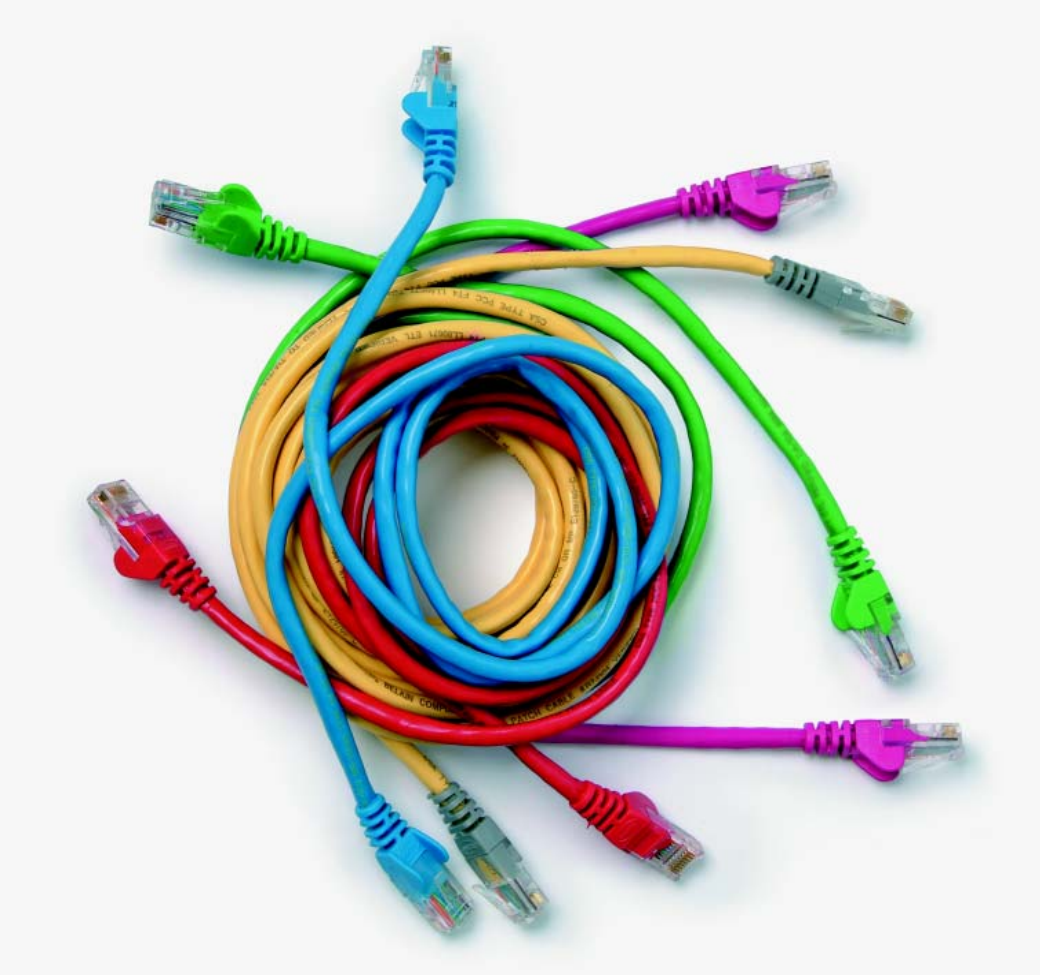
Systems and Principles Unit Syllabus

Level 2 Networking Principles 7540-002

www.cityandguilds.com
October 2010
Version 2.0



About City & Guilds

City & Guilds is the UK's leading provider of vocational qualifications, offering over 500 awards across a wide range of industries, and progressing from entry level to the highest levels of professional achievement. With over 8500 centres in 100 countries, City & Guilds is recognised by employers worldwide for providing qualifications that offer proof of the skills they need to get the job done.

City & Guilds Group

The City & Guilds Group includes City & Guilds, ILM (the Institute of Leadership & Management) which provides management qualifications, learning materials and membership services, NPTC which offers land-based qualifications and membership services, and HAB (the Hospitality Awarding Body). City & Guilds also manages the Engineering Council Examinations on behalf of the Engineering Council.

Equal opportunities

City & Guilds fully supports the principle of equal opportunities and we are committed to satisfying this principle in all our activities and published material. A copy of our equal opportunities policy statement *Access to assessment and qualifications* is available on the City & Guilds website.

Copyright

The content of this document is, unless otherwise indicated, © City & Guilds Limited and may not be copied, reproduced or distributed without prior written consent.

However, approved City & Guilds centres and learners studying for City & Guilds qualifications may photocopy this document free of charge and/or include a locked PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching learners working towards a City & Guilds qualification, or for internal administration purposes
- learners may copy the material only for their own use when working towards a City & Guilds qualification
- the *Standard Copying Conditions* on the City & Guilds website.

Please note: National Occupational Standards are not © City & Guilds Limited. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

Publications

City & Guilds publications are available on the City & Guilds website or from our Publications Sales department at the address below or by telephoning +44 (0)20 7294 2850 or faxing +44 (0)20 7294 3387.

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)844 543 0000 (Centres)
T +44 (0)844 543 0033 (Learners)
F +44 (0)20 7294 2413

www.cityandguilds.com
enquiry@cityandguilds.com

Contents

Unit 002 Networking Principles

Syllabus Overview		2
Outcome 1	Identify network concepts and terminology	3
Outcome 2	Identify components that make up a network	6
Outcome 3	Install, configure and test a network	8
Outcome 4	Use and control a local area network	10
Unit record sheet		14

Unit 002 Networking Principles

Syllabus Overview

Rationale

Networks are a major component of ICT communication. This unit provides learners with both the practical and theoretical knowledge of basic networks. They will learn about the different components used to create a network including hardware, software and topologies. Learners will develop practical skills required to install, configure and test a small computer network.

Once learners have grasped the theoretical and practical knowledge contained in this unit, they can improve their learning of networking by developing further skills in this area, either by self-study or adopting specialised networking routes.

Learning outcomes

There are **four** outcomes to this unit. The candidate will be able to:

- Identify network concepts and terminology
- Identify components that make up a network
- Install, configure and test a network
- Use and control a local area network

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full time or part time basis.

Assessment and grading

Assessment will be by means of a **set assignment** covering both practical activities and underpinning knowledge.

Unit 002 Networking Principles

Outcome 1 Identify network concepts and terminology

Practical activities

The candidate will be able to:

1 use data communications services

2 use the main hardware components of a network

3 use the main functions of a Network Operating System

4 use different methods of electronic communication

5 use different network configurations

- a peer-to-peer
- b server based

6 use basic information from the models and standards for electronic communications to select network features eg

- a OSI
- b IEEE 802.XXX

7 select different network topologies eg

- a bus
- b ring
- c star
- d mesh

8 select protocols used for electronic communications eg

- a TCP/IP
- b NetBEUI.

Underpinning knowledge

The candidate will be able to:

1 define what a network is and what its main goals are

2 describe network topologies eg

- a bus
- b star
- c ring
- d mesh

3 describe the main features (speed, access method, topology and media) of the following network technologies

- a Ethernet
- b token ring and token bus
- c wireless
- d FDDI/CDDI

4 describe the services provided by electronic communications

- a electronic mail
- b file transfer
- c interacting with databases
- d sharing information on the system
- e sharing hardware resources
- f sharing application software
- g access to and use of the Internet
- h web browsing
- j other electronic communication

5 describe the main functions of a Network Operating System including

- a administration
- b share level security
- c user level security
- d hardware support
- e storage support

6 explain modes of electronic communication

- a simplex, duplex and half duplex
- b serial and parallel
- c synchronous and asynchronous

Underpinning knowledge continued

7 describe the differences between peer-to-peer and server based networks including
   a servers
   b clients
   c peers
   d shared resources
   e operating systems
   f administration
   g security
   h central support systems
8 describe binary and hexadecimal number systems
9 state the purpose of communication protocols
   a IPX/SPX
   b NetBEUI
   c Appletalk
   d TCP/IP
   e FTP
   f SMTP
   g HTTP/HTTPS
   h POP
10 explain the function of the TCP/IP protocol
11 describe the function and construction of data packets in a network
12 describe the function of each of the OSI layers (Open Systems Interconnection)
13 state the difference between a local area network (LAN) and a wide area network (WAN)
14 identify a MAC address and its parts
15 identify an IP address and its parts
16 state the purpose of sub-netting
17 identify the basic characteristics of the following Internet access technologies
   a DSL
   b broadband (ADSL)
   c PSTN (dial-up)
   d satellite
   e wireless
18 explain what is meant by a collision and how LANs deal with them
19 explain line encoding used in CSMA/CD and CSMA/CA LANs and identify the limitations of CSMA/CA.

Unit 002 Networking Principles

Outcome 2 Identify components that make up a network

Practical activities

The candidate will be able to:

1 select suitable cable or wireless methods for connecting network components

2 select suitable cable connectors

3 select a suitable network interface card

4 select a suitable hub

5 select network security software

6 adjust factors that affect the range and speed of wireless services eg

- a interference
- b antenna type and position
- c environment
- d configuration.

Underpinning knowledge

The candidate will be able to:

1 describe the characteristics of the following components that are used in a network

- a cables
  - i UTP
  - ii STP
  - iii coaxial
  - iv fibre optic
- b media connectors
  - i RJ-11
  - ii RJ-45
  - iii fibre optic
  - iv local connector
  - v serial
  - vi USB
  - vii BNC
- c communication
  - i wired
  - ii wireless 802.11x
  - iii infrared
  - iv Bluetooth
  - v radio waves

- d hub (passive, active, intelligent)
- e switch
- f bridge
- g repeater
- h router
- j gateway
- k NIC
  - i wireless
  - ii fibre optic
  - iii Ethernet
- l modem
- m firewall
- n WAP
- p back-up devices/media
- q network printer
- r network operating systems
- s other specific computer components, peripherals, and services related to networking

2 state the methods of connection to the Internet
- a dial-up
- b permanent connection

3 explain security related issues with using a network

4 describe fault tolerance and recovery procedures in a network

5 explain the 5-4-3 rule of network design.

Unit 002 Networking Principles

Outcome 3 Install, configure and test a network

Practical activities

The candidate will be able to:

1 select specific hardware components for a peer-to-peer network
   a network interface cards
   b hubs/switches
   c cables and connectors
2 use tools and antistatic equipment to ensure safe working conditions
3 install and configure necessary hardware for a network eg a NIC
4 produce suitable cables for networking
   a straight through
   b crossover
5 connect and operate computers and a printer in a peer-to-peer network
6 install and configure the network software components
   a drivers
   b protocols
7 set up the system to access the Internet
8 configure the system/network according to any specific user requirements
9 install and configure other software required on the network
   a virus protection software
   b firewall software
   c web browser
   d email software
   e messaging software
   f other required software
10 set up clients and directory/folder facilities to access resources on a computer
11 configure the host computer to allow access to specified shared resources by the guest computer using a password
12 perform a post installation check to test the functionality of the network
13 test the network system for
   a access to the Internet
   b downloading files
   c send and receive email
   d speed of access to the World Wide Web
   e operation of firewall and anti-virus

Practical activities continued

14 resolve routine problems encountered on the network

15 given a scenario, select and use appropriate network trouble-shooting utilities eg

- a tracert
- b ping
- c netstat
- d network analysers
- e other utilities.

Underpinning knowledge

The candidate will be able to:

1 identify basic requirements for client workstations to connect to and use network resources (media, protocols, services, DNS)

2 identify the tools typically required for creating a network cable

3 identify the purpose, benefit and characteristics of a network firewall (hardware and software)

4 state the purpose, benefit and characteristics of using anti-virus software

5 state the importance of performing pre-installation checks on hardware components

6 explain the reasons for considering the user's requirements/needs when setting up a system/network

7 describe the common problems associated with network installation and operation eg

- a computers not switched on
- b breaks in cables
- c network software/drivers incorrectly installed
- d incorrect drivers installed
- e cable plugged into incorrect socket
- f connector not firmly plugged in
- g protocols incorrectly set up

8 describe the role of drivers

- a network interface card
- b drive controller
- c printer
- d other

9 explain the function of an ISP when accessing the World Wide Web

10 describe the components of a website URL (Uniform Resource Locator) and how it relates to an IP address.

Unit 002 Networking Principles

Outcome 4 Use and control a local area network

Practical activities

The candidate will be able to:

1 use the main facilities of a computer network

2 perform data/file processes eg
- a retrieve
- b create
- c amend
- d delete
- e save

3 use shared peripheral devices

4 perform file management activities

5 adjust file properties eg
- a read-only
- b hidden

6 use network applications

7 maintain user accounts
- a create a new user account
- b delete a user account
- c modify access rights for user accounts.

Underpinning knowledge

The candidate will be able to:

1 describe the file management facilities on a network eg
- a group access
- b back-up
- c copy, rename, delete, move
- d search tools
- e file listing
- f directory/folder structure
- g access rights to directory/folder structure

2 explain the security measures used on a network eg
- a user identification
- b password
- c copyright requirements
- d back-up

3 describe the access rights available on a network eg
   a read
   b write
   c execute
4 describe the process of setting up a new user on a network eg
   a creating a user account
   b setting passwords
   c setting access rights.

Unit record sheet

Use this form to track your progress through this unit.

Tick the boxes when you have covered each outcome. When they are all ticked, you are ready to be assessed.

Outcome	✓	Date
1 **Identify network concepts and terminology**	☐	
2 **Identify components that make up a network**	☐	
3 **Install, configure and test a network**	☐	
4 **Use and control a local area network**	☐	

Candidate Signature ..... **Date** .....

City & Guilds Registration Number .....

Quality nominee (if sampled) ..... **Date** .....

Assessor Signature ..... **Date** .....

External Verifier Signature (if sampled) ..... **Date** .....

Centre Name ..... **Centre Number** .....

Published by City & Guilds
1 Giltspur Street
London
EC1A 9DD
T +44 (0)844 543 0000 (Centres)
T +44 (0)844 543 0033 (Learners)
F +44 (0)20 7294 2400
www.cityandguilds.com

City & Guilds is a company registered in England and Wales (company number 16513878)