**-SQA- SCOTTISH QUALIFICATIONS AUTHORITY**

**HIGHER NATIONAL UNIT SPECIFICATION**

**GENERAL INFORMATION**

**-Unit Number-** **D3BY 04**

**-Superclass-** **CB**

**-Title-** **NETWORK TECHNOLOGY (MICROSOFT)**

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**-DESCRIPTION-**

**GENERAL COMPETENCE FOR UNIT**: Describing the principles of operation of data communications equipment for computer networking and applying these to the design of a network system.

**OUTCOMES**

1. describe the main physical features of computer networks;
2. describe the operation of computer networks,
3. select appropriate hardware for use in a local area network;
4. describe the features and operation of wide area networks.

**CREDIT VALUE**: 1 HN Credit

**ACCESS STATEMENT**: Candidates should have prior experience of using a computer system and knowledge of the organisation and operation of computer hardware and communications. This may be evidenced by the possession of relevant HN units such as 8412465 Computer Architecture, 8412485 Hardware Installation and Maintenance and 8560085 Data Communications - or extensive practical experience.

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For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

Additional copies of this unit may be purchased from SQA (Sales and Despatch section). At the time of publication, the cost is £2.50 (minimum order (£5.00).

## HIGHER NATIONAL UNIT SPECIFICATION

## STATEMENT OF STANDARDS

**UNIT NUMBER**: D3BY 04

**UNIT TITLE**: NETWORK TECHNOLOGY (MICROSOFT)

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

### OUTCOME

**1.** DESCRIBE THE MAIN PHYSICAL FEATURES OF COMPUTER NETWORKS

### PERFORMANCE CRITERIA

(a) Benefits of computer networking are correctly described.
(b) Limitations on the transfer of data are correctly described.
(c) Common network topologies are accurately described.
(d) Common data transmission media are correctly described and their data transfer limitations accurately identified.
(e) The physical characteristics of common data transmission media are correctly identified.

### RANGE STATEMENT

Benefits: resource sharing; data distribution.

Data transfer limitations: bandwidth; speed; distance; reliability; quality; security.

Topologies: ring; bus; star.

Data transmission media: cable; optical fibre; wireless.

### EVIDENCE REQUIREMENTS

Written evidence that the candidate can describe the main physical features of computer networks as detailed in the performance criteria.

**OUTCOME**

**2.** DESCRIBE THE OPERATION OF COMPUTER NETWORKS

**PERFORMANCE CRITERIA**

(a) Methods of sharing transmission media are correctly described.
(b) Data transfer protocols are correctly described.
(c) The principle features of each layer of the Open System Interconnection (OSI) model are accurately identified.
(d) Common network configurations are correctly described and their relative merits correctly evaluated.

**RANGE STATEMENT**

Sharing methods: carrier sense multiple access/collision detection (CSMA/CD); carrier sense multiple access/collision avoidance (CSMA/CA); token passing.

Protocols: network layer; data link layer.

Configurations: client-server; peer-to-peer.

**EVIDENCE REQUIREMENTS**

Written evidence that the candidate can describe the operation of local area networks as detailed in the performance criteria.

**OUTCOME**

**3.** SELECT APPROPRIATE HARDWARE FOR USE IN A LOCAL AREA NETWORK

**PERFORMANCE CRITERIA**

(a) The hardware components of a LAN are correctly described.
(b) Operational requirements of LAN are accurately established.
(c) An appropriate network topology is selected and justified.
(d) Appropriate hardware components are selected to meet requirements.

**RANGE STATEMENT**

Components of LAN: servers; nodes; output devices; storage devices; transmission medium.

Operational requirements: data storage (shared and private); number of users; physical locations of server(s) and nodes; volume and type of output; backup and security; future expansion.

**EVIDENCE REQUIREMENTS**

Written evidence that the candidate can describe hardware components as detailed in Performance Criteria (a).

Performance evidence that the candidate can select hardware as detailed in PCs (b) to (d). This should be provided by selecting hardware to meet at least two different sets of requirements.

**OUTCOME**

**4.** DESCRIBE THE FEATURES AND OPERATIONS OF WIDE AREA NETWORKS

**PERFORMANCE CRITERIA**

(a) Application areas of WANs are correctly identified and described.
(b) Hardware components which extend or connect network segments are correctly described.
(c) Factors affecting or contributing to the performance of a distributed network are correctly described.
(d) Switching systems and their uses are correctly described.

**RANGE STATEMENT**

Hardware components: repeaters; bridges; routers.

Performance factors: availability; adaptive and non-adaptive routing; congestion control; shortest path algorithms.

Switching systems: circuit; message; packet.

**EVIDENCE REQUIREMENTS**

Performance evidence that the candidate can describe the features and operation of wide area networks as detailed in the performance criteria.

**MERIT** A candidate who achieves all performance criteria for all outcomes will be awarded a pass. A pass with merit may be awarded where the candidate demonstrates superior performance by:

- quality of response - depth of analysis and detail of response; or
- selecting hardware for a wide range of networking requirements; or
- providing evidence of further research or reading.

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**ASSESSMENT**

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of the assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

**SPECIAL NEEDS**

Proposals to modify outcomes, range statements or agreed assessment arrangements should be discussed in the first place with the external verifier.

## HIGHER NATIONAL UNIT SPECIFICATION

## SUPPORT NOTES

**UNIT NUMBER**: D3BY 04

**UNIT TITLE**: NETWORK TECHNOLOGY

**SUPPORT NOTES**: This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

**NOTIONAL DESIGN LENGTH**: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 40 hours. The use of notional design length for programme design and timetabling is advisory only.

**CONTENT/CONTEXT** The candidate should become familiar with all aspects of the hardware involved in assembling computer networks. Whilst Outcomes 1, 2 and 4 are mainly cognitive in nature the candidate should gain as much practical experience as resources permit. Thus, for example, samples of cables, connectors, terminators, network cards etc. should be available. Reference should be made wherever possible to actual examples of installed networks.

**APPROACHES TO GENERATING EVIDENCE** A candidate-centred, resource-based learning approach is recommended. During the course of the unit candidates should have several opportunities to develop their practical skills and should be assessed at appropriate points. Concepts and terminology should be presented in context throughout the unit.

Where the candidate is unsuccessful in achieving an outcome provision should be made for remediation and reassessment.

**ASSESSMENT PROCEDURES** Centres may use the instruments of assessment which are considered by the tutor/trainer to be the most appropriate. Examples of instruments of assessment which could be used are:

- practical exercises
- case studies
- questions
- reports
- assignments

**PROGRESSION** This unit contributes towards SQA Higher National Certificates, Higher National Diplomas and Professional Development Awards.

**REFERENCES**

1. Guide to unit writing.
2. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
3. Information for centres on SQA's operating procedures is contained in SQA's Guide to Procedures.
4. For details of other SQA publications, please consult SQA's publications list.

An exemplar assessment pack for this unit is available from SQA. Please call our Sales and Despatch section on 0141 242 2168 to check availability and costs. Quote product code C038.