment • software • test equipment • tools.
<i>Enterprise procedures</i> may include:	• asset registration • compliance • preferred suppliers • preferred vendors • procurement agreements • purchase requisition • service level agreements.
<i>Parameters of the core network</i> may include:	• for an ADSL network: • bandwidth utilisation of broadband remote access server (BRAS)-digital subscriber line access multiplexer (DSLAM) trunks • bandwidth utilisation of BRAS- layer2 network protocol network server (LNS) trunks • BRAS memory and CPU load • number of available BRAS ports • number of IP addresses in use • number of point-to-point protocol (PPP) sessions in use • for a HFC cable broadband network: • cable modem termination system (CMTS) memory and CPU load • IP address availability • number of services connected to a segment • upstream and downstream bandwidth utilisation • for an IP or MPLS Data network: • available and utilised bandwidth and ports

RANGE STATEMENT

	• network latency • packet loss rates • router or switch card slots available • router or switch CPU load • router or switch memory • for a media and content hosting and distribution network: • available and utilised bandwidth • available and utilised ports • router CPU load • router memory • router slots available • for a metropolitan Ethernet network: • available and utilised bandwidth • available and utilised ports • available and utilised VLANs • packet loss rates • switch card slots available • switch CPU load • switch memory • for an SDH network: • bandwidth provisioned • number of ADMS connected to a ring • number of card slots and ports available • number of circuits provisioned • for a voice network: • echo cancellation considerations • quality of service (QoS) and measure of service (MOS) • network jitter • network latency • packet loss rate • signalling capacity • traffic: • available and utilised bandwidth • available and utilised ports • number and duration of calls.
Network monitoring techniques	• alarms

RANGE STATEMENT

may include:

- customer complaints
- databases
- fault reports
- network management
- network operations reports
- network performance reports
- traffic monitoring.

Unit Sector(s)**Unit sector**

Telecommunications

Co-requisite units

Co-requisite units		

Competency field**Competency field**

Network planning