Networks

STARTER **1** With the help of this diagram, try to describe the function of these components of a typical network system:

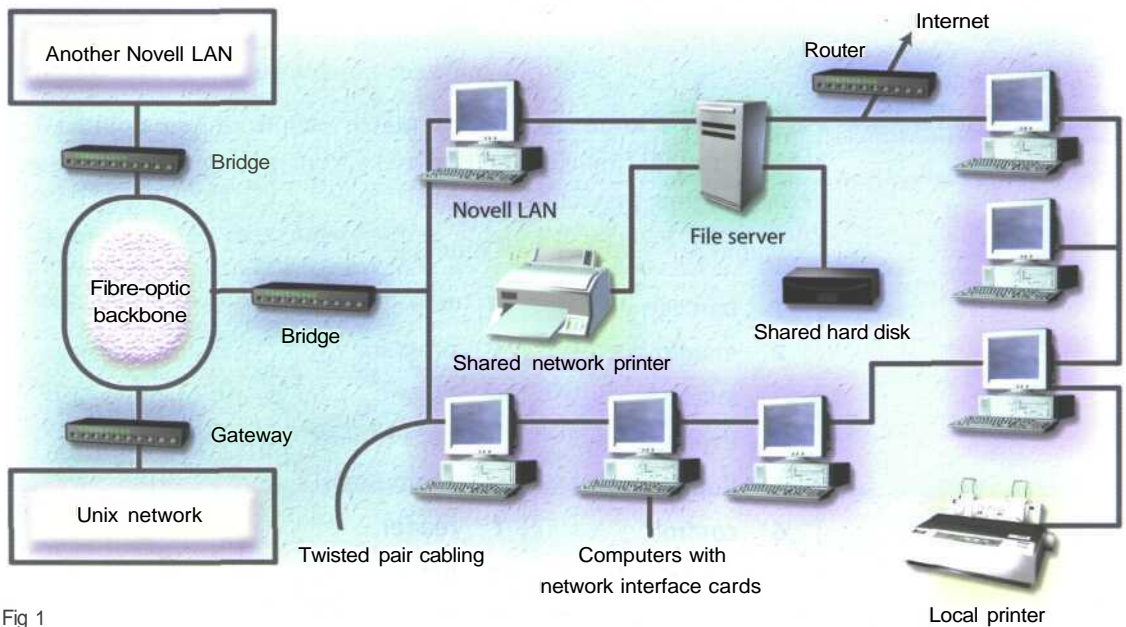|			
1	a file server	5	a LAN
2	a bridge	6	a gateway
3	a router	7	a modem
4	a backbone		

Fig 1
Components of a typical LAN

2 Now read these definitions to check your answers. You may also refer to the Glossary.

A **bridge** is a hardware and software combination used to connect the same type of networks. Bridges can also partition a large network into two smaller ones and connect two LANs that are nearby each other.

A **router** is a special computer that directs communicating messages when several networks are connected together. High-speed routers can serve as part of the Internet backbone.

A **gateway** is an interface that enables dissimilar networks to communicate, such as two LANs based on different topologies or network operating systems.

A **backbone** is the main transmission path, handling the major data traffic, connecting different LANs together.

A **LAN** is a network contained within a small area, for example a company department.

A **modem** is a device for converting digital signals to analogue signals and vice versa to enable a computer to transmit and receive data using an ordinary telephone line.

Now study this text and the diagram of a simple home network setup. Match the diagram key to the components of the network.

The technology needed to set up a home network is here today. It is just a matter of connecting a number of PCs equipped with Ethernet adapters to a hub using twisted-pair cabling which uses sockets rather like phone sockets. Special isolation adapters can be fitted to allow existing mains lines to be used instead of twisted-pair cabling. Most future home networks, however, are likely to be wireless network systems, using tuned transmitter and receiver devices. The simplest networks allow basic file-sharing and multi-player gaming as well as sharing of peripherals such as printers. Most advanced home networks are likely to have a client/server structure, with low-cost terminals, or 'thin' clients, connected to a central server which maintains the system's storage capacity and, depending on whether the terminals are dumb or processor-equipped network computers, its processing power. To make the most of such a network, it must become part of an integrated home entertainment and control system. To the user, the desktop becomes just one of many features accessible throughout the house. Tired of working in the study? Pop down to the living room and reload it into the terminal there. Before you start work, call up the hi-fi control program and have the music of your choice pumped through the living room speakers. Computer and entertainment networks can be separate but linked by the server to allow control of the latter from the terminals. Future home networks are more likely to have the entire system based on a single loop.

Fig 2
Simple home network
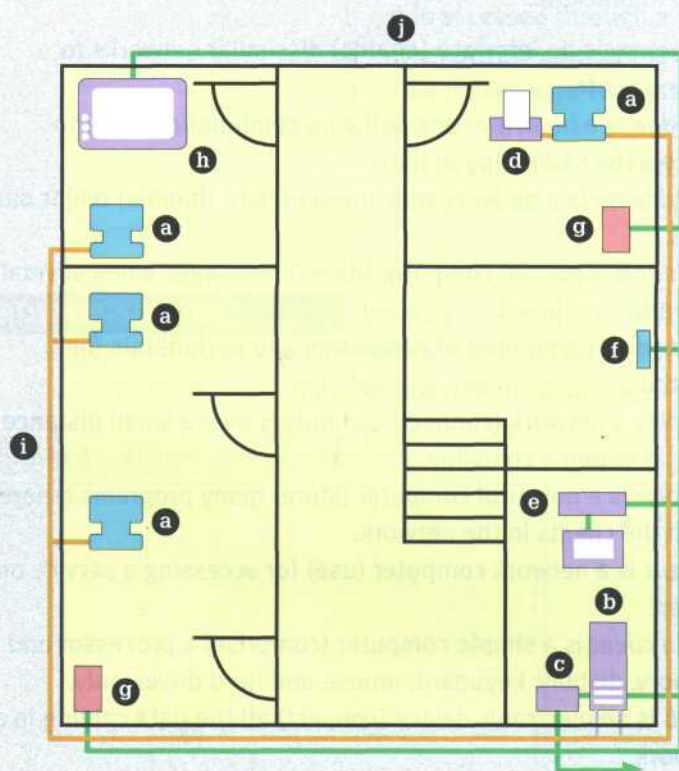
KEY TO THE DIAGRAM

1 Line receiver delivering home entertainment audio to speakers within the room.

2 TV set relaying digital TV broadcasts relayed from the receiver by the home entertainment system.

3 Network modem allowing clients to access the internet simultaneously. Ideally this would be replaced by an ISDN adapter or DSL modem fitted inside the server.

4 Thin client comprising a display, keyboard, mouse, floppy and CD-ROM drive. If the client is NetPC-based, it will have its own processor and memory. A dumb terminal will simply act as an interface to the real computer, the server.

5 Network printer connected to any client.

6 Line driver connected to the home entertainment system: the cable TV player, DVD player, etc.

7 Home server. It contains roughly 5Gb of storage per terminal and one or more processors, depending on whether it is connected to network computers or to cheaper dumb terminals.

8 Entertainment system delivery network. This also hooks up to the server to control the system and receive digital audio and video from it.

9 Entertainment network control pad. While the system can be controlled by a PC, there would be one of these per connected room to ensure that the client does not need to be activated to use the system.

10 Data line linking clients to server.

LANGUAGE WORK	Relative clauses with a participle

Relative clauses with a participle are often used in technical descriptions. They allow you to provide a lot of information about a noun using as few words as possible.

Study these examples from the Task 3 text.

1   The technology *needed to set up a home network*
2   PCs *equipped with Ethernet adapters*
3   Network modem *allowing clients to access the Internet simultaneously*
4   Data line *linking client to server*

We can use the passive participle as in examples 1 and 2.

1   The technology needed to set up a home network.
    = technology *which is needed*
2   PCs equipped with Ethernet adapters
    = PCs *which are equipped*

We can use an active participle as in examples 3 and 4.

3   Network modem allowing clients to access the Internet simultaneously
    = modem *which allows clients to access the Internet simultaneously*
4   Data line linking client to server
    = data line *which links client to server*

4   Complete these definitions with the correct participle of the verb given in brackets.

1   A *gateway* is an interface (enable) dissimilar networks to communicate.
2   A *bridge* is a hardware and software combination (use) to connect the same type of networks.
3   A *backbone* is a network transmission path (handle) major data traffic.
4   A *router* is a special computer (direct) messages when several networks are linked.
5   A *network* is a number of computers and peripherals (link) together.
6   A *LAN* is a network (connect) computers over a small distance such as within a company.
7   A *server* is a powerful computer (store) many programs (share) by all the clients in the network.
8   A *client* is a network computer (use) for accessing a service on a server.
9   A *thin client* is a simple computer (comprise) a processor and memory, display, keyboard, mouse and hard drives only.
10 A *hub* is an electronic device (connect) all the data cabling in a network.

5 Link these statements using a relative clause with a participle.

1 a The technology is here today.
  b It is needed to set up a home network.

2 a You only need one network printer.
  b It is connected to the server.

3 a Her house has a network.
  b It allows basic file-sharing and multi-player gaming.

4 a There is a line receiver in the living room.
  b It delivers home entertainment audio to speakers.

5 a Eve has designed a site.
  b It is dedicated to dance.

6 a She has built in links.
  b They connect her site to other dance sites.

7 a She created the site using a program called Netscape Composer.
  b It is contained in Netscape Communicator.

8 a At the centre of France Telecom's home of tomorrow is a network.
  b It is accessed through a Palm Pilot-style control pad.

9 a The network can simulate the owner's presence.
  b This makes sure vital tasks are carried out in her absence.

10 a The house has an electronic door-keeper.
  b It is programmed to recognise you.
  c This gives access to family only.

PROBLEM-SOLVING **6** Work in two groups, A and B. Group A, list all the advantages of a network. Group B, list all the disadvantages. Then together consider how the disadvantages can be minimised.

Group A Advantages of a network	Group B Disadvantages of a network

SPEAKING	7

Transmission modes Work in pairs, A and B. Explain to your partner how one mode of transmission between computers operates with the help of the text provided. Your explanation should allow your partner to label his/her diagram.

Student A
Your text is on page 186. Your explanation should allow your partner to label this diagram.
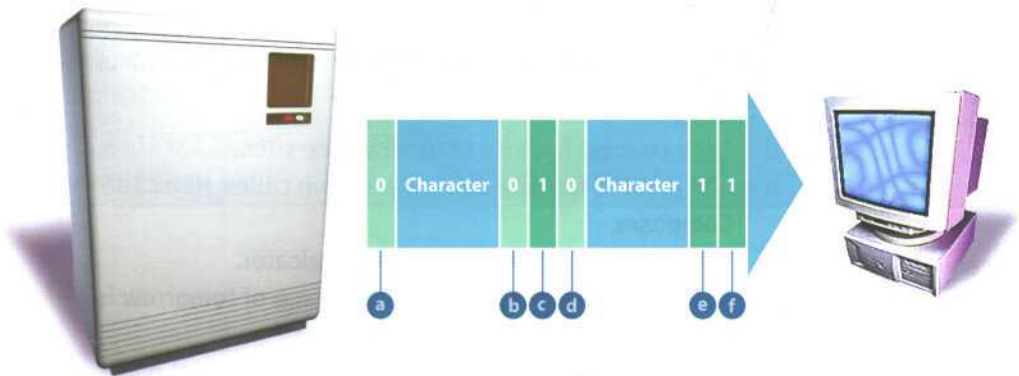

Fig 3
Asynchronous transmission

Student B
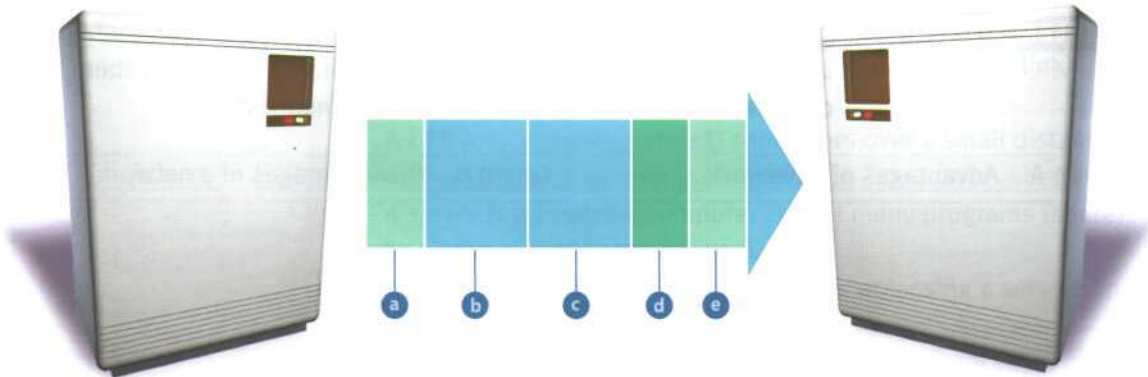Your text is on page 192. Your explanation should allow your partner to label this diagram.

Fig 4
Synchronous transmission

WRITING	8

Using the lists you compiled in Task 6, describe the advantages and disadvantages of networks. Try to link some of the advantages and disadvantages as in these examples.

Advantages	Disadvantages
Allow data to be shared.	Permit viruses to spread quickly.
Users can share software on the server.	Server failure means no one can work.

1 Although networks allow data to be shared, they permit viruses to spread quickly.
2 Users can share software on the server; however server failure means that no one can work.

WHEN YOU HAVE FINISHED THE READING SECTION ON THE FOLLOWING PAGES, COME BACK TO THESE ADDITIONAL EXERCISES

3 Identify which layer attaches the following headers to a network transmission:

a Specifying the language, the compression and encryption schemes
b Identifying each segment's checksum and its position in the message
c Containing the sequence of packets and the address of the receiving computer
d Marking the beginning and end of the message and specifying whether the messages will be sent half-duplex or full-duplex
e Identifying the sending and receiving computers

4 Fill in the missing words in the following sentences then put the sentences in the correct order:

a The checksum is recalculated by the.............. layer which also reassembles the message ....
b The message is..............and..............by the presentation layer.
c The message is reconverted into..............by the physical layer.
d The session layer then sends the message to the next................
e The application layer converts the bits into ....characters, and directs the data to the correct................
f The incoming..............are recounted by the network layer for..............and billing purposes.
g The..............layer confirms the arrival of the packets,..............them in, and calculates the ....for each packet.
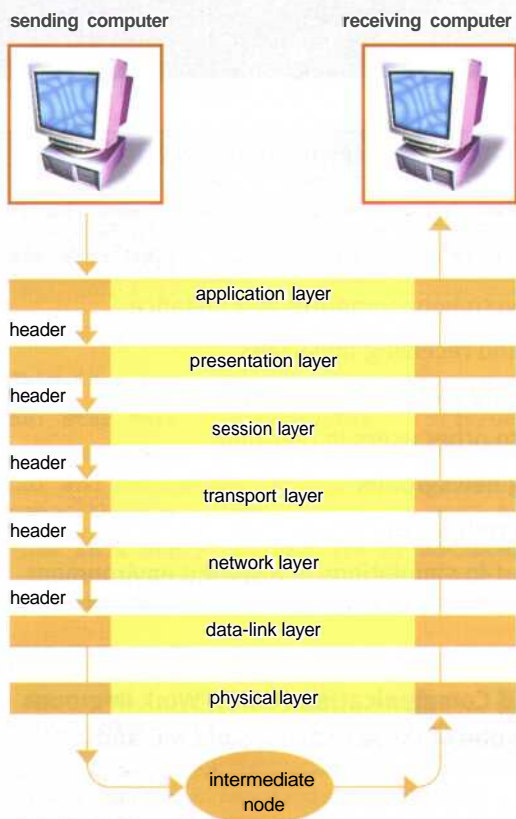h The parts of the message are..............by the ....layer until the message is................

D **Find the answers to these questions in the following text.**

1 Into what units is data subdivided by the following layers?
   a   transport layer
   b   network layer
2 What is the purpose of a transmission checksum test?
3 How long does the data-link layer keep a copy of each packet?
4 What processes can be carried out at intermediate nodes?
5 Which network communications layer is described by each of the following statements?
   a   Makes sure that the message is transmitted in a language that the receiving computer can understand
   b   Protects the data being sent
   c   Encodes and sends the packets
   d   Supervises the transmission
   e   The part of a communications process that a user sees
   f   Starts communications and looks after communications among network nodes
   g   Chooses a route for the message
   h   Makes backup copies of the data if required
   i   Confirms the checksum, then addresses and duplicates the packets

Network Communications

1 The application layer is the only part of a communications process that a user sees, and even then, the user doesn't see most of the work that the application does to prepare a message for sending over a network. The layer converts a message's data from human-readable form into bits and attaches a header identifying the sending and receiving computers.

2 The presentation layer ensures that the message is transmitted in a language that the receiving computer can interpret (often ASCII). This layer translates the language, if necessary, and then compresses and perhaps encrypts the data. It adds another header specifying the language as well as the compression and encryption schemes.

3 The session layer opens communications and has the job of keeping straight the communications among all nodes on the network. It sets boundaries (called bracketing) for the beginning and end of the message, and establishes whether the messages will be sent half-duplex, with each computer taking turns sending and receiving, or full-duplex, with both computers sending and receiving at the same time. The details of these decisions are placed into a session header.

4 The transport layer protects the data being sent. It subdivides the data into segments, creates checksum tests - mathematical sums based on the contents of data - that can be used later to determine if the data was scrambled. It can also make backup copies of the data. The transport header identifies each segment's checksum and its position in the message.

5 The network layer selects a route for the message. It forms data into packets, counts them, and adds a header containing the sequence of packets and the address of the receiving computer.

6 The data-link layer supervises the transmission. It confirms the checksum, then addresses and duplicates the packets. This layer keeps a copy of each packet until it receives confirmation from the next point along the route that the packet has arrived undamaged.

sending computer   receiving computer

application layer

header

presentation layer

header

session layer

header

transport layer

header

network layer

header

data-link layer

physical layer

intermediate node

7 The physical layer encodes the packets into the medium that will carry them - such as an analogue signal, if the message is going across a
50 telephone line - and sends the packets along that medium.

8 An intermediate node calculates and verifies the checksum for each packet. It may also reroute the message to avoid congestion on the network.

55 **9** At the receiving node, the layered process that sent the message on its way is reversed. The physical layer reconverts the message into bits. The data-link layer recalculates the checksum, confirms arrival, and logs in the
60 packets. The network layer recounts incoming packets for security and billing purposes. The transport layer recalculates the checksum and reassembles the message segments. The session layer holds the parts of the message until the
65 message is complete and sends it to the next layer. The presentation layer expands and decrypts the message. The application layer converts the bits into readable characters, and directs the data to the correct application.

B Re-read the text to find the answers to these questions.

1   Match the term in Table A with the statement in Table B.

Table A
a   Bracketing
b   Half-duplex
c   Full-duplex
d   Checksum

Table B
i   Transmission mode in which each computer takes turns sending and receiving
ii   Mathematical calculations based on the contents of data
iii   Set boundaries for the beginning and end of a message
iv   Transmission mode in which both computers send and receive at the same time

2   Mark the following statements as True or False:

a   Most of the work that an application does to prepare a message for sending over a network is not seen by the user.

b   ASCII is always used to transmit data.

c   The encryption layer compresses the message.

d   The network layer keeps track of how many packets are in each message.

e   The network layer keeps a copy of each packet until it arrives at the next node undamaged.

f   Analogue signals are used on ordinary telephone lines.

g   When a message arrives at its destination, it passes through the same seven network communications layers as when it was sent, but in reverse order.