



Australian Government

Department of Education, Employment and Workplace Relations

UEENEED121A Design and implement multi-layer switching for Internetworking systems

Release: 1

UEENEED121A Design and implement multi-layer switching for Internetworking systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the design, implementation and performance monitoring of Internetworking systems. It encompasses safe working practice, evaluating customer requirements, applying sound design principles, complying with regulation and standards, incorporation and advance multi-layer switching technologies access and documentation of design and performance monitoring.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit 2)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly

License to practice

3)

related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEED121A Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to design Internetworking systems.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood. 1.2 Established OHS risk control measures and procedures are followed in preparation for the work. 1.3 Design brief for the advance multi-layer switching technologies is developed and documented in consultation with person(s) of higher authority. 1.4 Work team/group is arranged of appropriately competent persons in accordance with skills required to meet work outcomes and organisation's established procedures. 1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work. 1.6 Strategies are implemented to ensure network development is carried out efficiently.
2 Design Internetworking systems.	2.1 Internetworking system is designed to comply with design brief and consideration of economical and appropriately effective design solutions. 2.2 Advance multi-layer switching technologies are included in the Internetworking system design. (See Note) 2.3 Internetworking system design includes specification of required media that is compliant

ELEMENT	PERFORMANCE CRITERIA
	with industry standards.
	2.4 Internetworking system design is documented in accordance with organisation policies and procedures.
	2.5 Internetworking system design is presented and discussed with person(s) of higher authority.
	2.6 Alterations to the Internetworking system design resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation's policy.
	2.7 Final Internetworking system design is documented and approval obtained from person(s) of higher authority.
3 Implement Internetworking systems.	3.1 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
	3.2 Appropriate development tools and software are selected based on specified requirements and performance standard.
	3.3 Knowledge of Internetworking arrangements and protocols is applied to installing, configuring and testing advance routing technologies.
	3.4 System malfunctions are identified during testing and rectified using logical techniques drawing knowledge of Internetworking arrangements and protocol.
	3.5 Approaches to issues/problems are analysed to provide most effective solutions.
	3.6 Quality of work is monitored against personal performance agreement and/or established organisational or professional standards.
	3.7 Final Internetworking system design and implementation are documented in accordance organisation's established procedures.

Note.

Examples of multi-layer switching technologies are, Fast

ELEMENT

PERFORMANCE CRITERIA

Ethernet, Gigabit Ethernet, VLAN basics, types, identification, and trunking protocol, Spanning Tree Protocol, MLS processes, and configuration and multicasting protocols and routing.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and designing and implementing Internetworking systems - multi-layer switching.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED121A Multi-layer switched networks

Evidence shall show an understanding of multi-layer switched networks to an extent indicated by the following aspects:

T1 Campus network design encompassing:

- core layer
- distribution layer
- access layer
- selection of appropriate devices
- defining workgroups

T2 Managing Redundant Links encompassing:

- Spanning Tree Protocols (STP)
- Controlling STP in redundant environments
- STP in Virtual Local Area Network (VLAN) environments
- Configuring redundant routing protocols for a fault-tolerant routing

Note.

An example is Hot Standby routing protocol (HSRP)

T3 Fast layer 2 services encompassing:

- Fast Ethernet
- Trunking
- Fast Ether channels
- Gigabit services

T4 Inter VLAN Routing encompassing:

- Hardware vs. Software switching
- Overview of fast switching technologies
- Elements of a multi-layer switch
- Configuring multi-layer switches

T5 Multicast encompassing:

- Multi-cast group management
- Configuring multi-cast control at layer 2
- Configuring multi-cast control at layer 3

T6 Controlling Access to the Campus Network

REQUIRED SKILLS AND KNOWLEDGE

T7 Managing Network Traffic

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the

assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.
Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Design and implement Internetworking systems – multi-layer switching as described in 8) and including:

A Developing a design brief for multi-layer switching technologies in an Internetworking

- system
- B Planning work activities including requirements for work team/group
 - C Designing Internetworking system based on economic and effective solutions that meet with design brief requirements
 - D Detailing multi-layer switching technologies and specification for Internetworking media in the design
 - E Documenting and presenting design for approval
 - F Implementing Internetworking system design
 - G Identifying and rectifying system malfunctions
 - H Documenting Internetworking installation and configuration activities
 - I Detail technologies and media specifications used in the design of advanced wireless LANs technologies.
 - J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to designing and implementing Internetworking systems – multi-layer switching.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED11 8A	Design and implement Internetworking systems
UEENEED11 9A	Design and implement Internetworking systems — advance routing
UEENEED12 0A	Design and implement Internetworking systems — remote access
UEENEED12 2A	Design and implement Internetworking systems — security
UEENEED12 3A	Design and implement Internetworking systems — wireless LANs/WANs

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and implementing advance configuration of multi-layer switching in an Internetworking system between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Computer Systems