



## Higher National Unit Specification

### General information

**Unit title:** Computer Networking: Introduction for Business  
(SCQF level 7)

**Unit code:** HT9L 34

**Superclass:** CB

**Publication date:** August 2017

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

The purpose of this unit is to provide learners with an overview of computer networking used within a business environment. It will identify and describe the basic components required for computer networking and build towards the explanation of communication models.

This unit addresses network topologies leading to organisational network scopes (eg intranet/extranet) within a business. Network addresses and network boundaries are discussed and explored (eg basic subnets/network dimensions). The unit covers the requirements, from a business perspective, to maintain security from a small home office network (SOHO) to a large corporate network, and network access both internal and external, is investigated and explored.

To aid understanding learners will be given the opportunity to apply the theoretical knowledge studied, in a hands-on practical environment. The practical environment will allow the learner the opportunity to configure and use a local area network and connect to wide area network systems. Learners will also utilise basic network troubleshooting tools and techniques to ensure basic network connectivity prior to seeking specialist help.

On completion of the unit, learners will understand the requirements and concepts behind computer networks. They will attain the skillset to configure and troubleshoot basic computer networking used in a business environment.

## Higher National Unit Specification: General information (cont)

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(SCQF level 7)

### Outcomes

On successful completion of the unit, the learner will be able to:

- 1 Describe the components involved in network structures.
- 2 Describe the characteristics and security requirements of networks.
- 3 Apply networking skills in a business environment.

### Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

### Recommended entry to the unit

This is an introductory unit in computer networking and, as such, there are no recommended entry requirements. There is no requirement for previous knowledge or experience in computer networks.

### Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this unit specification.

There is no automatic certification of Core Skills or Core Skill components in this unit.

### Context for delivery

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

### Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## Higher National Unit Specification: Statement of standards

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(SCQF level 7)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### Outcome 1

Describe the components involved in network structures.

#### Knowledge and/or skills

- ◆ Network components
- ◆ Network structures
- ◆ Theoretical communication models
- ◆ Practical communication models

### Outcome 2

Describe the characteristics and security requirements of networks.

#### Knowledge and/or skills

- ◆ Network characteristics
- ◆ Network topologies
- ◆ Organisational network scopes
- ◆ Network addresses
- ◆ Security requirements of networks

### Outcome 3

Apply networking skills in a business environment.

#### Knowledge and/or skills

- ◆ Local area network access
- ◆ Remote access connections
- ◆ Basic troubleshooting skills

## Higher National Unit Specification: Statement of standards (cont)

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(SCQF level 7)

### Evidence requirements for this unit

Learners will need to provide evidence to demonstrate their knowledge and/or skills across all outcomes by showing that they can produce:

- ◆ knowledge evidence
- ◆ product evidence

The knowledge evidence will comprise the descriptions required in Outcomes 1 and 2. Evidence is normally required for all of the associated knowledge; however, sampling is permissible when testing is used (see below).

This knowledge evidence may be sampled through testing. Given that the focus is breadth rather than depth, sampling must be wide and shallow (such as the use of multiple choice or short answer questions) rather than narrow and deep (such as the use of an essay on one element of the knowledge domain). When testing is used, it must be controlled in terms of location, timing and access to reference materials. Re-assessment requires a significant change in the question set.

The product evidence will comprise of evidence that the learner has applied knowledge and skills in a specific task as required in Outcome 3. The evidence will take the form of a computer network configuration. At least one computer network must be configured. At this level, it is anticipated that the type of network will be non-complex, and the types of tools and techniques employed will be basic. The solution(s) can take any appropriate form but must be capable of being evidenced in the form of a product (such as a report, video or detailed observational checklist). This evidence may be produced under open-book conditions.

The SCQF level of this unit provides additional context on the nature of the required evidence and the associated standards. The following level descriptors are particularly relevant to the knowledge evidence:

- ◆ An overall appreciation of the body of knowledge
- ◆ Knowledge that is embedded in the main theories, concepts and principles
- ◆ An awareness of the dynamic nature of knowledge and understanding
- ◆ Use some of the basic and routine professional skills, techniques, practices and materials
- ◆ Use a range of approaches to address defined and/or routine problems
- ◆ Exercise some initiative and independence in carrying out defined activities at a professional level

These level descriptors should be used (explicitly or implicitly) when making judgements about the evidence.

The amount of evidence should be the minimum consistent with the defined knowledge and skills. When evidence is produced in open-book conditions it must be authenticated. The *Guide to Assessment* provides further advice on methods of authentication.

The *Guidelines on Approaches to Assessment* (see the support notes section of this specification) provides specific examples of instruments of assessment.



## Higher National Unit support notes

**Unit title:** Computer Networking: Introduction for Business  
(SCQF level 7)

Unit support notes are offered as guidance and are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

### Guidance on the content and context for this unit

The general context for this unit is an overview of networking technologies. The unit is intended for non-specialists with no requirement of prior knowledge. The unit identifies with the following National Occupation Standards (NOS) for ICT:

- ◆ ESKIIICF1 IT communication fundamentals
- ◆ ESKISIS2 Set up an IT system
- ◆ ESKIITS3 IT security for users

The unit is intended as a general introduction to computer networking in a business environment and there is no requirement to dive deep into networking theory. Basic knowledge of each topic is sufficient. For example, the construction of network packets, frames, routing and congestion theories would be considered too deep for this audience. It is expected that a basic level of knowledge will be sufficient to allow learners to achieve this unit. Where possible real world events should be used to underpin theoretical knowledge.

#### Outcome 1

This outcome introduces the components used in the construction of networks. Technologies used in the following environments should be identified and explained:

- ◆ Small Office/Home Office (SOHO)
- ◆ Small and Medium-sized Enterprises (SMEs)
- ◆ Large enterprises

At the time of writing (2017) components that should be discussed are listed below, the list is not exhaustive and should be updated as technologies evolve:

- ◆ Network interfaces
- ◆ Network access devices
- ◆ Switches
- ◆ Routers
- ◆ Access points
- ◆ Firewalls
- ◆ Intrusion Protection Systems (IPS)
- ◆ Intrusion Detection Systems (IDS)

## Higher National Unit support notes (cont)

### **Unit title:** Computer Networking: Introduction for Business (SCQF level 7)

The theory of how information travels across the network should be discussed. For example, the Shannon and Weaver communication model in conjunction with the Open System Interconnect (OSI) model should be explained and discussed. The responsibility of each layer in the OSI model would be a sufficient level of knowledge. The encapsulation/de-encapsulation process should be explained. The TCP/IP protocol suite should be discussed and a comparison between this and the OSI should be drawn.

The scale of computer networks should be explained and the best network for environments explored, eg peer to peer, client/server.

An overview of technologies that permit internetwork communication should be discussed, eg Network Address Translation (NAT).

### **Outcome 2**

This outcome discusses the contemporary networks as identified in the non-exhaustive list:

- ◆ Star
- ◆ Extended star
- ◆ Mesh
- ◆ Partial mesh

Each topology should be explained and the advantages and disadvantages of each described.

The implementation and application of organisational network scopes should be discussed. Intranets, extranets, internetworks and the internet should be explained in the context of business use. Their uses and benefits they provide to the organisation should be explored.

The concept of network addresses should be explained. IPv4 and IPv6 should be discussed in an overview capacity. Network boundaries (subnets) should be explained, logical ANDing from binary could be used to help clarify the boundaries.

Security practices for each organisational network scope should be discussed with emphasis on the dangers of an insecure network. Each environment will have differing levels of security; each should be discussed and current best practices explained.

### **Outcome 3**

This outcome delivers the practical skillset for the unit. Learners should construct a network either in a physical or virtualised environment. The network should consist of a minimum of three nodes. Where possible, a variety of nodes should be experienced and exposure to wired and wireless technologies should be given where possible.

Clients should be configured to connect remotely to a network. Learners are not expected to configure a WAN environment but should be provided the opportunity to connect to WAN environments.

## Higher National Unit support notes (cont)

**Unit title:** Computer Networking: Introduction for Business  
(SCQF level 7)

Basic connectivity troubleshooting methods and tools should be explained and used, eg bottom up checking physical parts, ipconfig and ping for connectivity checks.

### Guidance on approaches to delivery of this unit

It is recommended that the knowledge outcomes are taught in sequence (1, 2 and 3). A suggested distribution of time, across the outcomes, is:

Outcome 1	10 hours
Outcome 2	10 hours
Outcome 3	20 hours

The topics within the unit can be explained through the use of video and audio materials. A learner-centred approach to teaching is recommended. Most of the topics can be independently researched by each learner. However, when this approach is used, it is vital that the teacher provides context and sets objectives for this learning and regularly reviews progress. Group discussions are also suggested.

Summative assessment may be carried out at any time. However, when testing is used (see evidence requirements) it is recommended that this is carried out towards the end of the unit (but with sufficient time for remediation and re-assessment).

There are opportunities to carry out formative assessment at various stages in the unit. For example, formative assessment could be carried out upon the completion of each outcome to ensure that learners have grasped the knowledge contained within it. This would provide assessors with an opportunity to diagnose misconceptions and intervene to remedy them before progressing to the next outcome.

### Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

A traditional approach to (summative) assessment would involve a multiple choice test (for knowledge evidence) and a practical assignment (for product evidence).

The multiple choice test could cover all of the knowledge contained within Outcomes 1 and 2 and last one hour. It could consist of four options (one key) with a pass mark of 60%. The test could consist of 35 multiple choice questions, which would span both of the outcomes and sample all of the knowledge statements.

## Higher National Unit support notes (cont)

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The practical assignment would involve the learner configuring a network to a given specification, connection to WAN environments and basic troubleshooting techniques. This could take the form of three separate practical tasks, or basic troubleshooting could be incorporated into a LAN and WAN task.

### Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

### Opportunities for developing Core and other essential skills

Although this unit does not embed any Core Skills, there are opportunities to develop the Core Skill in *Problem Solving* through their use of troubleshooting skills (Outcome 3).



## History of changes to unit

Version	Description of change	Date

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## General information for learners

### **Unit title:** Computer Networking: Introduction for Business (SCQF level 7)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This unit is an introduction to computer networking for the beginner. It is suitable for learners who are undertaking a wide range of qualifications. No previous knowledge of computing is required for you to benefit from taking this unit.

The unit covers the theory and practice of computer networking. You would benefit from undertaking this unit if you want to know more about the basics of computer networking and how it can be used in practice.

The unit covers the following topics:

- ◆ Basic network components used in constructing and configuring networks
- ◆ Theoretical communication models used to create rules and regulations within computer networking
- ◆ Practical communication models used in contemporary computer networks
- ◆ Network topologies used in contemporary computer networks
- ◆ Organisational network scopes used in business environments
- ◆ Network addresses used in contemporary computer networks
- ◆ Basic security requirements of computer networks in business environments
- ◆ Types of network devices and how they connect to different computer networks
- ◆ Connection to computer networks from remote locations
- ◆ Basic network troubleshooting techniques and tools

The treatment of each topic is light. This is not a Computer Science unit. It will be delivered in an accessible and interesting way, audio and video materials may be used to enliven learning.

Teaching methods could include self-learning, research and group discussion.

The unit can be assessed in a number of ways including, for example, a multiple choice test, writing a blog, recording a video of your learning or a detailed observation checklist. Whatever approach is taken, most of your time will be spent learning — not being assessed.

At the end of the unit you will know the basics of computer networking, where it is used and why it is beneficial, how it can enhance your job, and how it is impacting on the world around you.