

Higher National Unit Specification

General information for centres

Unit title: Implementing Small Local Area Networks

Unit code: DG40 34

Unit purpose: This Unit has been designed to allow candidates to develop an awareness of LAN topologies and network operating systems. It will also allow candidates to assess a customer's requirements and then design, and implement a LAN to suit these specifications.

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

1. Explain the main LAN types, their operation and relative merits.
2. Assess the functional requirements of a network specification and then plan a LAN installation.
3. Install and commission a small LAN.

Credit value: 1 HN 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 Access 1 to Doctorates.*

Recommended prior knowledge and skills: Candidates should have a basic knowledge and understanding of electronics. This may be evidenced by possession of Higher Electronics, Intermediate 2 Electronic and Electrical Fundamentals or the following National Qualifications Units: D186 12 Applied Electronics, E952 12 Amplification, E9S3 04 Combinational Logic and E9SB 12 Logic Families and Digital System Analysis.

Core skills: There may be opportunities to gather evidence towards Core Skills in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: This Unit was developed for the HNC/D Electronics awards. If this Unit is used in another group award(s) it is recommended that it should be taught and assessed within the context of the particular group award(s) to which it contributes.

Assessment: The assessment of this Unit should be a written assessment paper for Outcome 1 and part of Outcome 2 and an integrated assessment covering the remainder of Outcome 2 and all of Outcome 3.

General information for centres (cont)

The written paper covering Outcome 1 and the items in Outcome 2 Group A, Knowledge and Skills should consist of a suitable balance of short answer, restricted response and structured questions. The duration of the paper should be one hour and thirty minutes and the assessment conditions should be closed book and conducted under controlled supervised conditions.

The assessment covering the items in Outcome 2 Knowledge and Skills Group B and Outcome 3 should consist of a written specification defining the requirements for a small LAN. The assessment tasks should involve the candidates producing a written report defining a possible solution. This report should give justifications for the chosen solution, contain diagrams, and costs. The candidate should then demonstrate that he/she can install and set up the network. The candidates should complete the assignment in six hours.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

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. Candidates 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

Explain the main LAN types, their operation and relative merits

Knowledge and/or skills

- ◆ Explain the relationship between bandwidth and data transmission rates
- ◆ Describe the topology and operation of the main LAN types
- ◆ Explain the relative merits of each transmission media in terms of data rates, installation cost, noise immunity, reliability and cost
- ◆ Advantages/disadvantages of peer to peer and client server LANs

Evidence requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be presented in responses to specific questions. Each candidate will need to demonstrate that she/he can answer correctly questions based on a sample of the items shown above. In any assessment of this Outcome three out of four knowledge and/or skills items should be sampled.

In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of three out of four knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all three items.

Assessment guidelines

The assessment of this Outcome should be by a written assessment paper and integrated with the items in Outcome 2 Group A Knowledge and Skills

The written paper should consist of a suitable balance of short answer, restricted response and structured questions. The duration of the paper should be 1 hour and thirty minutes and the assessment conditions should be closed book under controlled, supervised conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Implementing Small Local Area Networks

Outcome 2

Assess the functional requirements of a network specification and then plan a LAN installation

Knowledge and/or skills

Group A

- ◆ Explain the effect of the size of the network on choice
- ◆ Explain the effect numbers of users and frequency of use has on the choice
- ◆ Explain the effect of types of files to be transferred across the network on bandwidth requirements and hence choice of network
- ◆ Justify the selection of either a peer to peer or client server operating system
- ◆ Explain the implication of types of external links (Internet, etc) and required data rates to the LAN

Group B

- ◆ Produce a specification for the LAN to meet a given set of requirements
- ◆ Produce a report which contains diagrams, costs and justification for a LAN design

Evidence requirements

Evidence for the items in Knowledge and Skills Group A will be provided on a sample basis. The evidence may be provided in response to specific questions. Each candidate will need to demonstrate that they can satisfactorily answer three out of five of the Knowledge and Skills items in Group A.

All candidates must produce satisfactory responses to both items listed in Knowledge and Skills Group B.

Assessment guidelines

The assessment of the items in Group A should be integrated with the assessment of Outcome 1.

The assessment of the items in Group B should be integrated with the assessment of Outcome 3 in the form of an assignment. Details of the assignment are given in Outcome 3.

Higher National Unit specification: statement of standards (cont)

Unit title: Implementing Small Local Area Networks

Outcome 3

Install and commission a small LAN

Knowledge and/or skills

- ◆ Select appropriate type of cable and connectors for the network
- ◆ Select appropriate network interface cards (NICs)
- ◆ Correctly install cables, NICs and any other necessary network equipment
- ◆ Select and install appropriate uninterruptible power supply and surge protection equipment
- ◆ Use supplied test software to verify the correct operation of the LAN

Evidence requirements

Candidates must produce correct responses to all items in the Knowledge and Skills list.

The assignment covering the items in Outcome 2 Knowledge and Skills Group B and Outcome 3 should consist of a written specification defining the requirements for a small LAN.

The specification should involve the interconnection of at least four items of equipment, one of which must be a printer.

The assignment tasks should involve the candidates producing a written report defining a possible solution. This report should give justifications for the chosen solution, contain diagrams and costs. The candidate should then demonstrate that she/he can install and set up the network

Assessment guidelines

It is intended that this Outcome be assessed by an assignment and integrated with the items in Outcome 2 Group B Knowledge and Skills. It is recommended that the candidates complete the assignment in six hours.

Administrative Information

Unit code:	DG40 34
Unit title:	Implementing Small Local Area Networks
Superclass category:	CB
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Higher National Unit specification: support notes

Unit title: Implementing Small Local Area Networks

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

Outcome 1

Explain the main LAN types, their operation and relative merits.

- ◆ An awareness of current cabling standards (BS501173 and BS501174)
- ◆ Local area network topologies including Bus, Ring and Star
- ◆ The operation of Medium Access Control methods: CSMA/CD, Token passing and FDDI
- ◆ An awareness of the IEEE 802 LAN standards
- ◆ Comparison of data rates possible with 10Base-T, 100Base-T and FDDI
- ◆ Advantages/disadvantages in terms of cost, speed and security of wired, wireless and fibre systems

The student should understand the difference between peer to peer and client/server LANs. They should also be able to explain where each would be used and the advantages and disadvantages of each.

Peer to Peer Lan

Advantages:

- ◆ easy to install and configure
- ◆ cheap compared to client/server networks

Disadvantages:

- ◆ no centralised control, hence effectively unmanageable
- ◆ not secure

Client/Server

Advantages:

- ◆ central control of network resources
- ◆ possible to set stringent controls on security
- ◆ able to secure and back up data from the server

Disadvantages:

- ◆ more expensive to implement than peer to peer network because of the cost of the server
- ◆ if the server fails the network fails

Higher National Unit specification: support notes (cont)

Unit title: Implementing Small Local Area Networks

Outcome 2

Assess the functional requirements of a network specification and then plan a LAN installation.

An appreciation of the size of files generated by different applications and the implication this has when deciding on the required bandwidth and type of network.

- ◆ The student should be aware of the factors that affect the performance of Ethernet and token passing LANs under different operating conditions
- ◆ Token ring LANs perform best when there is a relatively small number of attached computers which frequently access the network
- ◆ Ethernet LANs perform best when there is a large number of attached users who make only occasional use of the network. Ethernet performs best when handling few large batches of data rather than numerous small items of data.

Outcome 3

Install and Commission a small LAN

From a written specification that gives:

- ◆ The physical size of the network
- ◆ The number of users
- ◆ The types of applications being used
- ◆ How frequently each user needs to access the network

The student should:

- ◆ Identify the key issues
- ◆ Write a report justifying the selection of a suitable LAN, the report should include details of cable types and required hardware and software
- ◆ Install and configure the LAN

Guidance on the delivery and assessment of this Unit

This Unit could be delivered by distance learning and should ideally incorporate on-line support. The student would require the use of:

- ◆ PCs
- ◆ various network hardware
- ◆ network software
- ◆ suitable cable and terminations

Assessment of Outcomes 1 and 2 will require the centre to ensure that written evidence is sufficient, authentic and should be conducted under controlled, supervised conditions. It is unlikely that Outcome 3 could be assessed outwith the main centre.

Higher National Unit specification: support notes (cont)

Unit title: Implementing Small Local Area Networks

Open learning

Given the practical nature of this Unit it is unlikely that it will be suitable for distance learning.

For information on normal open learning arrangements, please refer to the SQA guide *Assessment and Quality of Open Distance Learning* (SQA 2000).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Implementing Small Local Area Networks

This Unit has been designed to allow you to gain knowledge, understanding and skills related to small local area networks. Local area networks can now be found throughout commercial, industrial and public service organisations.

Outcome 1 covers the different types of LAN. The operation of each type is considered and comparisons of how each performs under different operating conditions is made.

Outcome 2 covers the factors that need to be taken into account when designing a LAN. You will be given details of a customer's proposed LAN installation and required to specify and design the most suitable installation.

Outcome 3 requires you to install a LAN and then verify that it operates correctly.