Unit 24: Networking Technologies

Unit code: M/601/0472

QCF Level 4: BTEC Higher National

Credit value: 15

- **Aim**

To enable learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology.

- **Unit abstract**

Understanding of the underlying principles of networking is of vital importance to all IT professionals in an environment that is increasingly complex and under continuous development.

The aim of this unit is to provide a background to the basic components of networked systems from which all networking operations derive. It also includes the evaluation of networks and network applications.

Learners taking this unit will explore a range of hardware and technologies, culminating in the design and deployment of a networked system. Working with many technologies, this unit can be used for mobile systems, local area networks as well as larger scale wider area networked systems. Supporting a range of units in the Higher National suite this unit underpins the principles of networks for all and enables learners to work towards their studies in vendor units if applicable.

- **Learning outcomes**

On successful completion of this unit a learner will:

1 Understand networking principles

2 Understand networking components

3 Be able to design networked systems

4 Be able to implement and support networked systems.

Unit content

1 Understand networking principles

Role of networks: purpose, benefits, resource implications, communications, working practice, commercial opportunity, information sharing, collaboration

System: types, eg peer based, client-server, cloud, cluster, centralised, virtualised

Networking standards: conceptual models eg OSI model, TCP/IP model; standards: eg IEEE 802.x

Topology: logical eg Ethernet, Token Ring; physical eg star, ring, bus, mesh, tree, ring

Communication: bandwidth, throughput

Protocols: relationship to networking standards; purpose of protocols; routed protocols eg IPv4, IPv6, FTP, HTTP, SMTP, POP3, SSL; management of protocols for addressing; routing protocols eg RIP, RIPv2, OSPF, OSPFv3, BGP

2 Understand networking components

Hardware components: workstation eg mobile, fixed, handheld, console; servers; switches; routers; cabling; hubs; repeaters; bridges; wireless devices; mobile eg 3G, 4G, GPRS

Software components: software eg client software, server software, client operating system, server operating system

Server: type eg firewall, email, web, file, database, combination, virtualisation, terminal services server

Server selection: cost, purpose, operating system requirement

Workstation: hardware eg network card, cabling; permissions; system bus; local-system architecture eg memory, processor, I/O devices

3 Be able to design networked systems

Bandwidth: expected average load; anticipated peak load; local internet availability; cost constraints

Users: quality expectations, concept of system growth

Applications: security requirements, quality of service needs

Communications: suited to devices, suited to users, supportive of lifestyle desires, supportive of commercial requirements

Scalable: able to support device growth, able to support addition of communication devices, able to cope with bandwidth use and trend changes, protocol utilisation, addressing

Selection of components: supporting infrastructure needs; supporting connectivity requirements

4 **Be able to implement and support networked systems**

Devices: installation of communication devices, allocation of addresses, local client configuration, server configuration, server installation

Connectivity: installation of internet work communication medium

Testing: communication; bandwidth

User access: bandwidth, applications, devices

Policy review: bandwidth, resource availability

System monitoring: utilisation, bandwidth needs, monitoring user productivity

Maintenance schedule: backups, upgrades, security, auditing

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	Assessment criteria for pass 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.

Guidance

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

The learning outcomes associated with this unit are closely linked with:

Level 3	Level 4	Level 5
Unit 5: Managing Networks	Unit 2: Computer Systems	Unit 36: Internet Server Management
Unit 9: Computer Networks	Unit 25: Routing Concepts	Unit 43: Networking Infrastructure
Unit 10: Communication Technologies	Unit 26: Design a Small or Home Office Network	Unit 44: Local Area Networking Technologies
Unit 32: Networked Systems Security	Unit 27: Network Operating Systems	Unit 45: Wide Area Networking Technologies
	Unit 28: IT Support for End Users	Unit 46: Network Security

This unit has links to the Level 4 and Level 5 National Occupational Standards for IT and Telecoms Professionals, particularly the areas of competence of:

- IT/Technology Infrastructure Design and Planning
- Systems Development
- IT/Technology Service Operations and Event Management
- IT/Technology Management and Support.

Essential requirements

Learners must have access to a live or 'detached' network environment to create the network infrastructure and develop their skills; this may be successfully accomplished using virtual machines.

Evaluation of current systems and solutions, commercial practices, social conditions and the culture surrounding the system in use is of as much importance as delivering work supporting potential understanding of the technological systems and the services they offer.

Implementation of the networked system must be tested systematically and based on the technology used in the design solution. The final system implemented may be on a live system, but ideally should be tested in a simulated or sand box environment.

Resources

Books

Burgess M – *Principles of Network and System Administration, 2nd Edition* (John Wiley and Sons Ltd, 2003) ISBN 0470868074

Hallberg B – *Networking*: *A Beginner's Guide*, *4th Edition* (Osborne/McGraw-Hill US, 2005) ISBN 0072262125

Limoncelli T and Hogan C – *The Practice of System and Network Administration* (Addison Wesley, 2001) ISBN 0201702711

Lowe D – *Networking All-in-One Desk Reference for Dummies, 2nd Edition* (Hungry Minds Inc US, 2005) ISBN 0764599399

More M, Southwick P, Pritsky T and Riggs C – *Telecommunications*: *A Beginner's Guide* (McGraw-Hill Education, 2001) ISBN 0072193565

Olifer N and Olifer V – *Computer Networks: Principles, Technologies and Protocols for Network Design* (John Wiley and Sons Ltd, 2005) ISBN 0470869828

Schiller J – *Mobile Communications*, *2nd Edition* (Addison Wesley, 2003) ISBN 0321123816

Subramanian M – *Network Management: An Introduction to Principles and Practice* (Addison Wesley, 2000) ISBN 0201357429

Websites

www.cisco.com

www.howstuffworks.com

www.webopedia.com

www.wikipedia.org

Employer engagement and vocational contexts

Working with a live system will present many risks, that the centre, employer and learner must be aware of using a current vocational context to deploy an additional or alternate solution will enhance the learners experience and enable understanding of wider technical application.