



Australian Government

Department of Education, Employment and Workplace Relations

ICTTEN6216A Design and manage internet protocol TV in a service provider network

Release: 1

ICTTEN6216A Design and manage internet protocol TV in a service provider network

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to design a multiprotocol label switching (MPLS) network for internet protocol TV (IPTV) and manage the delivery of IPTV services. This includes Core and Access Networks for the service provider. 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 designing and dimensioning an IP-MPLS Core and Access Network for a service provider of IP services in technology convergence of data, voice and video apply the skills and knowledge in this unit. Relevant job roles include designer and installer of Next Generation Networks (NGN). These IP networks provide fast internet, voice over internet protocol (VoIP), IPTV and internet TV services.
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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. Produce and evaluate design requirements for an IPTV network	1.1. Analyse the major video models and the impact the video challenges will have on the design of an IPTV network 1.2. Evaluate IPTV against other competing TV broadcast technologies to determine optimum design approach 1.3. Produce the topology of an IPTV network showing network architecture from the IPTV standards bodies and determine the design requirements 1.4. Plan the dimensioning of network parameters for multicast and unicast video delivery over broadband in a service provider network
2. Design an IPTV network for video on demand (VoD) delivery	2.1. Design the content delivery system (CDS) to cache IPTV content in each major metropolitan area for broadcast or streaming VoD models to eliminate performance variability introduced by Internet transport or core peering relationships 2.2. Design a video network to provide VoD loads with network solutions using VoD design requirements 2.3. Design VoD application to meet bandwidth requirements and quality of service (QoS) requirements for commercial viability of IPTV network
3. Design and configure an MPLS IPTV network to meet business requirements	3.1. Determine the IP-MPLS network design requirements 3.2. Investigate factors that affect design considerations and ways they can be minimised 3.3. Produce the design topology of a MPLS network to provide secure methods of transporting IP packets using layer 2 protocols 3.4. Design an MPLS layer over the IP networking structure to combine the efficiency of multicast protocols with traffic engineering (TE) facilities to enable fast packet forwarding for real time video streaming applications
4. Manage the delivery of IPTV services	4.1. Determine the operational processes required to support IPTV by operators 4.2. Produce a plan of the management and customer support model including strategies dealing with the delivery of VoD issues 4.3. Produce a plan of a video network using video delivery strategies to deliver optimum average revenue per user (ARPU) to serve the demographic of an area and the nature of an operator's business 4.4. Manage and monitor video across the network using a management tool

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- analytical skills to analyse and evaluate:
 - broad features of a particular business domain and best practice in networking technologies when hardware and software network components to be installed are identified
 - competing video models over broadband networks
- literacy skills to produce plans
- problem solving skills to solve a predictable range of network problems
- project planning skills to set benchmarks and identify scope
- technical skills to:
 - deploy multipoint-to-multipoint VPLS domains via IP-MPLS cloud
 - design VoD facility for video delivery
 - dimension network parameters
 - implement and verify:
 - border gateway protocol (BGP)
 - enhanced interior gateway routing protocol (EIGRP)
 - Flash
 - hypertext transfer protocol (HTTP)
 - internet group management protocol (IGMP)
 - open shortest path first (OSPF)
 - real time streaming protocol (RTSP)
 - routing information protocol (RIP)
 - web cache communication protocol (WCCP) operations
 - implement MPLS architecture across a wide area network (WAN) environment
 - implement secure video streaming over MPLS network

Required knowledge

- competing video delivery over broadband networks
- current industry-accepted hardware and software products
- networking technologies incorporating detailed knowledge of network operating systems, IP networks and MPLS networks
- transmission technologies and protocols

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: - produce and evaluate design requirements for an IPTV network - design an IPTV network for VoD delivery - design and configure an MPLS IPTV network to meet business requirements - manage the delivery of IPTV services.
Context of and specific resources for assessment	Assessment must ensure: - protocols, configuration documents, management tools and standards - network and demographic trends, and customer demand data.
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: - review of design requirements and network designs completed by the candidate - oral and written questioning of the candidate on required knowledge - direct observation of the candidate designing and configuring and MPLS IPTV network and managing IPTV services.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: ICTTEN6172A Design and configure an IP-MPLS network with virtual private network tunnelling. 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.

EVIDENCE GUIDE

	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.

Major video models may refer to:	• broadcast video or multicast models replicating the behaviour of a Cable TV (CATV) system offering a customer multi-channel viewing • 'store for play' model or download model allowing the customer to load the video onto a local disk for viewing • VoD or unicast models allowing the customer to stream video in real-time as selected by the customer.
Video challenges may include:	• streaming video requiring real-time consistent network performance • user perception of video to be a continuous long term experience with complaints if any significant portion goes badly • video being bandwidth hungry as an application.

RANGE STATEMENT	
<i>Competing TV broadcast technologies</i> may include:	• CATV • internet TV or content delivery network • satellite TV.
<i>Topology of an IPTV network</i> may include:	• digital subscriber line access multiplexer (DSLAM) • head end servers • home gateway • media centres • media content servers • MPLS routers • MPLS switches • set-top box (STB).
<i>Network architecture</i> may include:	• Access Networks: • carrier Ethernet • fibre to the x (FTTx) • passive optical network (PON) • wireless fidelity (WiFi) • worldwide interoperability for microwave access (WiMAX) • x digital subscriber line (DSL) • core distribution network (MPLS) • internet TV or content delivery network (CDN): • CDN applications: • hyper syndicated video • session shifting • user generated content • internet delivery protocols: • Flash (RTMP, RTMPE, RTMPT and RTMPTE) • HTTP • RTSP • internet video formats: • video compression protocols (Flash, MPEG-2, MPEG-4, H.264 and VC-1) • video encapsulation (MP4, WMV, AVI, SWF, FLV) • terminal device: • home gateway

RANGE STATEMENT	
	• media centre • STB.

RANGE STATEMENT	
<i>IPTV standards bodies</i> may include:	• third generation partnership project (3GPP) - IP multimedia subsystem (IMS) • 3PPP • DVB • European Telecommunications Standards Institute (ETSI) • Home Gateway Initiative (HGI) • International Telecommunications Union (ITU-T) • Open IPTV Forum (OIPF) • Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).
<i>Network parameters</i> may include:	• broadcast system: • acquisition video quality (MPEG 2 - 6 to 20 Mbps) • distribution video quality required(H.264 2 to 8 Mbps) • level of redundancy • number of standards definition (SD) and high definition (HD) linear channels • CDS: • amount and location of vault storage required • number of VoD titles (SD and HD) • placement of streaming caches reduces network bandwidth • storage and stream redundancy required • streaming capacity based on peak concurrent streams required • conditional access system: • number of concurrent leases • number of STBs • peak transactions per second • headend control system: • number of STBs changing channels • number of STBs rebooting at one time • network requirements: • access and customer links • bandwidth across the core

RANGE STATEMENT	
	• number of linear channels viewed at a given time • placement of VoD streamers to save bandwidth.

RANGE STATEMENT	
Network solutions may include:	• dense wavelength division multiplexing (DWDM) application on optical fibre • network capacity • separation of VoD to other applications • size of pipe • star rather than mesh topology.
VoD design requirements may refer to:	• delivery model: • characteristics of customer access network and metro connection network • management and support model: • ways of ordering, supporting and billing • service model: • appliances to which video is delivered to • nature of content • video format.
Network design requirements may include:	• bandwidth • number and type of core and edge routers • number of channels • protocols: • BGP • IGMP • label distribution protocol (LDP) • OSPF • resource reservation protocol (RSVP) • RTSP • WCCP • quality of service (QoS) • security • throughput.
Factors may include:	• protocol incompatibility • QoS issues: • jitter • latency • loss rate • throughput • router availability.
MPLS network may include location and type of:	• core label switch routers (Core LSR) • edge label switch routers (Edge LSR)

RANGE STATEMENT

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| | <ul style="list-style-type: none">• hosting servers for media content. |
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RANGE STATEMENT	
<i>Layer 2 protocols</i> may include:	• asynchronous transfer mode (ATM) • Ethernet • frame relay • IGMP • packet over SONET (POS) • point to multipoint for IPTV (p2mp) • PPP - unicast for VoD streaming • protocol independent multicast (PIM) • spanning-tree protocol (STP).
<i>Operational processes</i> may include:	• content management • customer support • network operations • service activation • service delivery.
<i>VoD issues</i> may include:	• congestion level problems • customer care costs • packet loss problems • practices towards reduction of customer complaints • QoS issues • responsibility for customer care.
<i>Video delivery strategies</i> may include:	• delivery dimension: • linear RF format or IPTV • multicast or unicast • streamed or download • mobility dimension: • fixed • mobile • both • technology dimension: • Ethernet or tunnel infrastructure (BRAS) • using IP infrastructure (DHCP) • combination of both.
<i>Nature of an operator's business</i> may include:	• access network • broadcast or VoD strategy • content and media production • content delivery • core network • home network.

RANGE STATEMENT**Management tool** may include:

- Network and video service management for end to end video network management (ROSA)
- vulnerability assessment management service (VAMS).

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Telecommunications networks engineering
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