

Unit 16: Setting up an IT Network

Unit code:	M/601/3274
QCF Level 2:	BTEC Specialist
Credit value:	10
Guided learning hours:	60

Aim and purpose

This unit enables learners to understand the role of IT networks in organisations, including their features, services and components and be able to set up a small network for personal or commercial use.

Unit introduction

This unit starts by investigating the role of networks in organisations and how their services can be utilised to manage resources. The components that make up networks, including hardware devices and software, are investigated and the knowledge and understanding used to setup and test a simple local area network.

The practical activities in this unit can be addressed using a range of technologies and can be adapted to current devices, communication mediums and methods. Learners will gain knowledge of the individual hardware and software components and how they interconnect within a whole system.

Networking skills are particularly valued in the IT industry and this unit provides a solid foundation for learners to gain theoretical knowledge and practical application skills in networking.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Know the current use of computer networks	1.1 describe how the use of computer networks can improve communications for individuals and organisations 1.2 describe how a network is used by an organisation to manage its resources 1.3 describe potential issues with computer networks
2 Know the features and services of local and wide area network technologies	2.1 discuss the features and services of local and wide area network technologies
3 Understand how network hardware and software components are connected	3.1 explain how hardware, software and addressing combine to support network communications
4 Be able to set up a simple local area network	4.1 set up and test a simple local area network

Unit content

1 Know the current use of computer networks

Communication: individuals eg blogs, email, forums; organisations eg email, wikis, file storage, data centres; collaborative eg social networking, conferencing eg desktop sharing, video, audio; file sharing

Resource management: data; hardware; software

Issues: speed eg bandwidth, contention; costs; staff skills; down time; security issues eg unauthorised access, loss of data, malware, virus protection; backup eg recovery; hacking; firewalls

2 Know the features and services of local and wide area network technologies

Features: topologies eg star, bus, circle; types eg peer-to-peer, client server; data rates; addressing eg IP, MAC

Services: communication eg email, conferencing; file transfer; login; security; software deployment

Protocols: TCP/IP; purpose and function eg addressing, network, transport, application

3 Understand how network hardware and software components are connected

Hardware: network cards eg ethernet, wireless; workstations; servers eg file, printer, web; routers; switches; wireless devices

Communication: network cabling eg fibre optics, UTP, STP, coaxial; connectors; addressing; WAN connectivity eg ADSL, ISDN, broadband

Software: application-based eg internet browsers, firewalls, email; operating system; utility

4 Be able to set up a simple local area network

Preparation: components eg cabling, devices, network interface cards, software

Set up: hardware; software; security; health and safety awareness

Simple LAN: eg peer to peer, client-server

Faults: commonly occurring eg address conflict, network card failure, faulty cable; loss of service eg print, file, email

Testing: functionality; connectivity; addressing

Security: eg firewall configuration, file and folder permissions, access control, user rights

Use: communication; transfer files; others eg allocate user rights, allocate file space

Troubleshoot: problem solving eg connectivity, IP addresses

Essential guidance for tutors

Delivery

An emphasis on the practicality and application of different types of IT network is encouraged, together with the use of focused visits to a workplace and demonstrations by experienced practitioners such as school or college network staff. Talks by technicians are likely to be particularly valuable and will help to provide the required, realistic perspective. The IT network is not specified, and centres may use wired, wireless or a combination of the two as a solution for learners to resolve.

A work scheme can broadly follow the ordering of the unit content. However, introducing practical activities involving the identification of network components and use of network software early in the unit, would add motivation and interest as well as putting the theory in context. Constant reference should be made to real components as their functions and purpose are described, in order that learners feel comfortable in recognising and handling them. Large wall displays with diagrammatic representations of networks would be useful.

Some benefits and disadvantages of the using networks can be identified by the study of questionnaires given to a range of end users or through talks and visits – ideally, visiting speakers should be primed to cover various aspects of their networks. The content that relate to this unit using appropriate and consistent terminology.

Case studies can be used to provide opportunities for the selection decisions about the need for a network and the type of network chosen. Case studies should contain detail about the business need as well as detailed user requirements.

The internet could be introduced as one example of a wide area network and the easy availability of this network can be used to provide access to some of the services and functions of networks in general.

Although there is opportunity for learners to set up and test a network, it will be expected that, at this level, this will be carried out in a controlled and limited environment and that detailed instructions will be made available to learners. Although there are resource implications, the benefits to learners in respect of positive feedback and satisfaction will be considerable. Examples include simple peer-to-peer networks involving low specification computers and low cost network cards and communicators. It is expected that the set up process will include the installation of network cards and this will involve careful consideration and planning in respect of health and safety. Small groups in dedicated workshops are recommended.

The testing of functionality can be introduced via activities whereby learners find introduced faults in set up networks. This enables them to gain experience in troubleshooting, even if their own network functions correctly.

Diagrammatic representations of networks should be used throughout the delivery of the unit. The unit must be completed with 'real practical' resources, but simulation packages such as packet tracer may be used to support learning.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments. The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to the unit
<p>How are networks used?</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on how we communicate with networks • whole-class exercise – tutor presentation on how networks are used to manage resources • whole-class exercise – tutor presentation on what issues come with using a network.
Assignment 1 - What's the Use?
<p>LANs and WANs:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the features and services of LANs and WANs • directed research – learners investigate protocols, what they are, how they work • individual exercise – learners use tutor-set scenarios to look at the main security issues networks face.
Assignment 2 - Insecure?
<p>Understanding network hardware and software:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on network hardware, followed by individual exercise • whole-class exercise – tutor presentation on network software, followed by individual exercise • whole-class exercise – tutor presentation on how to communicate through a network, followed by individual exercise • directed research – learners look at common faults in a network system
Assignment 3 - Network
<p>Setting up a LAN:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the required components • individual exercise – learners practice setting set up a LAN • individual exercise – learners test a network and troubleshoot issues.
Assignment 4 - Applying the Knowledge

Assessment

It is suggested that this unit is assessed using four assignments as summarised in the *Programme of suggested assignments* table.

In order to achieve a pass, learners must achieve the six pass criteria listed in the assessment and grading criteria grid.

For 1.1, descriptions provided do not need to relate to a given case study or organisation. Learners should cover how networks can improve communications between internal and external bodies as well as making standard ways of working possible. 'Improvements' should be understood to mean a comparison with situations where no network is available. The evidence could be a poster presentation.

Evidence for 1.2 could be derived from a given case study or a structured workplace visit. Learner evidence needs to include how networks allow sharing of information, hardware, software and staffing. Tutors may guide learners towards researching and describing the Data Protection Act as it applies to shared data. A presentation would be the most appropriate evidence.

Evidence for 1.3 could include slowing down of response times, security issues, broken connections, hardware failure, software problems and user errors. Evidence could be a leaflet or a report.

For 2.1, learners will describe the features and services of local and wide area network technologies. The network technologies chosen should be complex enough to involve features, services, protocols and data security issues as detailed below and can be based on case studies. Features should include topologies, peer-to-peer, client server and network access methods. Services should include communication, file transfer and online databases. Protocols should include their purpose and function with an example. Data security issues should include access control, virus protection, backup, hacking and firewalls. A verbal presentation or report could be used as evidence.

For 3.1, learners could use either a peer to peer or client server network with internet connectivity and explain how users connect to and use resources and access the internet.

4.1 is a practical activity where learners need to be observed setting up, using and testing a simple local area network. Learners may work in small groups due to resource issues but it is important that evidence for each learner is available for how they prepared, set up, tested and used the network. It is acceptable for the centre to prepare check lists and sign off sheets in order to provide a framework for learners which can then be submitted with hard copy or observational evidence. Acceptable evidence would be a signed observation record with a report from each learner detailing how they completed this task.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the assessment criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
1.1, 1.2	What's the Use?	A firm's manager would like you to create a poster explaining to employees how a new IT network will help the organisation work better.	Poster.
1.3	Insecure?	The same firm now wants a pamphlet for its staff explaining network issues and how they can be dealt with.	Create a pamphlet or leaflet.
2.1, 3.1	Network	The firm's senior management wants a special briefing on how to set up, manage and maintain a network.	Individual presentation.
4.1	Applying the Knowledge	Finally, the company wants you to set up a basic network and troubleshoot it.	Practical task with report.

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

This unit forms part of the BTEC in IT sector suite. This unit has particular links with:

Level 1	Level 2	Level 3
	Networking Principles	Networking Principles
	Telecommunications Principles	Telecommunications Principles
	An Introduction to Communication Technologies	Communication Technologies
		Managing Networks
		Computer Networks

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 2 National Occupational Standards for IT (ProCom):

- 7.6 Availability Management
- 7.7 IT/Technology Capacity Management.

Essential resources

Learners will need access to networking equipment and communications technology, they can also use simulators such as Packet Tracer to develop their understanding of concepts.

For this unit learners will need good background materials in the form of handouts and diagrams of network structures and network operations. These can be placed into context by the use of case studies or local examples.

Learners need also to have access to research materials and case study examples. A suitable course textbook may also prove effective in providing essential background reading.

Some hardware and software will be needed for the practical aspects of the unit. As a minimum, each candidate will need access to two PCs with network cards, cabling and appropriate software and simple manuals for the setting up and testing of the network. The practical activity, although limited, should take place in a well-appointed workshop with appropriate tools and, take account of health and safety requirements. Access to technical support is seen as valuable, unless the assessor is well experienced in such practical activity.

For support to demonstrations and theory sessions, a wide range of currently available components should be available for learners to study and handle.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able help centres to engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Local, regional business links – www.businesslink.gov.uk
- National Education and Business Partnership Network – www.nebpn.org
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work-based learning guidance – www.aimhighersw.ac.uk/wbl.htm
- Work experience/workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Indicative reading for learners

Textbooks

Donahue G A – *Network Warrior* (O'Reilly Media, 2007) ISBN 0596101511

Hogan C J, Chalup S R and Limoncelli T – *The Practice of System and Network Administration* (Addison Wesley, 2007) ISBN 0321492668

Lowe D – *Networking for Dummies* (For Dummies (Computers) (John Wiley & Sons, 2007) ISBN 0470056207

Journal

Network World

Websites

www.networktutorials.info/index.html

www.practicallynetworked.com

Functional Skills – Level 2

Skill	When learners are ...
ICT - Using ICT	
Plan solutions to complex tasks by analysing the necessary stages	providing troubleshooting advice for connectivity problems in a local area network
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	setting up a network, including security features explaining how security issues can be minimised.