



Accredited

OCR LEVEL 3 CAMBRIDGE TECHNICAL CERTIFICATE/DIPLOMA IN IT

COMMUNICATION TECHNOLOGIES

F/601/7264

LEVEL 3 UNIT 21

GUIDED LEARNING HOURS: 60

UNIT CREDIT VALUE: 10



COMMUNICATION TECHNOLOGIES

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LEVEL 3

AIM AND PURPOSE OF THE UNIT

On completion of this unit learners will have an understanding of the principles of computer networks, the different types of networks and the services they use. Learners will explore a variety of different elements of data communications systems, how the data is transmitted and the protocols that enable connectivity. In addition, they will learn how to set up interconnection devices between users and for direct communication.

ASSESSMENT AND GRADING CRITERIA

Learning Outcome (LO)		Pass	Merit	Distinction
The learner will:		The learner can:		
1	Understand the communication principles of computer networks	P1 explain how networks communicate		D1 compare different network types
		P2 identify communication protocols and models		
		P3 identify different types of communication devices		
2	Know the main elements of data communications systems	P4 describe what data elements are and why they are important		
		P5 describe the principles of signal theory	M1 compare different electronic communication methods	
3	Be able to implement different forms of network communications	P6 describe different transmission methods used	M2 describe different internet communication technologies	D2 compare different direct communications
		P7 create direct network communication between two users		
		P8 set up interconnection devices for direct communication	M3 compare different interconnection devices	

TEACHING CONTENT

The unit content describes what has to be taught to ensure that learners are able to access the highest grade.

Anything which follows the i.e. details what must be taught as part of that area of content.

Anything which follows an e.g. is illustrative, it should be noted that where e.g. is used, learners must know and be able to apply relevant examples to their work though these do not need to be the same ones specified in the unit content.

LO1 Understand the communication principles of computer networks

- **computer networks**
 - types e.g.
 - LAN
 - WAN
 - WWAN
 - network topologies e.g.
 - star
 - extended star
 - mesh
 - tree (or hierarchical)
 - network services e.g.
 - packet switched
 - ISDN
 - multiplexed
 - ATM
 - WAP
 - broadband
 - network software e.g.
 - network operating system
 - network connection software
 - access methods e.g.
 - CSMA/CD
 - CSMA/CA
 - token passing.
- **network components**
 - servers
 - workstation
 - network cards e.g.
 - ethernet
 - wireless.
- **interconnection devices e.g.**
 - switches
 - routers
 - wireless access points
 - mobile base stations.
- **models e.g.**
 - open system interconnection (OSI) model
 - TCP/IP model.

- **protocols e.g.**
 - Bluetooth
 - Wifi
 - IrDa
 - cellular radio
 - GSM/UMTS
 - WAP
 - WML
 - 802.11 standards
 - TCP/IP
 - wireless security protocols.
- **communication devices**
 - wired devices e.g.
 - data terminal equipment (DTE)
 - data circuit-terminating equipment (DCE)
 - wireless devices e.g.
 - 3G
 - GPRS
 - mobile phones
 - laptop
 - netbook.

LO2 Know the main elements of data communications systems

- **signal theory**
 - digital signalling methods
 - representing data electronically, (bits, bytes, packet structures)
 - synchronous transmission
 - asynchronous transmission
 - error detection
 - error correction
 - bandwidth limitation
 - bandwidth noise
 - channel types e.g.
 - telephone
 - high frequency (HF) radio
 - microwave
 - satellite
 - other issues e.g.
 - bandwidth
 - data compression.

- **data elements**
 - checksum e.g.
 - cyclic redundancy check (CRC)
 - encapsulation e.g.
 - frames
 - packets
 - datagrams
 - addresses
 - sequence numbers.
- **electronic communication**
 - methods e.g.
 - simplex
 - duplex
 - half-duplex communication
 - parallel
 - universal
 - serial bus
 - serial
 - Bluetooth
 - WiFi
 - 3G.
- **system requirements**
 - wired or mobile systems
 - communication services e.g.
 - email
 - video
 - internet
 - software
 - configuration.
- **direct communication e.g.**
 - instant messaging
 - video communication
 - email
 - web phone
 - social networking
 - web conferencing
 - desktop sharing.
- **Interconnection devices e.g.**
 - switches
 - routers
 - wireless access points
 - mobile base station.

LO3 Be able to implement different forms of network communications

- **transmission**
 - methods e.g.
 - coaxial
 - optical fibre
 - unshielded twisted pair (UTP)
 - shielded twisted pair (STP)
 - radio
 - microwave
 - satellite.
- **internet communication**
 - terminology e.g.
 - HTTP
 - HTTPS
 - FTP
 - SMTP
 - worldwide web
 - other e.g.
 - blogs
 - wikis
 - video conferencing
 - vlogs
 - social networking.

DELIVERY GUIDANCE

This unit has links with the system support and networking units in this qualification.

For every learning outcome the learners will benefit from using a simulation network package; these packages allow learners to create various different types of networks and to investigate some of the different connections available.

Understand the communication principles of computer networks

Learners will need to be taught about computer networks. This involves looking at the different types of networks, the different network topologies, protocols, models, what network services are available, the network software available and what access methods are available.

Learners will need to look at the different network components and interconnection devices. Here learners will benefit from having access to the devices to be able to handle them and look at how they connect together.

Learners will also need to look at the different models and protocols that are used in networking. All these can be delivered through presentations, together with some investigations on real life networks looking at the different features of the different types of network and group discussions to compare the different types, features etc.

Know the main elements of data communications systems

It would benefit learners if an IT communications technology specialist were able to offer talks/ discussions with the learners.

The tutor could deliver class presentations on each of the sub-elements of this learning outcome: Communication devices, signal theory, data elements, electronic communication, transmission media and methods. By putting learners in to groups, they can all focus on researching different areas of the learning outcome, presenting and discussing their findings with the wider group.

Learners carrying out the research must be encouraged to cover their allocated sector and the subcriteria in detail to ensure that all learners fully understand all elements and carry out comparisons and contrasts, advantages and disadvantages where appropriate.

Be able to implement different forms of network communications

Learners would benefit if delivery of this learning outcome could be practical, with exercises to demonstrate they can implement different forms of network communications; it may also be relevant for centres to develop scenarios and specifications to suit their particular learning environment to engage the learners and ease their learning.

Learners will need to know about network communications; they could be given exploration exercises on terminology, WWW, blogs, video conferencing etc to prompt discussion.

Learners should investigate/explore the system requirements of wired and mobile systems including looking at the communication services, sharing their findings with other members of the class.

SUGGESTED ASSESSMENT SCENARIOS AND TASK PLUS GUIDANCE ON ASSESSING THE SUGGESTED TASKS

Assessment Criteria P1/D1

Learners are required to explain how networks communicate. The explanation must include the types of network, the network topologies that can be used, the network services that can be used and access methods. The evidence could be in the form of a series of annotated diagrams, presentation or report.

For distinction criterion D1, learners are required to compare a range (three or more) of different types of networks. The evidence could be in the form of a presentation, video/audio discussion, annotated diagrams, table or report. The evidence may be an extension from the evidence presented for P1.

Assessment Criterion P2

Learners are required to identify communication protocols and models. Learners should give an overview of the models and protocols which could be supported by images and/or diagrams. The evidence presented could be in the form of a presentation, annotated diagrams, hand out or report.

Assessment Criterion P3

Learners are required to identify different types of communication devices. The evidence must include a range (at least three) of different communication devices. The evidence must include a wired and wireless device. The evidence could be in the form of annotated diagrams, hand out, leaflet, presentation or report.

Assessment Criterion P4

Learners are required to describe what data elements are and why they are important. The description must include what the data element is, how it works and why it is important. The learners must provide these explanations using their own words. The evidence could be in the form of a presentation or report supported by annotated diagrams.

Assessment Criterion P5, M1

Learners must describe the principles of signal theory. It is important that they describe what each signal theory is, how it works, why it is used and any issues surrounding its use. The evidence could be in the form of a presentation or report with annotated diagrams.

For merit criterion M1, learners are required to compare different electronic communication methods. The comparison must include the list identified within the teaching content and include

how the communication method works, where/when it is used and any associated issues with its use. The evidence could be in the form of a table, report, presentation or booklet. The evidence could be enhanced by the inclusion of annotated diagrams.

Assessment Criteria P6, M2, D2

For P6, learners are required to describe different transmission methods used. The description must include the methods identified in the teaching content. The descriptions should include how they are used, how they work and where they may be used. Annotated diagrams could enhance the evidence. The evidence could be in the form of annotated diagrams, report, presentation, video demonstration or booklet.

For merit criterion M2, learners must describe different internet communication technologies. The evidence must include the list in the teaching content and the descriptions must include the full titles as well as the acronyms, an overview of how they work and their purpose. The evidence could be presented in a table, presentation or report supported by annotated diagrams where appropriate.

For distinction criterion D2, learners are required to compare different direct communications. The comparison should include at least five of the direct communications listed in the teaching content. The comparison must include the similarities and differences between the direct communication examples used. The evidence could be presented in the form of a table, presentation, booklet or report.

Assessment Criterion P7

This is a practical activity where learners must create direct network communication between two users. This could be by setting up any of the listed items in the teaching content. The evidence could be in the form of a video showing the learner creating the communication (and proving that it is working); an observation can be used but it must be detailed and written in context of what the learner is doing. Alternatively learners could provide a written account of what they did which should then be endorsed by an appropriate person to confirm that they carried out the work and that it functioned correctly.

Assessment Criteria P8/M3

This is also a practical activity and could link to P7, depending on what activity is being undertaken by the learner. Learners must use an interconnection device (such as those identified in the teaching content). The evidence could be in the form of a video showing the learner creating the communication (and proving that it is working); an observation can be used but it must be detailed and written in context of what the learner is doing. Alternatively learners could provide a written account of what they did which should then be endorsed by an appropriate person to confirm that they carried out the work and that it functioned correctly.

For merit criterion M3, learners must compare different interconnection devices. The comparison must include a description of each device, the similarities and differences for each, and where they are used. The evidence could be in the form of a report, presentation or booklet using annotated diagrams to support explanations.

MAPPING WITHIN THE QUALIFICATION TO THE OTHER UNITS

Unit 7: Computer networks

Unit 8: IT technical support



CONTACT US

Staff at the OCR Customer Contact Centre are available to take your call between 8am and 5.30pm, Monday to Friday.

We're always delighted to answer questions and give advice.

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