

## SQA Advanced Unit specification: general information

**Unit title:** Computer Networking: Practical

**Unit code:** HP20 47

**Superclass:** CB

**Publication date:** August 2017

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

This unit is designed to introduce candidates to the basic components of contemporary local area networks (LAN) and wide area networks (WANs). Candidates will gain practical experience of implementing a client server local area network using industry-standard equipment and protocols. Candidates will also learn how to configure appropriate devices to allow a remote computer to gain access to the LAN.

The unit is intended for candidates undertaking an SQA Advanced Certificate in Computing, or a related SQA Advanced course in the Computing framework.

On completion of the unit the candidate should be able to:

- 1 implement a client server local area network.
- 2 diagnose and rectify network problems.
- 3 provide a remote computer with access to the LAN.

### Recommended prior knowledge and skills

Access to this unit will be at the discretion of the centre. It is recommended that candidates should already have undertaken Unit HR87 47 *Computer Networking: Fundamentals*.

### Credit points and level

1 SQA credit at SCQF level 7: (8 SCQF credit points at SCQF level 7\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from National 1 to Doctorates.*

## **SQA Advanced Unit Specification**

### **Core Skills**

Opportunities to develop aspects of Core Skills are highlighted in the support notes of 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.

**Unit specification: statement of standards**

**Unit title:** Computer Networking: Practical

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The sections of the unit stating the outcomes, Knowledge and/or Skills, and evidence requirements are mandatory.

Please refer to *Knowledge and/or Skills for the unit* and *Evidence requirements for the unit* after the outcomes.

**Outcome 1**

Implement a client server local area network.

**Knowledge and/or Skills**

- ◆ Connect and test appropriate media for a given physical network topology
- ◆ Configure clients to connect to servers
- ◆ Verify successful address and name resolution
- ◆ Verify successful user authentication

**Outcome 2**

Diagnose and rectify network problems.

**Knowledge and/or Skills**

- ◆ Explain and use a range of TCP/IP utilities
- ◆ Troubleshoot a range of hardware and software network problems

**Outcome 3**

Provide a remote computer with access to the LAN.

**Knowledge and/or Skills**

- ◆ Configure a device to offer a remote access service
- ◆ Configure a remote client computer for remote access
- ◆ Connect a remote client computer to the LAN via a remote access method

## SQA Advanced Unit Specification

### Evidence requirements for the unit

The assessment of the knowledge and understanding component of the unit will comprise 20 multiple-choice/multiple-response questions relating to the TCP/IP component of Outcome 2 with appropriate sampling of at least 50% of this component.

The assessment must be undertaken in a closed-book environment where candidates have no access to the internet, books, handouts, notes or other learning material. Testing can be done in either a machine-based or paper-based format and must be invigilated. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the test. The time allowed will be one hour.

The questions presented must significantly change on **each** assessment occasion.

Candidates must answer at least 60% of the questions correctly in order to obtain a pass.

The skills component of the unit will be assessed by a practical exercise implementing a given network topology. In the assessment, candidates should be given a network scenario brief with the following minimum requirements to resolve:

- ◆ A given physical topology to build
- ◆ A given IP address structure to implement
- ◆ A requirement to configure a number of clients (minimum of two) for network communication
- ◆ A requirement for at least two servers to be accessed for network services such as user authentication, DHCP and DNS.
- ◆ A requirement to verify successful intra communication between hosts on the network
- ◆ A requirement to implement a remote access (or simulated) service
- ◆ A requirement to configure a client for remote access
- ◆ A requirement to verify successful remote access from a client

### SQA Advanced Unit specification: support notes

#### Unit title: Computer Networking: Practical

This part of the unit specification is offered as guidance. The support notes 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 suggested time allocation for each Outcome (including assessment) is as follows:

Outcome 1 — 20 hours

Outcome 2 — 10 hours

Outcome 3 — 10 hours

As it is likely that the bulk of the material in this unit will be delivered through lecturer exposition, it is important that every opportunity is taken to introduce real-world examples, opportunities for whole-class and group discussion and practical demonstrations wherever possible. Concepts and terminology should be presented in context throughout the unit. Candidates should be strongly encouraged to undertake further reading and opportunities for individual or group research should be provided.

Outcome 1 covers the practical skills involved in implementing a small client server local area network.

Candidates should participate in exercises to configure and connect clients and servers and should be able to gain first-hand experience of the range of industry-standard equipment used to connect and configure devices on a LAN. It is therefore important that resources are available to permit this.

Appropriate media should be selected and tested to connect clients and servers. Ideally end devices should be connected through structured cabling to a patch panel where appropriate connections to an appropriate networking device, eg a switch, can be made. Alternatively, wireless or a combination of wired and wireless media could be selected.

Pre-configured servers providing clients with services such as authentication, DNS and DHCP should be made available.

Outcome 2 covers the use of diagnostic tools to locate and rectify network faults.

Candidates should be introduced to a range of utility programs such as ipconfig, ping, arp, getmac, netstat and, where appropriate, cable testing tools. These tools should be discussed and appropriately demonstrated in the context of fault diagnosis and resolution.

Outcome 3 covers the use of appropriate technologies to connect a remote computer to a LAN.

There are a variety of methods for connecting a client computer, ideally through VPN connection, to a LAN to access network resources. The technologies used will vary from centre to centre and candidates should participate in exercises to configure a remote computer to connect to a LAN using the preferred technology for their respective centre.

## SQA Advanced Unit Specification

### Guidance on the delivery of this unit

This unit will probably be delivered as part of an SQA Advanced Certificate in Computing group award. It is recommended that the Unit HR87 47 *Computer Networking: Fundamentals* is delivered as a prerequisite to the unit. It is also recommended that this unit is scheduled following delivery of other core units such as *Troubleshooting Computer Problems*.

### Guidance on the assessment of this unit

#### Assessment guidelines

It is recommended the unit should be assessed by two instruments of assessment: a multiple-choice/multiple-response test covering the knowledge and understanding of the TCP/IP component of Outcome 2 and a skills test covering all the unit outcomes.

The multiple-choice/multiple response test shall comprise a total of 20 questions and will be undertaken in closed-book conditions. Centres cannot deviate from this where they choose to devise their own instruments of assessment. A sample of 50% of knowledge area should be examinable in any test set.

With regard to the skills test, competence can be demonstrated by a series of observation checklists relating to the respective tasks undertaken within the assessment.

### Online and distance learning

The practical nature of this unit does not lend itself to online and distance learning methods.

If this unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.

### Opportunities for the use of 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 candidate evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*.

### Opportunities for developing Core Skills

There are no opportunities to develop Core Skills in this unit.

### 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).

## History of changes

Version	Description of change	Date

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

**FURTHER INFORMATION:** Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our [Centre Feedback Form](#).

### General information for candidates

#### Unit title: Computer Networking: Practical

This is a single credit unit at SCQF level 7 and is designed to allow you to gain hands-on experience of implementing a client server local area network using industry-standard equipment and protocols. You will also learn how to configure appropriate devices to allow a remote computer to gain access to the LAN.

Outcome 1 covers the practical skills involved in implementing a small client server local area network.

You will participate in exercises to configure and connect clients and servers and should be able to gain first-hand experience of the range of industry-standard equipment used to connect and configure devices on a LAN. Appropriate media should be selected and tested to connect clients and servers. Ideally end devices should be connected through structured cabling to a patch panel where appropriate connections to an appropriate networking device, eg a switch, can be made. Alternatively, wireless or a combination of wired and wireless media could be selected.

Pre-configured servers providing clients with services such as authentication, DNS and DHCP should be made available.

Outcome 2 covers the use of diagnostic tools to locate and rectify network faults.

Candidates should be introduced to the range of utility programs such as ipconfig, ping, arp, getmac, netstat and, where appropriate, cable testing tools. These tools should be discussed and appropriately demonstrated in the context of fault diagnosis and resolution.

Outcome 3 covers the use of appropriate technologies to connect a remote computer to a LAN.

There are a variety of methods for connecting a client computer, ideally through VPN connection, to a LAN to access network resources. You will participate in exercises to configure a remote computer to connect to a LAN using the preferred technology for your centre.

The unit will be assessed by two instruments of assessment: a multiple-choice/multiple-response test covering the knowledge and understanding of the TCP/IP component of Outcome 2 and a skills test covering all the unit outcomes.

The multiple-choice/multiple-response test shall comprise a total of twenty questions and will be undertaken in closed-book conditions.

With regard to the skills test competence can be demonstrated by a series of observation checklists relating to the respective tasks undertaken within the assessment.