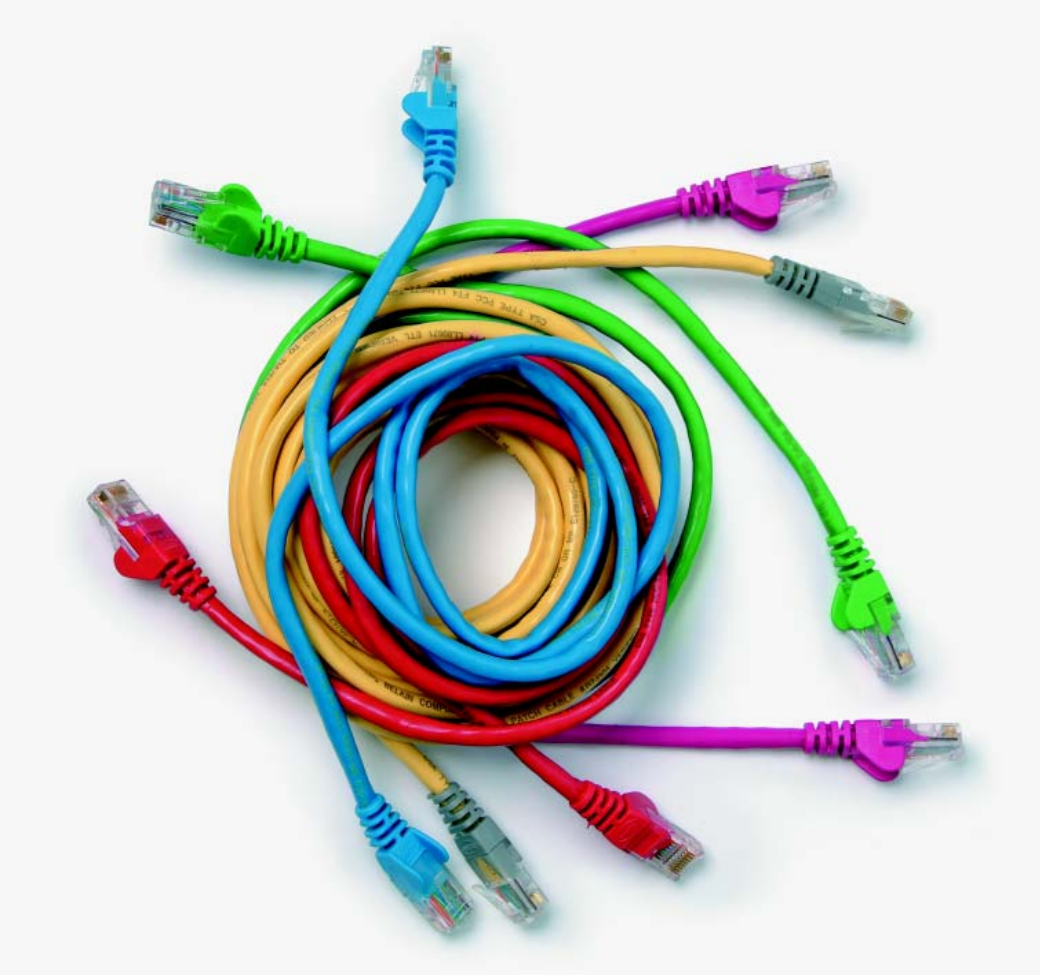
Systems and Principles Unit Syllabus

Level 3 Networking Principles
7540-031

www.cityandguilds.com
September 2010
Version 1.0



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, City & Guilds Institute, 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 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 candidates 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 candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates 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 also apply.

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
learnersupport@cityandguilds.com

Contents

Unit 031 Networking Principles

Syllabus Overview		2
Outcome 1	Understand physical and logical Topologies and Systems	3
Outcome 2	Implement a network	4
Outcome 3	Understand the Internet Protocol Suite (TCP/IP)	5
Outcome 4	Implement a network	6
Unit record sheet		7

Unit 031 Networking Principles

Syllabus Overview

Unit accreditation number **J/601/3250**

Credit value **10**

Rationale

This unit is aimed at advanced Networking students who already posses the fundamentals of computer networks and desktop PC support and are now moving to study second and third line support roles where network operations and troubleshooting are now more fundamental to the job role. This qualification should be studied alongside a logical network design and server admin and server application infrastructure qualification.

In addition a more fundamental network security qualification should also be studied.

Learning outcomes

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

- Understand physical and logical Topologies and Systems
- Understand the Open Systems Interconnection (OSI) model
- Understand the Internet Protocol Suite (TCP/IP)
- Implement a network

Guided learning hours

It is recommended that 75 guided learning hours should be allocated for this unit. This may be on a full time or part time basis.

Connections with other qualifications

This unit contributes towards the learning outcomes and assessment criteria required for the level 3 Diploma in ICT Professional Competence.

Assessment and grading

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

Unit 031 Networking Principles

Outcome 1 Understand physical and logical Topologies and Systems

Underpinning knowledge
The candidate will be able to:

1 Describe common physical network topologies, eg
- a Star
- b Ring
- c Bus
- d Mesh

2 Explain the difference between logical and physical network topologies

3 Describe the network topologies and hardware and software components used to implement common data communication systems, eg
- a Fast Ethernet
- b Token Ring
- c FDDI
- d NIC
- e UTP
- f MAC
- g CSMA/CD

4 Identify and briefly explain common
- a cable types and properties including: Ethernet, coaxial, fibre
- b connector types including: Rj45, BNC, Fibre
- c wiring standards including T565A / T565B
- d wireless standards including 802.11a/b/g/n

Unit 031 Networking Principles
Outcome 2 Implement a network

Underpinning knowledge
The candidate will be able to:

1 Describe the OSI model and how its layers relate to each other eg
   a Data flow

2 Explain the function of each layer of the OSI model

3 Describe the key features, protocols and standards of each OSI layer

Unit 031 Networking Principles

Outcome 3 Understand the Internet Protocol Suite (TCP/IP)

Underpinning knowledge

The candidate will be able to:

1 Describe the Internet Protocol Suite (TCP/IP) Four Layer model and the function of each layer eg

- a Application
- b Transport
- c Internet / Network
- d Network Access

2 Describe the key features, protocols and standards of each TCP/IP layer

3 Explain how each TCP/IP layer relates to the comparable OSI model layer, giving examples of

- a Functions
- b Protocols used

Unit 031 Networking Principles
Outcome 4 Implement a network

Practical activities
The candidate will be able to:

1 Design a routed network incorporating the following:
- a Internet protocol (IP) addressing
- b Simple Domain Name System (DNS) infrastructure
- c Dynamic Host Configuration Protocol (DHCP)
- d Category 5e / 6 (CAT5 / CAT6) cable using EIA/TIA 568 standards
- e Wireless 802.11 LAN

2 Plan, construct and configure the network. The plan should include:
- a all network nodes, clearly identifying subnetworks as appropriate
- b all networking hardware, type and location;
- c all network cabling;
- d the full IP addressing scheme for all network nodes
- e the proposed DNS structure
- f wireless protocols and encryption standards

The configuration should show:
- a DHCP settings along with any static addresses
- b Wireless settings
- c Login restrictions and password complexity

3 Test and record functionality eg
- a Ping
- b Traceroute

4 Evaluate the network and suggest improvements

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 Understand physical and logical Topologies and Systems	☐	
2 Understand the Open Systems Interconnection (OSI) model	☐	
3 Understand the Internet Protocol Suite (TCP/IP)	☐	
4 Implement a 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)