



**ADVANCED**  
**General Certificate of Education**  
**January 2012**

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**Applied Information and  
Communication Technology**

**Assessment Unit A2 13**

*assessing*

**Unit 13 : Networking and Communications**

**[A6J71]**

**MONDAY 23 JANUARY, AFTERNOON**

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**MARK  
SCHEME**

1 Name of device is **network card**

[1]

Description (Any **two** of the following)

- inserted into port at back of computer
- inserted onto motherboard
- uniquely identifies the computer in the network – MAC address
- sends and receives data
- cannot access file server if missing
- cannot download files or programs from server, if missing
- OSI level 1 device
- **or** any suitable property plus brief description

Any **two** properties with brief description

2 × [2]

[4]

5

2

The cabling of bus topologies requires the use of fibre optics	FALSE
Within a bus network, each network card is allocated its own IP address	FALSE
Client server networks are useful when the network need to be scaleable	TRUE
A ring network uses a special timer to send the data around the ring	FALSE
A switch must always be used in token ring networks	FALSE
In a star network the most important part is the RJ 12 connection	FALSE
All network topologies cost the same	FALSE
Peer to peer systems are used in large networks	FALSE
Wireless networks are less secure than cabled networks	TRUE
Star networks need hubs or switches to function properly	TRUE
Terminators are used widely in bus networks	TRUE
A network operating system is needed in a client server network	TRUE

Each correct statement of true or false

12 × [1]

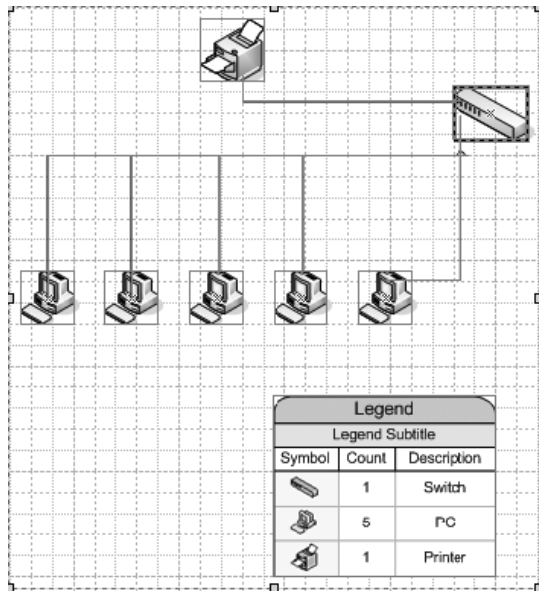
[12]

12

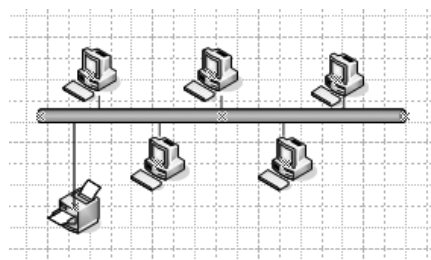
### 3 Network set up and description

The description may include a wired solution – bus based and star based. The solution may include all or some of the following:

- A labelled diagram showing a star based peer to peer network
  - The hub (or switch) is shown and described
  - The 5 computers are shown connected to the hub (or switch)
  - The printer is connected to the hub (or switch)



- A labelled diagram showing a bus based network
  - The 5 computers are shown connected to the cable
  - Mention is made of terminators
  - Mention of CSMA/CD
  - Sharing of the cable
  - Printer attached to the cable



Level of response	Marking criteria	Mark band
Excellent	<p>The candidate describes correctly and in detail the hardware and software required to set up different networks. (The candidate may include an accurate labelled diagram.)</p> <p>Their use of spelling, punctuation and grammar are excellent and clearly legible.</p> <p>Their discussion of the hardware shows a very good knowledge of the requirements of connecting the 5 computers and the printer.</p> <p>Their discussion of the set up for connection uses an excellent form and style.</p> <p>Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.</p>	[9]–[12]
Good	<p>The candidate describes correctly the hardware and software required to set up the networks. (The candidate may include a diagram.)</p> <p>Their use of spelling, punctuation and grammar are satisfactory and clearly legible.</p> <p>Their discussion of the hardware shows some knowledge of the requirements of connecting the 5 computers and the printer.</p> <p>Their discussion of the set up for connection and Internet uses a satisfactory form and style.</p> <p>Their discussion is coherent and is organised and they use a range of correct specialist terms.</p>	[5]–[8]
Poor	<p>The candidate may describe some hardware and software required to set up a network.</p> <p>Their use of spelling, punctuation and grammar are poor and is not that legible.</p> <p>Their description may not be well organised.</p> <p>Their discussion of the set up for connection uses a poor form and style.</p> <p>Their discussion is poor and they use few specialist terms.</p>	[1]–[4]

When a response is not worthy of credit a [0] should be awarded. [12]

#### 4 NOS properties

Multitasking + description

Multi-user + description

File allocation + description

Allows a user to log onto the system by checking password allocation

Time slicing + description

Any other valid feature + description

Mention of any **two** properties plus descriptions

$2 \times ([1] + [1])$

[4]

4

## 5 Client server architecture

A client is an individual user's computer or a user application that does a certain amount of processing on its own. It also sends and receives requests to and from one or more servers for other processing and/or data.

A server consists of one or more computers that receive and process requests from one or more client machines. A server is typically designed with some redundancy in power computing and file storage.

(Sometimes the term server refers to software rather than computer e.g. 'mail')

Client server also embodies the idea of user accounts and sharing of resources and the system will keep track of different users' files and applications during a user's session.

Client server architecture is the dominant structure for corporate computing.

### Advantages of the Client/Server Environment

- Client/server is an open system. The advantages of this environment include:
- Interoperability – key components (client/network/server) work together.
- Scalability – any of the key elements may be replaced when the need to either grow or reduce processing for that element dictates, without major impact on the other elements.
- Adaptability – new technology (i.e. multimedia, broad band networks, distributed database, pen computing, etc.) may be incorporated into the system.
- Affordability – cost effectiveness is ensured by using less expensive MIPs available on each platform.
- Data Integrity – entity, domain and referential integrity are maintained on the database server.
- Accessibility – data may be accessed from WANs and multiple client applications.
- Performance – performance may be optimised by hardware and process.
- Security – data security is centralised on the server.

### Bandwidth problems

Many users with different needs could be vying for the medium at one time

Large files have slowed down the network

Hub transmitting to all attached users slows down the network

High bandwidth users will cause the system to slow

Any other valid problem description

Level of response	Marking criteria	Mark band
Excellent	<p>The candidate describes correctly and in detail the definition of client server architecture. They will also give detailed response to the problems that caused the bandwidth to be allocated.</p> <p>Their use of spelling, punctuation and grammar are excellent and clearly legible.</p> <p>Their discussion of the hardware shows a very good knowledge of the client server network and the problems of bandwidth.</p> <p>Their discussion of the set up for connection uses an excellent form and style.</p> <p>Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.</p>	[9]–[12]
Good	<p>The candidate describes correctly the definition of client server architecture. They will also give a response to the problems that caused the bandwidth to be allocated.</p> <p>Their use of spelling, punctuation and grammar are satisfactory and legible.</p> <p>Their discussion of the hardware shows a satisfactory knowledge of the client server network and the problems of bandwidth.</p> <p>Their discussion of the set up for connection uses a satisfactory form and style.</p> <p>Their discussion is coherent and is organised and they use a range of correct specialist terms.</p>	[5]–[8]
Poor	<p>The candidate may incorrectly describe the definition of client server architecture. They will also give poor response to the problems that caused the bandwidth to be allocated.</p> <p>Their use of spelling, punctuation and grammar are poor and may not be legible.</p> <p>Their discussion of the hardware shows a poor knowledge of the client server network and the problems of bandwidth.</p> <p>Their discussion of the set up for connection uses a poor form and style.</p> <p>Their discussion is coherent and they use a few correct specialist terms.</p>	[1]–[4]

When a response is not worthy of a credit a [0] should be awarded. [12]

**6 Star and bus network properties**

Holds MAC addresses in the server	
Can change network card codes	
Passes a token	
Uses coaxial cabling	✓
Is part of the OSI model	
It needs a switch to function properly	✓
It uses a central hub	✓
It uses terminators	✓
It needs a printer to be installed	

Each correct tick [1]

[4]

4

**7 Ethernet**

- Baseband signalling + description
- Cable is shared + description
- CSMA CD + description
- 10 BASE 2 (10 BASE 5, 100 BASE 2) + description
- Large files slow things down + description
- Collisions plus description of solution
- Mention of move to 10 BASE T
- Hub or switch based systems are better + reason
- Length restrictions, repeaters, bridges, routers + description
- **or** any other valid feature plus description

3 × [2] (feature + description)

[6]

6



**8 Benefits of networks**

- Allows students to share printers and other hardware resources
- Allows school to exercise control over what students can (and cannot) do
- Allows user accounts (and passwords) to be set up
- Allows software to be shared
- Allows new users to be entered onto network
- Any other benefit

3 × [2] (benefit + description) [6]

6

**9 Router**

It allows <b>only</b> family members to log onto the home network	
It allocates IP addresses to computers in the family's home network	✓
It controls a proxy server	
It checks each family member's password when they log on	
It can split the family's single network into two logical separate networks	✓
It can show all the networks that exist in the family's neighbourhood	
It switches off when not being used	
It keeps information about other routers in 'routing tables'	✓
It broadcasts data in packets	✓

Each tick [1] [4]

4

## 10 Security

The main points of discussion will be:

- **Misuse of the computer system**
  - Most of computer misuse is committed by employees of the organisation. Examples include creating (and paying) bogus employees, creating dummy purchase orders and paying invoices etc.
    - Policies need to be in place to ensure these events can't happen
  - Employees need to be educated not to share their IDs and passwords
    - Training issues
  - Employees may attempt to enter restricted areas on the system
    - Consequences explained
- **Attacks on the network**
  - These can be identified by:
    - Unstructured threats – inexperienced individuals download software from the Internet and 'try something!'
      - Training and explanation of consequences
    - Structured threats – usually by experienced hackers
      - Firewalls installed
    - External threats – by outsiders through the Internet (Viruses, worms, Trojan horses, DoS)
      - Anti-virus software
    - Internal threats – someone authorises the use of the network for non work related tasks
      - Training and policies in place
- **Physical dangers:**
  - attempts to damage the server
    - countered by physically locking the server away (or removing keyboard and/or screen)
  - attempts to enter prohibited areas
    - use of physical security devices, e.g. fobs, swipe cards, key in codes
  - attempts to use resources without authority, e.g. printers
    - allocation of rights and permissions
  - depending on topology (e.g. star) risk to network if hub (or hard disk) (or switch) is damaged
    - have appropriate backup strategy in place
  - Power surge (or outage)
    - Backup strategy in place

Level of response	Marking criteria	Mark band
Excellent	<p>The candidate describes correctly, and in detail, all the issues surrounding network security.</p> <p>Their use of spelling, punctuation and grammar are excellent and clearly legible.</p> <p>Their discussion shows a very wide knowledge of the security issues.</p> <p>Their discussion of the need for security uses an excellent form and style.</p> <p>Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.</p>	[9]–[12]
Good	<p>The candidate describes correctly the issues surrounding network security.</p> <p>Their use of spelling, punctuation and grammar are satisfactory and legible.</p> <p>Their discussion shows a satisfactory knowledge of the security issues.</p> <p>Their discussion of the set up for connection uses a satisfactory form and style.</p> <p>Their discussion of security is coherent and organised and they use a range of specialist terms.</p>	[5]–[8]
Poor	<p>The candidate describes few of the issues surrounding network security.</p> <p>Their use of spelling, punctuation and grammar are poor and their work is not that legible.</p> <p>Their discussion shows a weak knowledge of the security issues.</p> <p>Their discussion of network security is not organised and uses a poor form and style.</p> <p>Their discussion is not organised and they use a few (if any) correct specialist terms.</p>	[1]–[4]

When a response is not worthy of credit a [0] should be awarded. [12]

12

**11 (a) IP addressing**

Static addressing uses an unregistered IP address and maps it to a registered IP address on a one-to-one basis whereas supplied (dynamic) addressing is allocated on demand.

Static addressing is used when a device on a private network needs to be available from outside the private network whereas dynamic addressing allocates the address of hardware devices supplied for use internally by router.

Dynamic addressing is only visible within the private network.  
 2 × [2] (difference + description) [4]

**(b) Disadvantage of static over dynamic (supplied)**

Static is open to attack from outside organisation  
 Security may be compromised by allocating a static address  
 Static addresses may be prone to attack from hackers  
 Supplied addresses are only allocated on demand  
 Dynamic (supplied) addresses are only visible to the internal organisation

1 × [2] (disadvantage + description) [2]

6

**12 (a) Access rights**

An access right defines a network user's right to use (not use) media resources (e.g. a system or a file) within the network  
 An access right defines what a user can do on the network.  
 It can be controlled using log on codes and passwords.

Definition [1]

**Access Rights Examples**

- Can log on to any or specific computers
- Can use specific hardware devices such as colour printers or scanners
- May be given log on rights, to say, the area reserved for high bandwidth users

2 × [2] [4]

**(b) Permission**

A permission allows a network user to have certain privileges and actions when logged onto the network.  
 It determines what an authorised user can do.

Definition [1]

**Permission Examples**

- Can be allocated status as user, super-user, printer-controller etc.
- Can be given read, write, execute permissions
- Can add, create, delete or rename files
- Can execute a program
- Can enter a directory
- **or** any other suitable permission

2 × [2] [4]

10

**13 e-mail features**

- Draw up a document and save it as a draft + description
- Compose e-mail + description
- Enter e-mail address of receiver (use of contacts) + description
- Add subject matter detail + description
- Use of distribution lists + description
- Use of cc, bcc + description
- Ask for receipt on delivery or reading + description
- Use of voting buttons + description
- Allows instant (or almost instant) response
- Not restricted to office – world wide possible
- Can access e-mail from home
- **or** any other suitable feature + description

2 × [2]

[4]

4

**14 Wireless connections**

**Advantage**

- No cabling + description
- Easy mobility + description
- Fast set up +description
- Much cheaper cost to set up + comparison to non-wireless
- Easy to expand + description

Name of advantage 1 × [1]

[1]

**Disadvantage**

- Security problem + description
- Interference + description
- Inconsistent connection + description
- Admin. Difficulties re. exact physical layout

Name of disadvantages 2 × [1]

[2]

3

**Total**

**100**