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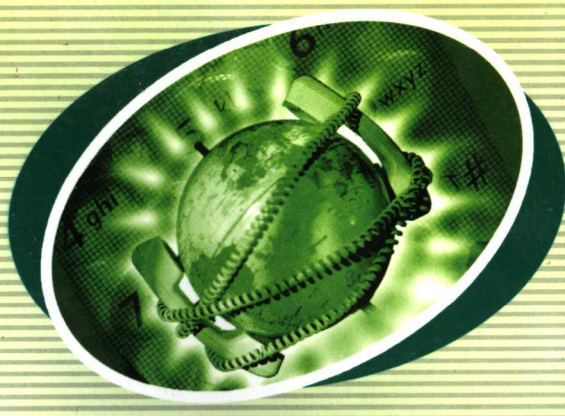
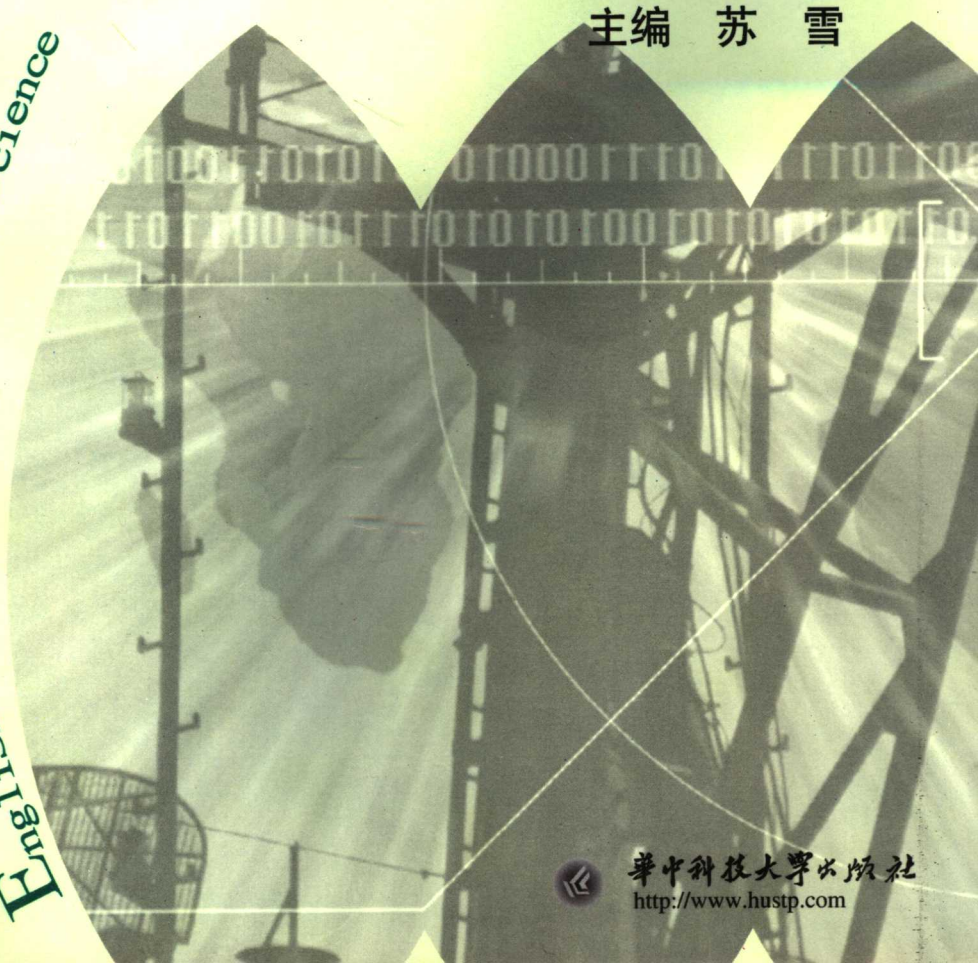


通信专业英语

English for Communication Science

主编 苏 雪



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English for Communication Science

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内容简介

本书是一本实用的专业英语教材，内容新颖、丰富，以通信技术为专业背景，力求切合实用型通信类专业学生的培养目标。本书充分考虑了通信专业英语的复杂性和发展性，参考了大量国内外优秀的文献，不仅注重通信专业基础知识，同时紧跟通信技术日新月异的变化，尽可能兼顾系统性、实用性和可操作性。

全书共五大知识模块，精选包括数据通信、通信协议、光纤通信、无线通信、数据通信网络相关知识的科技英语内容。每一模块都含有4～6课，每课由课文、单词、词组、难句分析和练习等组成。练习部分包括回答问题、翻译、长句分析、填空、选择和判断正误等内容。力求体现贴近教学实际、图文并茂的特点。同时，为方便学生学习，文后附有专业英语常用语法知识、单词表、通信专业缩略语、模拟试题等。

另外，为便于教师教学，本书赠送教师教学参考书，内容包括所有课后习题参考答案、课文及阅读材料参考译文，可供教师作教学参考使用。

前　言

现代通信产业发展迅猛，日新月异的发展态势对集理论知识和实践技能于一体的高等技术人才需求巨大。如何提高从业人员的素质，增强产业竞争力，已成为通信运营商高层决策和企业用人单位所考虑的重要问题。本书以实用型通信专业类学生的培养目标为编写依据，注重学生专业英语知识的学习和应用能力的培养，力求切合当前通信产业对从业人员专业英语的要求，增强学生的综合素质和就业能力。

本书是一本实用的专业英语教材，内容新颖、丰富，主要以通信技术为专业背景，充分考虑了通信专业英语的复杂性和发展性。课文内容基本涵盖了现代通信技术的各个领域，由浅入深，循序渐进，注释详细，适合大、中专和高职院校学生及二级学院本科生学习，也可供通信、计算机和英语知识爱好者使用。

全书共五大知识模块，精选包括数据通信、通信协议、光纤通信、无线通信、数据通信网络相关知识的科技英语内容。每一模块都含有4～6课，每课由课文、单词、词组、难句分析和练习等组成。文中配有图片，以增强学习兴趣。为便于学生学习，文后及单词表中单词基本上都给出了音标(个别不影响课文学习的合成词或专业词汇未给出音标)。练习部分包括回答问题、翻译、长句分析、填空、选择和判断正误等内容，起到检查读者对课文的理解和掌握程度的作用。其中的阅读材料部分，在注重系统性、科学性的基础上重点突出了实用性和操作性，重点讲述与通信相关的基本概念和知识。按照由浅入深的教学原则，把教材的各部分内容有机地联系起来，采取循序渐进的教学方法，力求通俗而不肤浅，深入而不玄奥。本书内容全面、详实，建议单篇课文课堂教学用时2～4学时；教师可结合教学实际，对部分课堂教学内容自主选择使用。

在教材的编写过程中，得到华东理工大学宋国新教授、龚正良副教授以及武汉烽火科技集团张小云高级工程师的热情关心和指导；同时华中科技大学出版社杨鸥副编审、冯传禄编辑给予了积极的支持和帮助，在此一并表示衷心的感谢！另外，教材编写过程中，我们参考了国内外大量的优秀文献，在此对文献的作者表示诚挚的敬意和谢意！

由于作者水平有限，书中难免有不当之处，敬请读者批评指正！

编　者

2007年6月

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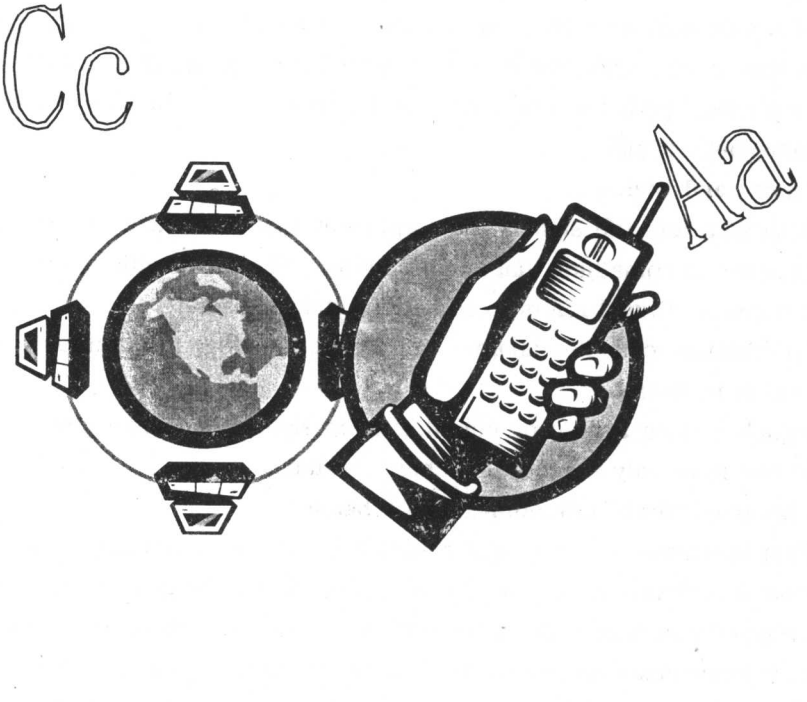
Part 1



Data Communication (数据通信)

Text 1 Fundament to Data Communication[①]（数据通信基础）

The need to communicate is part of mans inherent being. Since the beginning of time man has used different techniques and methods to communicate. Circumstances and available technology have dictated the method and means of communications. Data communications concerns itself with the transmission (sending and receiving) of information between two parties. Now let's learn the foundation knowledge of data communication.

Signals

1s and 0s can't be sent as such across network links. They must be further converted into a form that transmission media can accept. Transmission media work by conducting energy along a physical path. So, a data stream of 1s and 0s must be turned into energy in the form of electromagnetic signals.

Analog and Digital

Both data and the signals that represent them can take either analog or digital form. Analog refers to something that is continuous—a set of specific points of data and all possible points between. Digital refers to something that is discrete.

Information can be analog or digital. Analog information is continuous. Digital information is discrete.

Signals can be analog or digital. Analog signals can have any value in a range; digital signals can have only a limited number of values.

Characteristics of Communications Channels

First is transmission rate. The transmission rate of a communication channel is determined by its bandwidth and its speed. The bandwidth is the range of frequencies that a channel can carry. Since transmitted data can be assigned to different frequencies, the wider the bandwidth, the more frequencies, and the more data can be transmitted at the same time. [②]

The speed at which data is transmitted is usually expressed as bits per second or as a baud rate. Bits-per second (bps) is the number of bits that can be transmitted in one second. The baud rate is the number of times per second that signal being transmitted changes. Usually only one bit is transmitted per signal change and, thus, the bits per second and the baud rate are the same.

The second is direction of transmission. The direction of data transmission is classified as simplex, half duplex, or full duplex. In simplex transmission, data flows in one direction only. Simplex is used only when the sending device, such as radio, never requires a response from the computer. In half-duplex transmission, data can flow in both directions but in only one direction at a time. Half-duplex is often used between terminals and a central computer. For example, interphone. In full-duplex transmission, data can be sent in both directions at the same time. A normal telephone line is an example of full-duplex transmission. Both parties can talk at the same time. Full-duplex transmission is used for most interactive computer

applications and for computer-to-computer data transmission.

Third is transmission mode. The transmission mode includes asynchronous and synchronous. In asynchronous transmission mode, individual characters (made up of bits) are transmitted at irregular intervals, for example, when a user enters data. To distinguish where one character stops and another starts, the asynchronous communication mode used a start and a stop bit. ③An additional bit called a parity bit is sometimes included at the end of each character. Parity bits are used for error checking, asynchronous transmission mode is used for lower speed data transmission and is used with most communications equipment designed for personal computers.

Serial and Parallel Transmission

Data travels in two ways: in serial and in parallel, in serial data transmission, bits flow in a series or continuous stream, like cars crossing a one-lane bridge. Serial transmission is the way most data is sent over telephone lines. For this reason, external modems typically connect to a microcomputer through a serial port. More technical names for the serial port are RS-232C connector and asynchronous communications port. ④

With parallel data transmission, bits flow through separate lines simultaneously. In other words, they resemble cars moving together at the same speed on a multilane freeway. Parallel transmission is typically limited to communications over short distances and typically is not used over telephone lines. It is, however, a standard method of sending data from the system unit to a printer.

New Words and Expressions

technique[tek'ni:k] *n.* 方法,技术
electromagnetic [i'lektrəumæg'netik] *adj.* 电磁的
analog ['ænəlɔg; (*US*) 'ænəlɔ:g] *n.* 类似物
continuous[kən'tinjuəs] *adj.* 继续的,连续的,持续的,延伸的
discrete[dis'kri:t] *adj.* 离散的,分立的,不连续的
characteristic [ˌkæriktə'ristik] *adj.* 表示特性的,典型的,特有的
frequency['fri:kwənsi] *n.* 屡次,频繁
baud *n.* 波特(发报速度单位)
duplex['dju:pleks; (*US*) 'du:pleks] *adj.* 〈电信、计〉双工的,双向的
simplex *n.* 单工
interphone *n.* 对讲机
asynchronous *adj.* 不同时的,[电]异步的
synchronous['siŋkrənəs] *adj.* 同时发生的,同步的
parity ['pæriti] *n.* 同等,平等,〈计〉奇偶校验
serial ['siəriəl] *adj.* 连续的
parallel ['pærəlel] *adj.* 平行的,并行的
resemble [ri'zemb(ə)l] *v.* 相似
simultaneously[ˌsiməl'teiniəsli; (*US*) saim-] *adv.* 同时地

Notes to the Text

①本文对数据通信中有关术语进行了简单的介绍。

②Since transmitted data can be assigned to different frequencies, the wider the bandwidth, the more frequencies, and the more data can be transmitted at the same time.

句中 Since transmitted data can be assigned to different frequencies, 是原因状语从句; the more... the more 是一个双重比较级的句子,相当于汉语的"越……越……"。

译文:因为传输的数据能被分配到不同频率,所以带宽越宽频率越多,同一时间能被传输的数据就越多。

③ To distinguish where one character stops and another starts, the asynchronous communication mode used a start and a stop bit.

句中 To distinguish where one character stops and another start 是不定式短语,在句中作状语; where one character stops and another starts 是宾语从句,作 to distinguish 的宾语。

译文:为了辨别一个字符在什么地方停止而另一个字符在什么地方开始,异步通信模式使用一个起始位和一个停止位。

④ More technical names for the serial port are RS-232C connector and asynchronous communications port.

句中 RS-232C 的机械指标规定:RS-232C 接口通向外部的连接器(插针和插座)是一种标准的"D"型保护壳的 25 针连接器。目前微机的 RS-232C 接口多采用"D"型保护壳的 9 针连接器。

译文:串行端口著名的技术是 RS-232C 连接器与异步通信接口。

Exercises to the Text

1. Translate the following words and phrases into English.

(1)信号 (2)波特率 (3)单工 (4)同步 (5)信道

(6)模拟 (7)数字 (8)电磁的 (9)串行口 (10)带宽

2. Answer the following questions according to the text.

(1) Please give out some characteristics of communication channels.

(2) Please write out the difference between Bits-per second(bps) and the baud rate.

(3) Please write out the difference between simplex and half duplex.

(4) How many types can the transmission mode be divided into?

(5) Please write out the difference between serial transmission and parallel transmission, and give out one or more examples.

3. Translate the following words and phrases into Chinese.

(1) baud (2) asynchronous (3) full duplex (4) parallel

(5) electromagnetic (6) discrete (7) simultaneously (8) parity

4. Translate the following paragraph into Chinese.

Third is transmission mode. The transmission mode includes Asynchronous and Synchronous. In asynchronous transmission mode, individual characters (made up of bits) are transmitted at irregular intervals, for example, when a user enters data. To distinguish where one character stops and another starts, the asynchronous communication mode used a start and a stop bit. An additional bit called a parity bit is sometimes included at the end

of each character. Parity bits are used for error checking, asynchronous transmission mode is used for lower speed data transmission and is used with most communications equipment designed for personal computers.

Switching Technologies[①] (交换技术)

Whether they provide connections between one computer and another or between terminals and computers, communication networks can be divided into two basic types: circuit-switched (sometimes called connection oriented) and packet-switched (A variation of message switching is packet switching, sometimes called connectionless) Circuit-switched networks operate by forming a dedicated connection (circuit) between two points.[②] The U. S. telephone system uses circuit switching technology, a telephone call establishes a circuit from the originating phone through the local switching office, across trunk lines, to a remote switching office, and finally to the destination telephone.[③] While a circuit is in place, the phone equipment samples the microphone repeatedly, encodes the samples digitally, and transmits them across the circuit to the receiver. The sender is guaranteed that the samples can be delivered and reproduced because the circuit provides a guaranteed data path of 64 Kbps (thousand bits per second), the rate needed to send digitized voice.[④] The advantage of circuit switching lies in its guaranteed capacity: once a circuit is established, no other network activity will decrease the capacity of the circuit. One disadvantage of circuit switching is cost: circuit costs are fixed, independent of traffic.[⑤] For example, one pays a fixed rate for a phone call, even when the two parties do not have a talk.

In message switching, the transmission unit is a well-defined block of data called a message. In addition to the text to be transmitted, a message comprises a header and a checksum. The header contains information regarding the source and destination addresses as well as other control information; the checksum is used for error control purpose. The switching element is a computer referred to as a message processor, with processing and storage capabilities. Messages travel independently and asynchronously, finding their own way from source to destination. First the message is transmitted from the host to the message processor to which it is attached. Once the message is entirely received, the message processor examines its header, and accordingly decides on the next outgoing channel on which to transmit it. If this selected channel is busy, the message waits in a queue until the channel becomes free, at which time transmission begins. At the next message processor, the message is again received, stored, examined, and transmitted on some outgoing channel and the same process continues until the message is delivered to its destination. This transmission technique is also referred to as the store-and-forward transmission technique.

A variation of message switching is packet switching. Here the message is broken up into several pieces of a given maximum length, called packets. As with message switching, each packet contains a header and a checksum. Packets are transmitted independently in a store-

and-forward manner.

Packet-switched networks, the type usually used to connect computers, take an entirely different approach. In a packet-switched network, data to be transferred across a network is divided into small pieces called packets that are multiplexed onto high capacity intermachine connections. A packet, which usually contains only a few hundred bytes of data, carries identification that enables the network hardware to know how to send it to the specified destination. For example, a large file to be transmitted between two machines must be broken into many packets that are sent across the network one at a time. The network hardware delivers the packets to the specified destination, where software reassembles them into a single file again. The chief advantage of packet-switching is that multiple communications among computers can proceed concurrently, with inter-machine connections shared by all pairs of machines that are communicating.

With circuit switching, there is always an initial connection cost incurred in setting up the circuit. It is cost-effective only in those situations where once the circuit is set up there is a guaranteed steady flow of information transfer to amortize the initial cost. This is certainly the case with voice communication in the traditional way, and indeed circuit switching is the technique used in the telephone system. Communication among computers, however, is characterized as bursty. Burstiness is a result of the high degree of randomness encountered in the message-generation process and the message size, and of the low delay constraint required by the user. The users and devices require the communication resources relatively infrequently; but when they do, they require a relatively rapid response. If a fixed dedicated end-to-end circuit were to be set up connecting the end users, then one must assign enough transmission bandwidth to the circuit in order to meet the delay constraint with the consequence that the resulting channel utilization is low. If the circuit of high bandwidth were set up and released at each message transmission request, then the set-up time would be large compared to the transmission time of the message, resulting again in low channel utilization. Therefore, for bursty users (which can also be characterized by high peak-to-average data rate requirements), store-and-forward transmission techniques offer a more cost-effective solution, since a message occupies a particular communications link only for the duration of its transmission on that link; the rest of the time it is stored at some intermediate message switch mid the link is available for other transmissions. Thus the main advantage of store-and-forward transmission over circuit switching is that the communication bandwidth is dynamically allocated, and the allocation is done on the fine basis of a particular link in the network and a particular message (for a particular source—destination pair).

Packet switching achieves the benefits discussed so far and offers added disadvantage. The disadvantage, of course, is that as activity increases, a given pair of communicating computers receives less of the network capacity. ⑥ That is, whenever a packet switched network becomes overloaded, computers using the network must wait before they can send additional packets. ⑦

Despite the potential drawback of not being able to guarantee network capacity, packet-switched networks have become extremely popular. The motivations for adopting packet

switching are cost and performance. Because multiple machines can share the network hardware, fewer connections are required and cost is kept low. Because engineers have been able to build high speed network hardware, capacity is not usually a problem. So many computer interconnections use packet-switching that, throughout the remainder of this text, the term network will refer only to packet-switched networks.

New Words and Expressions

dedicated ['dedikeitid] *adj.* 〈计〉专用的
destination [ˌdesti'neiʃ(ə)n] *n.* 目的地,终点
microphone ['maikrəfəun] *n.* 麦克风,话筒,扩音器 (也作:mike)
guaranteed *n.* 有保证的,被担保的
decrease [di'kri:s] *v.* 减少,变少,降低
comprise [kəm'praiz] *v.* 包括,包含,构成
checksum 检验[校验]和,[核对和]
outgoing ['autgəuiŋ] *adj.* 往外去的,即将离任的,好交往的
maximum ['mæksiməm] *n.* ,*adj.* 最大量(的),最大值(的)
multiplex ['mʌltipleks] *adj.* 复合的,多重的
identification [aiˌdentifi'keiʃ(ə)n] *n.* 认明,识别,鉴定
concurrent [kən'kʌrənt] *adj.* 同时发生的,同时存在的
incurred *v.* 招致,遭受
amortize [ə'mɔ:taiz; (*US*) æ'mərtaiz] *v.* 摊销,摊还,分期偿付
burst [bə:st] *v.* 爆炸,胀裂
constraint [kən'streint] *n.* 约束,限制
randomness *n.* 随意,无安排
relatively ['relətivli] *adv.* 相对地,比较地
utilization [ˌju:təlai'zeiʃ(ə)n] *n.* 利用
intermediate [intə'mi:diət] *adj.* 中间的,居中的
whenever [wen'evə(r)] *adv.* 随便什么时候
motivation *n.* 动机
remainder [ri'meində(r)] *n.* 剩余物,其余(的人)

Notes to the Text

①本文介绍了几种交换技术,并分析了每种交换技术的优劣。

②Circuit-switched networks operate by forming a dedicated connection (circuit) between two points.

本句括号内的 circuit 译为"线路"。

译文:电路交换网络运行时在两点之间形成一条专用连线(线路)。

③...a telephone call establishes a circuit from the originating phone through the local switching office, across trunk lines, to a remote switching office, and finally to the destination telephone.

句中 a telephone call 可译为"一个电话呼叫"。

译文:……一个电话呼叫建立一条线路,从发起呼叫的电话机通过本地交换局,穿过中继线到

一个远程交换局,最后到达目的电话机。

④The sender is guaranteed that the samples can be delivered and reproduced because the circuit provides a guaranteed data path of 64 Kbps (thousand bits per second), the rate needed to send digitized voice.

句中 guaranteed data path 译为"被保证的数据通路(路径)"。the rate needed... 是64Kbps的同位语。digitized voice 译为"数字化语音"。

译文:发话方确信采样一定会被传输和重新生成,因为线路提供了一条被保证的64Kbps(千比特每秒)数据路径,这个速率是发送数字化的语音所必需的。

⑤... circuit costs are fixed, independent of traffic.

句中 independent of traffic 译为"与通信(话)量无关"。

译文:……线路的费用是固定的,与通信量无关。

⑥The disadvantage, of course, is that as activity increases, a given pair of communicating computers receives less of the network capacity.

句中 as activity increases 译为"随着网络活动的增加"。

译文:它的缺点是,随着网络活动的增加,一对通信的计算机所获得的网络容量就会减少。

⑦That is, whenever a packet switched network becomes overloaded, computers using the network must wait before they can send additional packets.

句中 before they can send additional packets 译为"在它们能够继续发送分组之前"。

译文:也就是说,每当一个分组交换网络超载,那么使用这个网络的计算机在可以继续发送分组之前必须等待。

Exercises to the Text

1. Translate the following words and phrases into English.

(1)交换技术 (2)存储转发技术 (3)数据块 (4)分组交换

(5)电路交换 (6)带宽 (7)多路通信 (8)面向连接

2. Answer the following questions according to the text.

(1) In general, how many types can the communication networks be divided into?

(2) Please give out a brief description of packet-switched.

(3) Please write out a brief description of circuit-switched.

(4) Please write out the disadvantage of circuit-switched.

(5) Nowadays, packet-switched have become extremely popular, why? give out your reason.

3. Translate the following paragraph into Chinese.

Packet-switched networks, the type usually used to connect computers, take an entirely different approach. In a packet-switched network, data to be transferred across a network is divided into small pieces called packets that are multiplexed onto high capacity inter-machine connections. A packet, which usually contains only a few hundred bytes of data, carries identification that enables the network hardware to know how to send it to the specified destination. For example, a large file to be transmitted between two machines must be broken into many packets that are sent across the network one at a time. The network hardware delivers the packets to the specified destination, where software reassembles them into a single file again. The chief advantage of packet-switching is that

multiple communications among computers can proceed concurrently, with inter-machine connections shared by all pairs of machines that are communicating.

Text Carrier Frequencies and Multiplexing[1] (载波和多路复用)

Computer networks that use a modulated carrier wave to transmit data are similar to television stations that use a modulated carrier wave to broadcast video. The similarities provide the intuition needed to understand a fundamental principle:

Two or more signals that use different carrier frequencies can be transmitted over a single media simultaneously without interference.

To understand the principle, consider how television transmission works. Each television station is assigned a channel number on which it broadcasts a signal. In fact, a channel number is merely shorthand for the frequency at which the station's carrier oscillates. [2]To receive a transmission, a television receiver must be tuned to the same frequency as the transmitter. More important, a given city can contain many television stations that all broadcast on separate frequencies simultaneously. A receiver selects one to receive at any time.

Cable television illustrates that the principle applies to many signals traveling across a wire. Although a cable subscriber may have only one physical wire that connects to the cable company, the subscriber receives many channels of information simultaneously. The signal for one channel does not interfere with the signal for another.

Computer networks use the principle of separate channels to permit multiple communications to share a single, physical connection. Each sender transmits a signal using a particular carrier frequency. A receiver configured to accept a carrier at a given frequency will not be affected by signals sent at other frequencies. [3]All carriers can pass over the same wire at the same time without interference.

Frequency Division Multiplexing

Frequency Division Multiplexing (FDM) is the technical term applied to a network system that uses multiple carrier frequencies to allow independent signals to travel through a medium. [4] FDM technology can be used when sending signals over wire. RF (Radio Freqency), or optical fiber. Figure 1-1 illustrates the concept, and shows the hardware components needed for FDM.

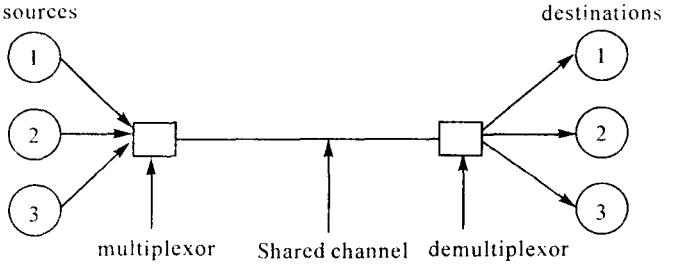


Figure 1-1 The concept of multiplexing

In theory, as long as each carrier operates at a different frequency from the others, it remains independent. In practice, however, two carriers operating at almost the same frequency or at exact multiples of a frequency can interfere with one another. ⑤To avoid the problem, engineers who design FDM network systems choose a minimum separation between the carriers. The mandate for large gaps between the frequencies assigned to carriers means that underlying hardware used with FDM can tolerate a wide range of frequencies. ⑥ Consequently, FDM is only used on high-bandwidth transmission channels.

Frequency division multiplexing (FDM) allows multiple pairs of senders and receivers to communicate over a shared medium simultaneously. The carrier used by each pair operates at a unique frequency that does not interfere with the others.

Time Division Multiplexing

The general alternative to FDM is time division multiplexing (TDM), in which sources sharing a medium take turns. ⑦For example, some time-division multiplexing hardware use a round-robin scheme in which the multiplexor sends a packet from source1, then sends a packet from source2, and so on. Figure 1-2 illustrates the idea.

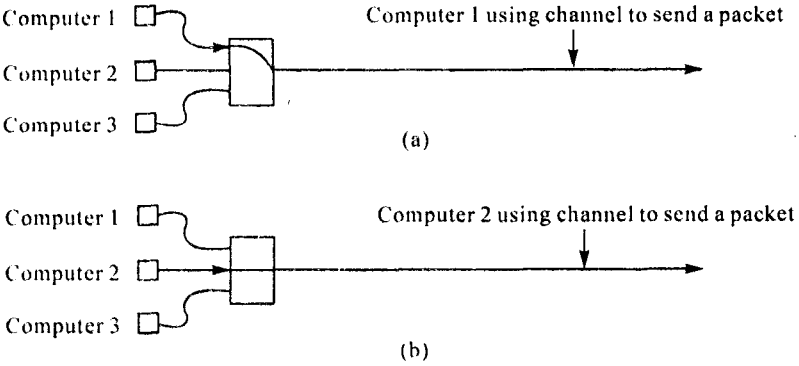


Figure 1-2 Illustration of multiplexing with packets

Dividing data into small packets ensures that all sources receive prompt service because it prohibits one source from gaining exclusive access for an arbitrarily long time. In particular, if one source has a few packets to send and the other has many, allowing both sources to take turns sending packets which guarantees that the source with a small amount of data will finish promptly.

In fact, most computer networks use some forms of time division multiplexing.

New Words and Expressions

multiplexing [ˈmʌltipleksiŋ] *n.* 多路技术，复用
modulated [ˈmɔdjuleitid] *adj.* 已调整[制]的，被调的
video [ˈvidiəu] *n.* 电视，录像，视频
intuition [ˌintju(:)ˈiʃən] *n.* 直觉，直觉的知识
fundamental [ˌfʌndəˈmentl] *adj.* 基础的，基本的
simultaneously [ˌsiməlˈteiniəsli; (*US*) saim-] *adv.* 同时地
interference [ˌintəˈfiərəns] *n.* 冲突，干涉