Higher National Unit specification: general information

Unit title: **Networking Technology**

Unit code: FR24 35

Superclass: CB

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Unit purpose

The purpose of this Unit is to enable candidates to work effective in a Local Area Network installation or support role using networking computers. It is intended for candidates undertaking an HND in Computing, Computer Networking or a related area who require a broad understanding of Local Area Networks.

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

1 Describe the components of Local Area Networks and media.
2 Describe the OSI and TCP/IP models, and their layers.
3 Describe and use common addressing schemes and routing in a networked environment.
4 Describe connectivity and transmission features, and operation of local and wide area networks.

5 Configure, build and test a simple Local Area Network.

Recommended prior knowledge and skills

Access to this Unit will be at the discretion of the Centre. There are no specific requirements, but candidates would benefit from knowledge of computer networks.

Unit title: **Networking Technology**

Credit points and level

2 Higher National Unit credit(s) at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

*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.

Core Skills

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.

Assessment

Evidence for the Knowledge and Understanding component of the Unit could be produced using a set of multiple choice/multiple response questions to assess candidates' capabilities. This could be administered as a single end of Unit test covering all Outcomes, or could be a series of individual end of Learning Outcome tests.

Alternatively, the evidence for the Knowledge and Understanding component of the Unit could be extended response/exam style questions covering all Outcomes.

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

Testing must take place 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 by an appropriate person. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the test.

If a candidate requires to be re-assessed, a different selection of questions must be used from all sections. A significant proportion of the questions used in the re-assessment must be different from those used in the original test.

If an Outcome has a practical component, this may be assessed by having the candidate use a logbook to record the practical tasks successfully completed. suitable method of collecting practical evidence, which ensures authenticity of student work (to be authenticated by an assessor), should be used and this evidence must be logged/stored to allow internal/external verification procedures to be carried out if required. Tools such as Virtualising software, camera recording software, or other recording tools to gather evidence of candidates completing the tasks required can be used.

Higher National Unit specification: statement of standards

Unit title: Networking Technology

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

Describe the components of Local Area Networks and media.

Knowledge and/or Skills

- Networking hardware
- Networking terminology
- Network architectures
- Networking protocols
- Protocol Suites

Evidence Requirements

The Evidence Requirements for this Outcome are found in the Evidence Requirements for the Unit.

Assessment Guidelines

The Assessment Guidelines for this Outcome are found in the Assessment Guidelines for the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Outcome 2

Describe the OSI and TCP/IP models, and their layers.

Knowledge and/or Skills

- The OSI model
- The TCP/IP model
- Application layer software, services and protocols
- Presentation layer function, services and protocols
- Session layer function, services and protocols
- Transport layer function, services and protocols
- Network layer function, hardware and protocols
- Data link layer function, hardware and standards
- Physical layer function, hardware and standards

Evidence Requirements

The Evidence Requirements for this Outcome are found in the Evidence Requirements for the Unit.

Assessment Guidelines

The Assessment Guidelines for this Outcome are found in the Assessment Guidelines for the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Outcome 3

Describe and use common addressing schemes and routing in a networked environment.

Knowledge and/or Skills

- Binary conversion — decimal to binary and binary to decimal for use in IP addressing
- Hexadecimal conversion — hexadecimal to decimal and decimal to hex for use in IP addressing
- IP v4 Addressing — design and calculation of IP v4 32bit addressing schemes including public and private address schemes
- IP v6 Addressing — describe IP v6 128 bit addressing scheme including identification of a valid address
- design and calculate subnets

Evidence Requirements

The Evidence Requirements for this Outcome are found in the Evidence Requirements for the Unit.

Assessment Guidelines

The Assessment Guidelines for this Outcome are found in the Assessment Guidelines for the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Outcome 4

Describe connectivity and transmission features, and operation of Local and Wide Area Networks.

Knowledge and/or Skills

- Signals and noise
- LAN connectivity and transmission basics
- WAN connectivity and transmission basics
- Operation of Local Area Networks
- Operation of Wide Area Networks
- Differences between LAN/WAN operations and features

Evidence Requirements

The Evidence Requirements for this Outcome are found in the Evidence Requirements for the Unit.

Assessment Guidelines

The Assessment Guidelines for this Outcome are found in the Assessment Guidelines for the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Outcome 5

1. Configure, build and test a simple Local Area Network.

Knowledge and/or Skills

- Methods of testing LAN's
- Test and install LAN media
- Build a peer-to-peer network
- Build a small workgroup
- Build a small Client server network
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The examples given above are indicative of the typical learning content and are not intended to form a prescriptive list for the purpose of assessment.

Evidence Requirements

The Evidence Requirements for this Outcome are found in the Evidence Requirements for the Unit.

Assessment Guidelines

The Assessment Guidelines for this Outcome are found in the Assessment Guidelines for the Unit.

Evidence Requirements for the Unit

The sample must cover **all** Outcomes with a suitable selection of at least 50% of the Knowledge and Skills points listed for each of the Outcomes.

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

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

The practical exercise for Outcome 3 must be assessed by completion of a practical exercise that requires that the candidate can:

- design the IP addressing scheme for a given scenario

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

The practical exercise for Outcome 5 must be assessed by completion of practical tasks from the given scenario that requires the candidate to complete each of the four items listed below.

1 Test and install LAN media. (Non-Virtualised)

The candidate must install a standard length of UTP media into a patch panel and test the connection. Media testing methods used should be briefly described, together with the results of test, eg Time Domain Reflectometry and Frequency Based.

2 Build a peer-to-peer network. (May be Virtualised)

The candidate must build a simple peer to peer LAN using a cross over cable and two hosts.

3 Build a small workgroup network. (May be Virtualised)
The candidate must build a peer-to-peer LAN workgroup using straight through cables, switch/hub and hosts.

4 Build a small Client server network (May be Virtualised)
The candidate must build a small client server network with at least two subnets using straight through cables (or any cables/media suited to the candidate's particular network), switch/hub, router and hosts.

Assessment Guidelines for the Unit

It is suggested that all the above concepts be presented and explained within the context of current real-world practice and applications.

Testing for the knowledge component can be done in either a machine-based or ~~paper-based format~~ and must be invigilated by a tutor or appropriate person. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the test.

Centres are recommended to create a coverage grid to highlight which questions cover which knowledge bullet points to assist in the assessment process.

he Outcomes have been listed below with guidelines on topics.

The examples given below are indicative of the typical learning content and are not intended to form a prescriptive list for the purpose of assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Assessments should sample from but not be restricted to the following:

Outcome 1

1 Networking hardware.
Common hardware used to connect a network, including but not restricted to Routers, Switches, Repeaters and NIC's.

2 Networking terminology.
Common topologies, LAN, WAN, MAN, SAN, PAN, WLAN, Virtual Private Networks, Intranets

3 Network architectures.
Fault tolerance, Scalability, Security, QOS (Quality of service), Circuit Switched and Packet Switched networks, Collision domains, segmentation, and broadcast domains.

Outcome 2

1 Describe differences between the OSI model and the TCP/IP Model; explain how the 7 layer model works within a networked environment, eg application layer software, services and protocols (DNS, HTTP, FTP and any other relevant protocols).
2 Presentation layer function, services and protocols, eg compression, encryption, coding and conversion.
3 Session layer function, services and protocols, eg maintaining a dialogue between computers
4 Transport Layer function, eg tracking communication between applications on the source and destination hosts, segmenting and managing data, reassembling the segments into streams of application data, ~~identifying~~ application, services (port addressing) and protocols (TCP and UDP).
5 Network layer function, eg Addressing, Encapsulation, Routing, Decapsulation, Hardware can include (Layer 3 Routers, Switches or any other relevant

hardware) and protocols can include (Internet Protocol version 4 (IPv4), Internet Protocol version 6 (IPv6), r any other relevant protocols.

6 Data link layer function, eg: framing, access control and error handling MAC, CSMA/CA, CSMA/CD, full/ half duplex link.

7 Logical link control and media access control, hardware (any level layer 2 hardware, layer 2 switching and switching modes) and Standards (ISO, IEEE, ITU and ANSI).

8 Physical layer function, eg encoding of data and control information, transmitter and receiver circuitry on the network devices), hardware (The physical media and associated connectors) and standards (cable, connectors and signals).

Higher National Unit specification: statement of standards (cont)

Unit title: Networking Technology

Outcome 3

1 Convert Decimal to Binary and Binary to Decimal for use in IP addressing.
2 Convert Hexadecimal to Decimal and Decimal to Hex for use in IP addressing.
3 Design and calculate IP v4 32bit Addressing scheme including public and private address schemes.
4 Describe IP v6 128 bit Addressing scheme including identification of a valid address.
5 Design and calculate subnets.

Practical assessment

The candidate is required to design an IP structure for the small client server network that they have to build in Outcome 5.

Outcome 4

1 Signals and noise, eg signalling over copper and fibre, attenuation, loss, noise, crosstalk.
2 LAN cabling, eg ethernet media, UTP (Categories 5, 5e, 6, and 7), fibre-optics, wireless devices (eg wireless router where cable is used to connect to LAN), LAN devices, MDI and MDIX.
3 WAN cabling, eg WAN serial communications, cable modems, DSL modems, PPP, and any relevant WAN devices

Practical assessment

This may be assessed by having the candidate use a logbook to record the practical tasks successfully completed. The descriptions of testing methods used could be incorporated as entries in the logs. The logbook should be electronic form and must be authenticated by the Assessor. A suitable method of collecting practical evidence, which ensures authenticity of student work (to be authenticated by the assessor), should be used and this evidence must be logged/stored and retained to allow

internal/external verification procedures to be carried out if required. Tools such as Virtualising software, camera recording software, screenshot recording with audio or other recording tools to gather evidence of candidates completing the tasks required can be used.

Higher National Unit specification: support notes

Unit title: Networking Technology

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 80 hours.

Guidance on the content and context for this Unit

The suggested time allocation for each Outcome (including assessment) is as follows:

Outcome 1 15 hours
Outcome 2 15 hours
Outcome 3 15 hours
Outcome 4 15 hours
Outcome 5 20 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. Video presentations should be used where appropriate for providing an alternative explanation of a difficult topic, or as a focus for class discussion or group work.

Given the theoretical elements in this Unit, it is intended that a significant amount of time will be made available as a central part of the course for revision, tutorials and formative assessment exercises. Candidates should be strongly encouraged to

undertake further reading and opportunities for individual or group research should be provided.

The most important overall emphasis should be on the relevance and currency of content in such a rapidly evolving field.

This Unit (in conjunction with the related Units: FR22 35 Routing Technology, FR23 35 Switching Technology and FR25 35 Internetworking Technology) may assist candidates in preparing for Cisco Cisco Certified Network Associate. Candidates should be encouraged to check the latest information at **www.cisco.com** to ensure that all objectives have been covered.

Higher National Unit specification: support notes (cont)

Unit title: Networking Technology

Guidance on the delivery and assessment of this Unit

The Unit is primarily intended to provide candidates with an understanding of the general principles underlying Local Area Networks. As such only one Outcome is practical based. Candidates completing this Unit as part of the Course should already be familiar with some of the concepts and terminology. Where this is the case, it is recommended that centres concentrate upon difficult areas of the curriculum such as subnetting and IPv6.

Outcome 1

Outcome 1 provides an overview of LANs and how a host may connect to the Internet. Although this is a considerable range of areas to cover in a single Outcome some candidates should already be familiar with these concepts from work completed during the first year of HND Networking. This first Outcome should be treated as revision material.

1 **Networking hardware**
The common hardware used to connect a network, including but not restricted to routers, switches, , repeaters and NICs should be delivered. It is important that candidates fully understand the hardware and how it works in relation to different types of networks.

2 **Networking terminology**
Networking terminology should be introduced and should reflect current and emerging technologies. Common topologies should be introduced and should cover ring, star, bus and extended star. Definitions such as Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Storage Area Networks (SANs) and Virtual Private Networks (VPNs) should be introduced and explained. The benefits of VPNs, Intranets and extranets should be described.

3 **Network architectures**

Common architectures such as circuit switched and packet switched networks, collision domains, segmentation, and broadcast domains should be described. The importance of how routers break up broadcast domains and manage broadcast traffic within a network should be emphasised. It is important candidates understand the significance of a switch in a shared media environment and its effect on collision domains, bandwidth domains, segmentation and broadcasts and include the following, fault tolerance, scalability, security (identify and describe various networking threats, identify different methods of attack, describe security procedures and applications) and QoS (Quality of service).

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4 Network protocols

Common network protocols such as the following although not restricted to should be described:

- HTTP (Hyper Text Transfer Protocol)
- HTTPS (Hyper Text Transfer Protocol Secure)
- SMTP (Simple Mail Transfer Protocol)
- FTP (File Transfer Protocol)
- TCP (Transmission Control Protocol)
- IP (Internet Protocol)
- DHCP (Dynamic Host Configuration Protocol)
- IMAP (Internet Message Access Protocol)
- UDP (User Datagram Protocol)
- TFTP (Trivial File Transfer Protocol)
- SNMP (Simple Network Management Protocol)

5 Protocol Suites and Industry Standards

A brief overview of the OSI Model and TCP/IP models should be delivered in this Outcome as it is covered in greater detail in Outcome 2. The centre should also deliver an overview of peer to peer communications and encapsulation as encapsulation is a characteristic feature of most networking models, including the OSI Model and TCP/IP Suite of protocols.

Outcome 2

Outcome 2 is the most difficult Outcome of the Unit. As such, a larger proportion of delivery time should be devoted to this than any other Outcome.

Describe the OSI and TCP/IP models

Networking models should be introduced, indicating how layers may be used to analyse problems and to describe data communication.

The application layer
The operation of the application layer should include brief discussion of DNS, FTP, HTTP, SMTP, SNMP and Telnet.

The presentation layer
The operation of the presentation layer and its services and protocols should include discussion of compression, encryption, coding and conversion.

The session layer
The operation of the session layer function, services and protocols (maintaining a dialogue between computers) should be discussed.

Unit title: Networking Technology

The transport layer
Flow control, session establishment, maintenance and termination, three-way handshake, windowing and acknowledgement are important topics that candidates should be aware of. Transmission Control Protocol (TCP), User Datagram Protocol (UDP) and their respective port numbers form the basis for further study in the Unit Switching Technology, so it is important candidates understand this area.

The network Layer
The operation of network layer functions (Addressing, Encapsulation, Routing and Decapsulation). Discussion on Hardware can include (Layer 3 Routers, Switches or any other relevant hardware) and protocols can include (Internet Protocol version 4 (IPv4), Internet Protocol version 6 (IPv6), or any other relevant protocols.

The data link layer
The operation of and data link layer functions (framing, access control and error handling) MAC, CSMA/CA, CSMA/CD, full/ half duplex link should be discussed.

Additionally, a discussion of logical link control and media access control, hardware (layer 2 hardware, Layer 2 switching and switching modes) and standards (ISO, IEEE, ITU and ANSI) should take place.

The physical layer
The operation of the physical layer functions (encoding of data and control information, Transmitter and receiver circuitry on the network devices), hardware (The physical media and associated connectors) and standards (cable, connectors and signals) should all be discussed fully.

Layer 1 copper media
Coverage of layer 1 copper media should include a brief description of voltage, resistance and impedance as these are crucial elements to understand cable testing. Common media types should be introduced including coaxial cable, shielded copper cable, and UTP cable.

Layer 1 optical media

Following this, new media types can be introduced beginning with optical media. The ray model of light, reflection, refraction and total internal reflection should be used to show how light can travel down multimode fibre or single-mode fibre cables.

Layer 1 wireless media

The other new medium included in this Unit is wireless networking. Coverage in the context of this Unit is intended as a brief overview. The 802.11 standards should be introduced. Common wireless devices such as NICs, access points should be described. WLAN topologies such as Basic Service Set and Extended Service Set should be included. How wireless LANs communicate, and the general principles of authentication and association should be explained to give candidates a general overview of this new technology, including security problems.

Higher National Unit specification: support notes (cont)

Unit title: Networking Technology

Outcome 3

Candidates should find IP addressing, decimal and binary conversion, IPv4 addressing, Class A, B, C, D, and E IP addresses, reserved IP addresses, public and private IP addresses straight forward. However, they are likely to find subnetting and the introduction to IPv6 more difficult.

Number systems should be introduced to help explain how TCP/IP represents network addresses. Thus, binary representation of data, bits and bytes, base 10 number system, base 2 number system, converting decimal numbers to 8-bit binary numbers, converting 8-bit binary numbers to decimal numbers, four-octet dotted decimal representation of 32-bit binary numbers would provide a thorough grounding in this area and may complement core skills. Advanced concepts such as hexadecimal, Boolean logic, addresses and network masks should also be included.

Candidates will be required understand and configure IP v4 32bit addressing scheme including public and private address schemes, Understand IP v6 128 bit addressing scheme, Understand and configure subnets, Understand and convert decimal to binary and binary to decimal for use in IP addressing, Understand and convert hexadecimal to decimal and decimal to hex for use in IP addressing.

Outcome 4

Signals and noise

Signals and noise are intended to introduce candidates to the basic mechanisms to send a signal over copper and fibre media as well as common problems affecting the signal such as attenuation, noise, and crosstalk.

LAN cabling basics

The problems affecting the signal will define LAN cabling standards and equipment. For an Ethernet network, common devices such as repeaters, switches, and routers should be described. Wiring standards such as EIA/TIA 568 should be introduced.

Ethernet media, UTP (Categories 5, 5e, 6, and 7), fibre-optics, wireless, LAN devices, MDI and MDIX should all be discussed.

WAN cabling basics

WAN cabling should be introduced, but this should be seen in the context of the Unit as a brief overview. ISDN BRI and DSL connections, WAN devices should also be described. WAN serial communications, cable modems DSL modems, PPP, and any relevant WAN devices, eg DCE and DTE devices should all be discussed. The content taught in this Outcome is the basis for learning Internetworking technology and any relevant candidates undertaking this Unit should be aware of this.

Higher National Unit specification: support notes (cont)

Unit title: Networking Technology

Outcome 5

Outcome 5 is the only mainly practical Outcome of the Unit and is intended to allow candidates to complement the theoretical knowledge gained so far with practical experience. This Outcome may be assessed via a series of small scenarios in which a small network can be seen to grow corresponding with each individual part of the Outcome listed below.

Test and install LAN media
Candidates should normally test and install UTP copper LAN media. However, where resources permit fibre optic media should be considered. Generally, candidates should install a standard length of UTP media into a patch panel and a telecom box and test the connection. Candidates can proceed to make various types of cable and use these to build small networks. Candidates should be aware of Time Domain Reflectometry and Frequency Based Cable Testing as common testing methods.

Build a peer-to-peer network
In building a simple peer to peer LAN, candidates can build a cross over cable, test this, configure a NIC on a host and then configure a pair of machines for access. Any common operating system may be used.

Build a small workgroup
This simple LAN should be expanded to a small workgroup, using straight through cables, a hub and hosts. Where resources permit, workgroups may be connected using uplink ports on hubs. Network backbones and segments should be explained at this stage.

Build a small client server network
This simple LAN should be expanded to a small client server network, using cables of the candidate's choice to connect at least two small networks using a router (either software or hardware based) where resources permit the network could be connected using switches/hubs and routers.

Open learning

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.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. Open learning is possible but may complicated to arrange. Providing that assessment authenticity can be ensured, this Unit could be delivered by online/distance methods. The practical elements (cabling patch panels) may prove difficult to invigilate, however the practical building of a network can be achieved via use of virtualised environments. For further information please refer to SQA Publication Assessment and Quality Assurance of Open and Distance Learning (Code, 2000)

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 e-checklists. 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), SQA Guidelines on
e-assessment for Schools (BD2625, June 2005).

Opportunities for developing Core Skills

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

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be considered when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date
02	The assessment requirements have been updated to provide centres with more flexibility	June 2025

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General information for candidates

Unit title: Networking Technology

This is a 2 credit Unit at SCQF level 8, intended for candidates undertaking a Computing or IT-related qualification who require a broad understanding of computer networking. It is designed to develop an understanding of the issues involved in the design, installation and maintenance of computer networks. On completion of the Unit the candidate should be able to:

- describe the components of local area networks and media
- describe the OSI and TCP/IP models and their layers
- describe and use common addressing schemes and routing in a networked environment
- describe connectivity and transmission features, and operation of local and wide area networks
- configure, build and test a simple local area network

2.

In the first part of the Course the candidate will learn about common networking hardware used to connect a network including but not restricted to routers, switches, hubs, bridges, repeaters and NICs. Networking terminology for example common topologies, LAN, WAN, MAN, SAN, PAN, WLAN, Virtual Private Networks and Intranets. Network architectures including fault tolerance, scalability, security, QoS (Quality of service), circuit switched, and packet switched networks, collision domains, segmentation, and broadcast domains. Network protocols (common network protocols can include but not restricted to protocols such as TCP, IP, , UDP). Protocol Suites and Industry Standards the OSI Model, TCP/IP model, peer to peer communications and encapsulation.

In the second part of the course the candidate will learn about each of the levels of the OSI model and its relationship to the TCP/IP protocol stack, the protocols at each level, the function of each level and the hardware used at the lower layers. This Outcome covers the operation of the layers of the OSI model. This is designed to

allow candidates to appreciate mechanisms used to deliver services to users at all layers of the OSI model and its comparison of with the TCP/IP protocol stack.

In the third part of the Course The candidate will learn about the IP v4 32bit addressing scheme including public and private address schemes, the IP v6 128 bit addressing scheme, how to configure subnets, how to convert decimal to binary and binary to decimal for use in IP addressing, how to convert hexadecimal to decimal and decimal to hex for use in IP addressing and learn how configure routing in a networked environment. This section covers IP addressing. Common internet addressing is reviewed, as is how an organization might obtain such an address. IP routing protocols are introduced to provide an understanding of how packets can be routed through the Internet. Subnetting is included to allow the design of an appropriate IP address scheme

In the fourth part of the Course the candidate will learn about network cabling which will include signals and noise, signalling over copper and fibre, attenuation, loss, noise, crosstalk, LAN cabling, Ethernet media, UTP (Categories 5, 5e, 6, and 7), fibre-optics, wireless, LAN devices, MDI and MDIX, WAN cabling, WAN serial communications, cable modems, DSL modems, PPP, and any relevant WAN devices.

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The fifth section covers building a LAN and is intended to allow the candidate to apply the knowledge gained during the earlier Outcomes in a practical environment. The candidate will make and test different types of network cables. The candidate will learn how to build and configure a peer-to-peer network, how to build and configure a workgroup network and how build and configure a client server network using routing technologies.

The assessment for the Knowledge and Understanding element may be a multiple choice/multiple answer/extended response closed book assessment covering all Outcomes or may be multiple choice/multiple answer/extended response closed book assessment for each Outcome. The candidate will also be expected to keep a suitable record recording the practical tasks the candidate has carried out during the Unit. The candidate must satisfy the requirements for these assessments to achieve the Unit.

This Unit (in conjunction with the related Units: FR22 35 Routing Technology, FR23 35 Switching Technology and FR25 35 Internetworking Technology) may assist the candidate in preparing for Cisco Certified Network Associate. The candidate should check the latest information at **www.cisco.com** to ensure that all objectives have been covered.