Unit 5

Text A

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Networking Hardware

Networking hardware includes all computers, peripherals, interface cards and other equipment needed to perform data processing and communications within the network (see Figure 5-1).

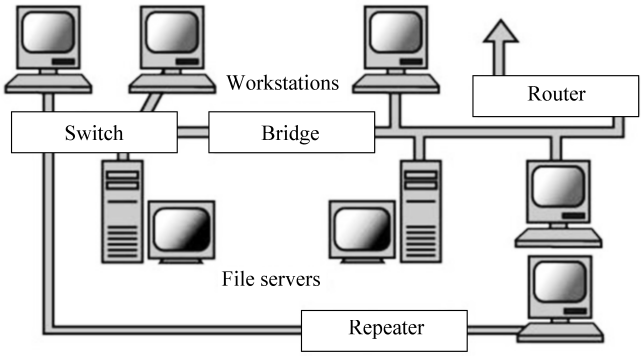

Figure 5-1 Networking Hardware

This section provides information on the following components:

- File servers.
- Workstations.
- Network interface cards.
- Concentrators/hubs.
- Repeaters.
- Bridges.
- Routers.

1. File Servers

A file server stands at the heart of most networks. It is a very fast computer with a large amount of RAM and storage space, along with a fast network interface card. The network operating system software resides on this computer, along with any software applications and data files that need to be shared.

The file server controls the communication of information between the nodes on a network. For example, it may be asked to send a word processor program to one workstation, receive a database file from another workstation, and store an e-mail message during the same time period. This requires a computer that can store a lot of information and share it very quickly. File servers should have at least the following characteristics:

- 75 megahertz or faster microprocessor.
- A fast hard drive with at least four gigabytes of storage.
- A RAID (Redundant Array of Inexpensive Disks) to preserve data after a disk casualty.
- A tape back-up unit.
- Numerous expansion slots.
- Fast network interface card.
- At least of 32 MB of RAM.

2. Workstations

All the computers connected to the file server on a network are called workstations. A typical workstation is a computer that is configured with a network interface card, networking software, and the appropriate cables. Workstations do not necessarily need hard drives because files can be saved on the file server. Almost any computer can serve as a network workstation.

3. Network Interface Cards

The network interface card (NIC) provides the physical connection between the network and the workstation. Most NICs are internal, with the card fitting into an expansion slot inside the computer. Some computers, such as Mac Classics, use external boxes which are attached to a serial port or a SCSI port. Laptop computers generally use external LAN adapters connected to the parallel port or network cards that slip into a PCMCIA[1] slot.

Network interface cards are a major factor in determining the speed and performance of a network. It is a good idea to use the fastest network card available for the type of workstation you are using.

The three most common network interface connections are Ethernet cards, LocalTalk connectors, and token ring cards. According to an International Data Corporation, Ethernet is the most popular, followed by token ring and LocalTalk.

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1 Short for Personal Computer Memory Card International Association, and pronounced as separate letters, PCMCIA is an organization consisting of some 500 companies that has developed a standard for small, credit card-sized devices, called PC Cards. Originally designed for adding memory to portable（['pɔːtəbl] *adj*. 轻便的，手提（式）的）computers, the PCMCIA standard has been expanded several times and is now suitable for many types of devices.

3.1 Ethernet Cards

Ethernet cards are usually purchased separately from a computer, although many computers (such as the Macintosh) now include an option for a preinstalled Ethernet card. Ethernet cards contain connections for either coaxial or twisted pair cables (or both). If it is designed for coaxial cable, the connection will be BNC[1]. If it is designed for twisted pair, it will have a RJ-45 connection. Some Ethernet cards also contain an AUI[2] connector. This can be used to attach coaxial, twisted pair, or fibre optics cable to an Ethernet card. When this method is used there is always an external transceiver attached to the workstation.

3.2 Token Ring Cards

Token ring network cards look similar to Ethernet cards. One visible difference is the type of connector on the back end of the card. Token ring cards generally have a nine pin DIN type connector to attach the card to the network cable.

4. Concentrators/Hubs

A concentrator is a device that provides a central connection point for cables from workstations, servers, and peripherals. In a star topology, twisted-pair wire is run from each workstation to a central concentrator. Hubs are multi-slot concentrators into which a number of multi-port cards can be plugged to provide additional access as the network grows in size. Some concentrators are passive. They allow the signal to pass from one computer to another without any change. Most concentrators are active. They electrically amplify the signal as it moves from one device to another. Active concentrators, like repeaters, are used to extend the length of a network. Concentrators are:

- Usually configured with 8, 12, or 24 RJ-45 ports.
- Often used in a star or star-wired ring topology.
- Sold with specialized software for port management.
- Also called hubs.
- Usually installed in a standardized metal rack that also may store netmodems, bridges, or routers.

5. Repeaters

When a signal travels along a cable, it tends to lose strength. A repeater is a device that boosts a network's signal as it passes through. The repeater does this by electrically amplifying the signal it receives and rebroadcasting it. Repeaters can be separate devices or they can be

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1 The BNC connector is a miniature quick connect/disconnect RF connector used for coaxial cable. It features two bayonet lugs on the female connector; mating is achieved with only a quarter turn of the coupling nut（连接螺母）. BNCs are ideally suited for cable termination for miniature-to-subminiature（[sʌb'minjətʃə] *adj.* 超小型的，微型的）coaxial cable (e.g., RG-58, 59, to RG-179, RG-316).

2 An attachment unit interface (AUI) is a 15 pin connection that provides a path between a node's Ethernet interface and the medium attachment unit（MAU，介质连接单元），sometimes known as a transceiver. It is the part of the IEEE Ethernet standard located between the media access control (MAC), and the MAU. An AUI cable may be up to 50 meters long, although frequently the cable is omitted altogether and the MAU and MAC are directly attached to one another.

incorporated into a concentrator. They are used when the total length of your network cable exceeds the standards set for the type of cable being used.

A good example of the use of repeaters would be in a local area network using a star topology with unshielded twisted-pair cabling. The length limit for unshielded twisted-pair cable is 100 meters. The most common configuration is for each workstation to be connected by twisted-pair cable to a multi-port active concentrator. The concentrator regenerates all the signals that pass through it allowing for the total length of cable on the network to exceed the 100 meter limit.

6. Bridges

A bridge is a device that allows you to segment a large network into two smaller, more efficient networks. If you are adding to an older wiring scheme and want the new network to be up-to-date, a bridge can connect the two.

A bridge monitors the information traffic on both sides of the network so that it can pass packets of information to the correct location. Most bridges can "listen" to the network and automatically figure out the address of each computer on both sides of the bridge. The bridge can inspect each message and, if necessary, broadcast it on the other side of the network.

The bridge manages the traffic to maintain optimum performance on both sides of the network. You might say that the bridge is like a traffic cop at a busy intersection during rush hour. It keeps information flowing on both sides of the network, but it does not allow unnecessary traffic through. Bridges can be used to connect different types of cabling, or physical topologies. They must, however, be used between networks with the same protocol.

7. Routers

A router translates information from one network to another; it is similar to a super intelligent bridge. Routers select the best path to route a message, based on the destination address and origin. The router can direct traffic to prevent head-on collisions, and is smart enough to know when to direct traffic along back roads and shortcuts.

While bridges know the addresses of all computers on each side of the network, routers know the addresses of computers, bridges, and other routers on the network. Routers can even "listen" to the entire network to determine which sections are busiest—they can then redirect data around those sections until they clear up.

If you have a school LAN that you want to connect to the Internet, you will need to purchase a router. In this case, the router serves as the translator between the information on your LAN and the Internet. It also determines the best route to send the data over the Internet. Routers can:

- Direct signal traffic efficiently.
- Route messages between any two protocols.

- Route messages between linear bus, star, and star-wired ring[1] topologies.
- Route messages across fiber optic, coaxial, and twisted-pair cabling.

New Words

concentrator	['kɒnsəntreɪtə]	*n*. 集中器
bridge	[brɪdʒ]	*n*. 桥接器
reside	[rɪ'zaɪd]	*vi*. 驻留
share	[ʃeə]	*n*. & *v*. 分享，共享
workstation	['wɜːksteɪʃn]	*n*. 工作站
megahertz	['meɡəhɜːts]	*n*. 兆赫
microprocessor	[ˌmaɪkrəʊ'prəʊsesə]	*n*. 微处理器
gigabyte	['ɡɪɡəbaɪt]	*n*. 十亿字节，吉字节
preserve	[prɪ'zɜːv]	*vt*. 保护，保持，保存
casualty	['kæʒuəlti]	*n*. 损坏，事故
configure	[kən'fɪɡə]	*vi*. 配置，设定
internal	[ɪn'tɜːnl]	*adj*. 内在的，内部的
external	[ɪk'stɜːnl]	*adj*. 外部的
determine	[dɪ'tɜːmɪn]	*vt*. 决定，断定
option	['ɒpʃn]	*n*. 选项，选择权
preinstall	['priːɪn'stɔːl]	*v*. 预设，预安装
coaxial	['kəʊ'æksɪəl]	*adj*. 同轴的，共轴的
transceiver	[træn'siːvə]	*n*. 收发器
connector	[kə'nektə]	*n*. 连接器
multislot	['mʌltɪslɒt]	*n*. 多插槽，多插座
passive	['pæsɪv]	*adj*. 被动的
active	['æktɪv]	*adj*. 主动的，活动的
amplify	['æmplɪfaɪ]	*vt*. 放大，增强
standardized	['stændədaɪzd]	*adj*. 标准的
rack	[ræk]	*n*. 架，设备架
		vt. 放在架上
netmodem	[net'məʊdem]	*n*. 网络调制解调器
boost	[buːst]	*v*. 推进
rebroadcast	[riː'brɔːdkɑːst]	*v*. & *n*. 转播，重播
exceed	[ɪk'siːd]	*vt*. 超越，胜过
		vi. 超过其他

1 A star-wired ring topology may appear (externally) to be the same as a star topology. Internally, the MAU (multistation access unit,多站访问部件) of a star-wired ring contains wiring that allows information to pass from one device to another in a circle or ring. The token ring protocol uses a star-wired ring topology.

unshielded	[ʌn'ʃi:ldɪd]	*adj*. 无防护的，无铠装的，无屏蔽的
regenerate	[rɪ'dʒenəreɪt]	*vt*. 使新生，重建
segment	[seg'ment]	*v*. 分割
	['segmənt]	*n*. 段，节，片断
address	[ə'dres]	*n*. 地址
inspect	[ɪn'spekt]	*v*. 检查
optimum	['ɒptɪməm]	*n*. 最适宜
		adj. 最佳的
intersection	[ˌɪntə'sekʃn]	*n*. 十字路口
unnecessary	[ʌn'nesəsərɪ]	*adj*. 不必要的，多余的
intelligent	[ɪn'telɪdʒənt]	*adj*. 聪明的，智能的
route	[ru:t]	*v*. 发送
		n. 路线，路程，通道
collision	[kə'lɪʒn]	*n*. 碰撞，冲突
shortcut	['ʃɔ:tkʌt]	*n*. 捷径
redirect	[ˌri:də'rekt]	*vt*. 重寄，使改道，使改变方向

Phrases

interface card	接口卡
network interface card (NIC)	网络接口卡
file server	文件服务器
storage space	存储空间
along with…	连同……一起，随同……一起
network operating system	网络操作系统
software application	软件应用程序
data file	数据文件
word processor	文字处理软件
database file	数据库文件
hard drive	硬盘驱动器
tape back-up unit	磁带备份机
be saved on…	被保存在……上
fit into	插入，装入
attach… to	附在……
serial port	串行端口
laptop computer	膝上型计算机
parallel port	并行端口
network card	网卡
slip into	分成

twisted pair	双绞线
fibre optics cable	光导纤维电缆
port management	端口管理
be incorporated into	融入
unshielded twisted-pair	非屏蔽双绞线
information traffic	信息流量
on both sides	双方，两边
figure out	计算出，断定
traffic cop	<美口>交通警察
rush hour	高峰时间
be similar to…	与……相似
clear up	整理，消除

Abbreviations

RAM (Random Access Memory)	随机存储器
RAID (Redundant Array of Inexpensive Disks)	独立磁盘冗余阵列
MB (Megabyte)	兆字节
SCSI (Small Computer System Interface)	小型计算机系统接口
PCMCIA (Personal Computer Memory Card International Association)	个人计算机存储卡国际联盟
BNC (Bayonet Nut Connector)	同轴电缆接插件
AUI (Attachment Unit Interface)	连接单元接口
DIN (Deutsche Industrie-Norm (德文))	德国工业标准

Analysis of Difficult Sentences

[1] Networking hardware includes all computers, peripherals, interface cards and other equipment needed to perform data processing and communications within the network.

本句中，needed to perform data processing and communications within the network 是一个过去分词短语，作定语，修饰和限定 other equipment。它可以扩展为一个定语从句：which are needed to perform data processing and communications within the network。

[2] A typical workstation is a computer that is configured with a network interface card, networking software, and the appropriate cables.

本句中，that is configured with a network interface card, networking software, and the appropriate cables 是一个定语从句，修饰和限定 a computer。

[3] Laptop computers generally use external LAN adapters connected to the parallel port or network cards that slip into a PCMCIAslot.

本句中，connected to the parallel port 是一个过去分词短语，作定语，修饰和限定 external LAN adapters。that slip into a PCMCIAslot 是一个定语从句，修饰和限定 network cards。

[4] Hubs are multi-slot concentrators into which a number of multi-port cards can be plugged to provide additional access as the network grows in size.

本句中，into which a number of multi-port cards can be plugged to provide additional access as the network grows in size 是一个介词前置的定语从句，修饰和限定 multi-slot concentrators。在该从句中，to provide additional access 作目的状语，as the network grows in size 作时间状语。

[5] While bridges know the addresses of all computers on each side of the network, routers know the addresses of computers, bridges, and other routers on the network.

本句中，While bridges know the addresses of all computers on each side of the network 是一个让步状语从句，while 的意思是“尽管，虽然”，等于 although。

Exercises

【EX.1】 Answer the following questions according to the text.

1. What does networking hardware include?
2. What is a file server?
3. What does a file server do?
4. What is a typical workstation?
5. What does the network interface card (NIC) do?
6. What are the three most common network interface connections?
7. What is a concentrator?
8. How does a repeater boost a network’s signal as it passes through?
9. What does a bridge do?
10. If you have a school LAN that you want to connect to the Internet, what will you need to buy?

【EX.2】Translate the following terms or phrases from English into Chinese and vice versa.

1.	network operating system	1.	
2.	serial port	2.	
3.	hard drive	3.	
4.	fiber optics cable	4.	
5.	unshielded twisted-pair	5.	
6.	parallel port	6.	
7.	bridge	7.	
8.	microprocessor	8.	
9.	preinstall	9.	
10.	connector	10.	
11.	*n*. 收发器	11.	

12.	*n*. 地址	12.	
13.	*n*. 碰撞，冲突	13.	
14.	*v*. 分割　*n*. 段，节，片断	14.	
15.	*vi*. 配置，设定	15.	

【EX.3】 Translate the following sentences into Chinese.

1. Data transmit between the concentrator and the collector in the form of wireless ad hoc networks.
2. Normally demodulation frequency is inside the limits of a few hertz to hundreds of megahertz.
3. The second option is technically superior but it demands higher-performance equipment.
4. Coaxial cable is also used for undersea telephone lines.
5. We are using this transistor to amplify a telephone signal.
6. It can regenerate data in storage units where the process of reading data results in its destruction.
7. Please inspect all parts for damage prior to installation and start-up.
8. Microsoft developed an intelligent solution to this problem.
9. What function would you use to redirect the browser to a new page?
10. Filter route establishes the basic rules for connectivity through a firewall.

【EX.4】Complete the following passage with appropriate words in the box.

provides	devices	host	surrounded	signals
carrier	random	amplify	electricity	designed

CSMA/CA stands for carrier sense multiple access collision avoidance. It is a network access method in which each device signals its intent to transmit before it actually does so. This prevents other ___1___ from sending information, thus preventing collisions from occurring between ___2___ from two or more devices. This is the access method used by LocalTalk.

CSMA/CD stands for carrier sense multiple access collision detection. It is a network access method in which devices that are ready to transmit data first check the channel for a carrier. If no ___3___ is sensed, a device can transmit. If two devices transmit at once, a collision occurs and each computer backs off and waits a ___4___ amount of time before attempting to retransmit. This is the access method used by Ethernet.

Concentrator is a device that ___5___ a central connection point for cables from workstations, servers, and peripherals. Most concentrators contain the ability to ___6___ the electrical signal they receive.

Dumb terminal refers to devices that are ___7___ to communicate exclusively with a host (main frame) computer. It receives all screen layouts from the host computer and sends all keyboard entry to the host. It cannot function without the ___8___ computer.

Fibre optic cable is a a cable which consists of a center glass core ___9___ by layers of plastic. It transmits data using light rather than ___10___. It has the ability to carry more information over much longer distances.

【EX.5】Translate the following passage into Chinese.

Network Gateway

A network gateway is an internetworking system capable of joining together two networks that use different base protocols. A network gateway can be implemented completely in software, completely in hardware, or as a combination of both. Depending on the types of protocols they support, network gateways can operate at any level of the OSI model.

Because a network gateway, by definition, appears at the edge of a network, related capabilities like firewalls tend to be integrated with it. On home networks, a broadband router typically serves as the network gateway although ordinary computers can also be configured to perform equivalent functions.

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Text B

Network Switch

A network switch is a computer networking device that links network segments or network devices. The term commonly refers to a multi-port network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally process data at the network layer (layer 3) and above are often called layer-3 switches or multilayer switches.

1. Function

A switch is a telecommunication device which receives a message from any device connected to it and then transmits the message only to the device for which the message is meant. This makes the switch a more intelligent device than a hub (which receives a message and then transmits it to all the other devices on its network). The network switch plays an integral part in most modern Ethernet local area networks (LANs). Mid-to-large sized LANs contain a number of linked managed switches. Small office/home office (SOHO) applications typically use a single switch, or an all-purpose converged device such as a residential gateway to access small office/home broadband services such as DSL or cable Internet. In most cases, the end-user device contains a router and components that interface to the particular physical broadband technology. User devices may also include a telephone interface for VoIP[1].

An Ethernet switch operates at the data link layer of the OSI model to create a separate

1 Voice over IP (VoIP, abbreviation of voice over internet protocol) commonly refers to the communication protocols, technologies, methodologies, and transmission techniques involved in the delivery of voice communications and multimedia sessions over internet protocol (IP) networks, such as the Internet.