Unit title:	Networking technologies
Unit number:	15
Level:	4
Credit value:	15
Guided learning hours:	60
Unit reference number:	M/601/0472

UNIT AIM AND PURPOSE

This unit will enable learners to understand the requirements for implementing a network. Learners will have the opportunity to actively apply the skills learnt in the design and installation of a network system.

LEARNING OUTCOMES AND ASSESSMENT CRITERIA

A pass grade is achieved by meeting **all** the requirements in the assessment criteria.

Learning Outcome (LO) The Learner will:	Pass The assessment criteria are the pass requirements for this unit. The Learner can:
LO1 Understand networking principles	1.1 discuss the benefits and constraints of different networking systems types and topologies 1.2 evaluate the impact of current network technology, communication and standards 1.3 discuss how protocols enable the effective utilisation of different networking systems
LO2 Understand networking components	2.1 discuss the role of software and hardware components 2.2 discuss server types and selection requirement 2.3 discuss the inter-dependence of workstation hardware with network components
LO3 Be able to design networked systems	3.1 design a networked system to meet a given specification 3.2 evaluate the design and analyse user feedback
LO4 Be able to implement and support networked systems	4.1 implement a networked system based on a prepared design 4.2 test the network system to meet user requirements 4.3 document and analyse test results against expected results 4.4 recommend potential enhancements for the networked systems

	4.5 design a maintenance schedule to support the networked system

GRADING CRITERIA

A merit grade is achieved by meeting **all** the requirements in the pass criteria **and** the merit descriptors.

A distinction grade is achieved by meeting **all** the requirements in the pass criteria **and** the merit descriptors **and** the distinction descriptors.

Merit Criteria (M1, M2, M3)	Distinction Criteria (D1, D2, D3)
(M1, M2, and M3 are mandatory to achieve a merit grade. Each must be achieved at least once per unit to achieve a merit grade.)	(D1, D2, and D3 are mandatory to achieve a distinction grade. Each must be achieved at least once per unit to achieve a distinction grade.) (In order to achieve a distinction grade, all merit criteria must also have been achieved.)
MANDATORY TO ACHIEVE A MERIT GRADE	MANDATORY TO ACHIEVE A DISTINCTION GRADE
M1 Analyse concepts, theories or principles to formulate own responses to situations.	D1 Evaluate approaches to develop strategies in response to actual or anticipated situations.
M2 Analyse own knowledge, understanding and skills to define areas for development.	D2 Evaluate and apply strategies to develop own knowledge, understanding and skills.
M3 Exercise autonomy and judgement when implementing established courses of action.	D3 Determine, direct and communicate new courses of action.

TEACHING CONTENT

The Teaching Content describes what has to be taught to cover **all** Learning Outcomes.

Learners must be able to apply relevant examples to their work although these do not have to be the same as the examples specified.

LO1 Understand networking principles	
Networking systems types and topologies	e.g. • Types (Peer to peer, Client-Server, Cloud, Virtual) • Basic topologies (Point-to-Point, Bus, Star, Ring or Circular, Mesh, Tree, Hybrid, Daisy chain) • Physical network viewpoint, logical network viewpoint • Centralisation, de-centralisation
Impact of current network technology, communication and standards	e.g. • Conceptual models (OSI, TCP/IP) • Standards (IEEE, ANSI, ISO) • Communication (throughput, bandwidth) • Dynamic Configuration Control Protocol (address ranges, scope design, lease times, IPv4, IPv6) • Domain Name System (Trees, Syntax, Name servers, authoritative, recursive and caching, reverse look-up)
Effective utilisation of different networking systems	e.g. • Protocols (purpose, relationship to industry standards, management, routed protocols (e.g. IPv4/6, HTTP, SMTP etc.), routing protocols (e.g. RIP, EIGRP, OSPF etc.))

LO2 Understand networking components	
Software and hardware components	• Hardware (servers, consoles, switches, routers, hubs, bridges, cabling, wireless and mobile) • Software (client, server, OS's, purpose)
Server types and selection requirement	• Server view (physical, virtual) • Server purpose (email, web, file, database, terminal, firewall) • Server selection (cost, purpose, OS requirements (e.g. open v's closed sourced))
Interdependence of workstation hardware with network components	• Workstation hardware (Network card, cabling, local system architecture (e.g. the effect memory, processor and I/O devices have on the network))

LO3 Be able to design networked systems	
Design of a networked system to meet a given specification	• User expectations e.g. cost, peak load, average load, physical constraints, scalable, business requirements, Quality of Service (QoS) • Dynamic Host Configuration Protocol (address ranges, scope design, lease times, IPv4, IPv6) • Domain Name System (Name Servers, authorisation, recursion and caching, reverse lookup).

LO4 Be able to implement and support networked systems	
Implementation of a networked system based on a prepared design	• Installation (DHCP, DNS, QoS, switches, hubs, routers, servers, clients)
Meeting user requirements	• Testing tools (e.g. ping, traceroute, nslookup, dig etc.) • Monitoring (e.g. System Centre, Solaris, Tivoli, CISCO)
Documenting and analysing test results against expected results	• Testing (plan, schedule, load, user, QoS, addressing, connectivity, access, monitoring reporting) • Analyse results
Potential enhancements	e.g. • Review (DHCP, DNS, QoS, switches, hubs, routers, servers, clients, System Centre, Solaris, Tivoli, CISCO)
Maintenance schedule	e.g. • backups, upgrades, security, auditing.

GUIDANCE

Delivery guidance

It will be beneficial to deliver this unit in a way that uses actual events, industry forecasts or sector specific contexts which offer the learner the opportunity to explore, develop and apply the fundamental principles of the sector or subject area. Typical delivery contexts could include the learner being a Network Architect and having to design and implement a directory based network.

Learners will benefit from being encouraged to exercise autonomy and judgement to design the network, adapt their thinking and reach considered conclusions when implementing and supporting the networked system (based on a foundation of relevant knowledge, understanding and/or practical skills).

Learners would benefit from being presented with subject/sector-relevant problems from a variety of perspectives and from being given the opportunity to explore them using a variety of approaches and schools of thought. For example, it would be beneficial if practicing network analysts were available to present talks and discussions to the learners.

Assessment evidence guidance

Evidence must be produced to show how a learner has met each of the Learning Outcomes. This evidence could take the form of assignments, project portfolios, presentations or, where appropriate, reflective accounts.

Where group work/activities contribute to assessment evidence the individual contribution of each learner must be clearly identified.

All evidence must be available for the visiting moderator to review. Where learners are able to use real situations or observations from work placement, care should be taken to ensure that the record of observation accurately reflects the learner's performance. This should be signed, dated, and included in the evidence. It is best practice to record another individual's perspective of how a practical activity was carried out. Centres may wish to use a witness statement as a record of observation. This should be signed and dated and included in the evidence.

RESOURCES

Books

Stanek, W. R. *Windows Server 2008 Administrator's Pocket Consultant 2nd Edition,* Microsoft Press, 2010.

Dye, M.A, McDonald, R., Rufi, A.W. *Network Fundamentals,* Cisco Press, 2008.

Websites

Microsoft. (2003). *How DHCP Technology Works.* Retrieved from Technet: http://technet.microsoft.com/en-us/library/cc780760(v=WS.10).aspx

Microsoft. (2003). *Technet.* Retrieved from How DNS Works: http://technet.microsoft.com/en-us/library/cc772774(v=WS.10).aspx

Ubuntu. (2012). *Domain Name Service (DNS).* Retrieved from Ubuntu Server Guide: https://help.ubuntu.com/12.04/serverguide/dns.html

Ubuntu. (2012). *Dynamic Host Configuration Protocol (DHCP).* Retrieved from Ubuntu Server Guide: https://help.ubuntu.com/12.04/serverguide/dhcp.html