



全国高职高专专业英语“十二五”规划教材

总主编 ◎ 苏 雪



通信专业英语

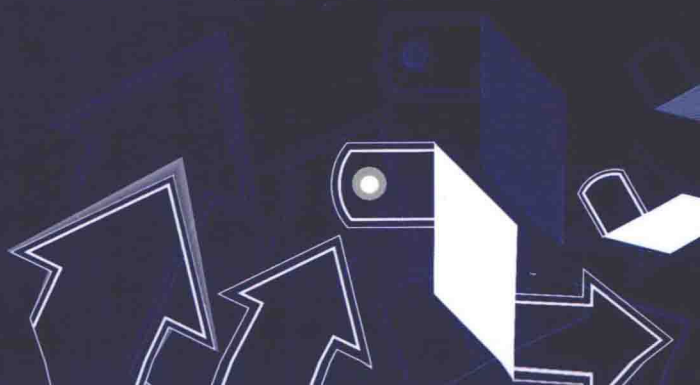


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English for Communication Science



华中科技大学出版社
<http://www.hustp.com>



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English for Communication Science

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华中科技大学出版社
中国·武汉

内 容 简 介

《通信专业英语》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,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。《通信专业英语》共五大知识模块方向,精心编为26课,包括数据通信、通信协议、光纤通信、无线通信、数据通信网络等相关知识的科技英语内容。每个模块方向都含有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,力求贴近教学实际。同时,为方便学生学习,书后还附有通信专业缩略语、单词表、模拟试题等。为便于教师教学,《通信专业英语》赠送教师教学参考电子备课包,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。免费索取请加QQ:407168192。

本书旨在提高读者专业英语能力,了解国内外通信领域的最新发展动态。本书既可作为高职高专院校通信专业及相关专业学生以及二级学院本科学生的专业英语教材,也可供通信技术、电子技术、计算机和英语爱好者使用。

图书在版编目(CIP)数据

通信专业英语/苏雪,余建平,朱三妹主编. —武汉:华中科技大学出版社,2014.5
ISBN 978-7-5680-0024-6

I. ①通… II. ①苏… ②余… ③朱… III. ①通信-英语-教材 IV. ①H31

中国版本图书馆 CIP 数据核字(2014)第 095403 号

通信专业英语

苏 雪 余建平 朱三妹 主编

策划编辑:刘 平

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出版发行:华中科技大学出版社

武昌喻家山 邮编:430074 电话:(027)81321915

录 排:华中科技大学惠友文印中心

印 刷:武汉首壹印刷有限公司

开 本:787×1092 1/16

印 张:10

字 数:253千字

版 次:2014年7月第1版第1次印刷

定 价:23.80



华中出版

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前 言

《通信专业英语》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。本书作者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。

《通信专业英语》结合通信专业特点,收集常用专业词汇及技术资料,力求实现职场英语及专业阅读的有机融合。本书涵盖通信方向五大知识模块,精心选取 26 课精读内容,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。本书精选了包括数据通信、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,从教学项目设计、辅助教学资料编制、背景资料准备、译文、典型词汇总结,到有针对性的课后练习,较完整地体现了通信专业英语教学理念和方法,有助于学生学习和教师教学。同时,为方便学生学习,书后附有通信专业缩略语、单词表、模拟试题等。

本书由武汉铁路职业技术学院苏雪、余建平、朱三妹任主编,邓小桃、吕枚芹(武汉软件工程职业学院)任副主编。同时,在本书的编写过程中,还得到了吴婷、王琳、武蕾、廖梦虎等老师以及华中科技大学出版社刘平编辑的支持和帮助,在此向他们表示衷心的感谢!另外,我们参考了大量国内外优秀的文献,对提供文献的作者,我们表示最诚挚的谢意!


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

2014 年 1 月

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Fundament to Data Communication

(数据通信基础)

The need to communicate is part of man's nature. 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 communication 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 they are 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.

Analogous and Digital

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

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

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

Characteristics of Communication Channels

The first is the 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 the frequencies, and the more data can be transmitted at the same time. ^①

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 the signals being transmitted change. Usually only one bit is transmitted per signal change and, thus, bits per second and the baud rate are the same.

The second is the direction of transmission. The directions of data transmission are classified as simplex, half duplex and full duplex. In simplex transmission, data flows in one direction only. Simplex is used only when the sending device, such as a 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.

The third is the transmission mode. Transmission modes include the asynchronous mode and the synchronous mode. In the 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 uses a start and a stop bit.^② An additional bit called a parity bit is sometimes included at the end of each character. Parity bits are used for error checking. The asynchronous transmission mode is used for lower speed data transmission and is used with most communication equipment designed for personal computers.

Serial and Parallel Transmission

Data travels in two ways: serial and 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 communication port.^③

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 is typically 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,lektrəʊmæg'netik] *adj.* 电磁的
 analog ['ænələg] *n.* 类似物
 continuous [kən'tinjuəs] *adj.* 继续的, 连续的, 持续的
 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.* 频率
 baud [bɔ:d] *n.* 波特(发报速度单位)
 duplex ['dju:pleks] *n.* [电信、计] 双工, 双向
 simplex ['simpleks] *n.* 单工, 单向
 interphone ['intəfəun] *n.* 对讲机
 asynchronous [e'sɪŋkrənəs] *adj.* 不同时的, [电] 异步的
 synchronous [ˌsɪŋkrənəs] *adj.* 同时发生的, 同步的
 parity ['pærɪti] *n.* 同等, 平等, [计] 奇偶校验
 serial ['siəriəl] *adj.* 连续的
 parallel [ˌpærəlel] *adj.* 平行的, 并行的
 resemble [ri'zembl] *v.* 相似
 simultaneously [ˌsiməl'teiniəsli] *adv.* 同时地

Notes to the Text

- ① Since transmitted data can be assigned to different frequencies, the wider the bandwidth, the more the 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。

- ② To distinguish where one character stops and another starts, the asynchronous communication mode uses a start and a stop bit.

句中 To distinguish where one character stops and another starts 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结束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结束位。

- ③ More technical names for the serial port are RS-232C connector and asynchronous communication 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 串行端口技术上又叫做 RS-232C 连接器和异步通信接口。

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 transmission modes 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.

The third is the transmission mode. Transmission modes include the asynchronous mode and the synchronous mode. In the 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 uses 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. The asynchronous transmission mode is used for lower speed data transmission and is used with most communication equipment designed for personal computers.



Communication Networks(通信网)

Defined in broad terms, a communication network can be said to be a system composed of the interconnection of basic communication components. Hence, a communication network can be represented in terms of nodes and links to interconnect the nodes. ^① A communication network is required in providing communication services to a multiple number of users dispersed in a wide area. ^② Communication services are represented in the form of traffic within the communication network. Here, traffic designates a flow of information or message through the communication network. Consequently, within the context of the traffic concept, a communication network can be described as a system in which equipment is interconnected to transport traffic originating from various communication services. ^③

When the communication network is depicted as a combination of nodes and links, the nodes represent communication equipment in the subscriber premises, as well as intraoffice and interoffice transmission equipment, while links represent the transmission facilities. So, if examined from the system standpoint, the basic components of a communication system can be divided into subscriber equipment, switching systems, and transmission facilities. Subscriber equipment is generally located within the subscriber premises and has the role of transmitting and receiving information, as well as controlling signals between subscribers and communication networks. Transmission facilities provide communication pathways for transporting information between subscribers. In general, transmission facilities consist of transmission media such as copper wire, waveguide, atmosphere and optical fiber and various electronic devices deployed along the transmission media. ^④ Here, electronic devices perform the function of amplifying, regenerating, and transforming transmitted signals. Also, transmission equipment in the central offices carries out the function of connecting transmission facilities to the switching systems. The switching system has the function of interconnecting transmission facilities at various locations and adjusting traffic pathways within the communication network. So the communication information generated from the subscriber equipment is transmitted to the switching systems via transmission facilities and interlinked via switching systems, thus accomplishing communication. ^⑤

The basic components of a communication system are as follows. ^⑥ The portion that links telephone offices is called the interoffice transit network or trunk network, and the portion that links telephone office and the subscriber is called the subscriber network. The transmission line that composes the interoffice network is called the trunk, and the transmission line inside the subscriber network is called the subscriber loop or customer loop. Also, the type of exchange that accommodates subscriber loops is called the local exchange (LE), and the exchange that links only the trunks is called the interexchange (IE) or transit exchange (TE). ^⑦ The corresponding signaling scheme is also divided into subscriber loop signaling and trunk signaling. If communication networks are classified in

terms of traffic, they can be divided into public switched telephone network (PSTN), packet-switched public data network (PSPDN), private data network, and telex network. Among them, PSTN is the largest and employs a circuit-switching scheme, while PSPDN and private data networks are data communication networks that are based on a packet-switching scheme.

New Words and Expressions

communication [kə,mju:ni'keɪʃn] *n.* 通信, 信息

network ['netwɜ:k] *n.* 网络

represent [ˌreprɪ'zent] *v.* 表示

node [nəʊd] *n.* 节点, 网, 叉点

service ['sɜ:vɪs] *n.* 服务, 业务

traffic ['træfɪk] *n.* 交通, 话务, 业务

information [ˌɪnfə'meɪʃn] *n.* 消息, 通知

message ['mesɪdʒ] *n.* 消息, 信息

originate [ə'rɪdʒɪneɪt] *v.* 发起, 产生

depict [dɪ'pɪkt] *v.* 描绘, 描写

combination [ˌkɒmbɪ'neɪʃn] *n.* 结合, 组合

intraoffice [ˌɪntrə'ɔ:fɪs] *a.* 局内的

interoffice [ˌɪntə'ɔ:fɪs] *a.* 局间的

transmission [trænz'mɪʃn] *n.* 传送, 传播

facility [fə'sɪləti] *n.* 设备

locate [ləʊ'keɪt] *v.* 位于

subscriber [səb'skraɪbə] *n.* 用户

switch [swɪtʃ] *n.* 交换, 开关

pathway ['pɑ:θweɪ] *n.* 小路

transport ['trænsɜ:t] *n.* 运输

media ['mi:diə] *n.* 媒介, 媒质

waveguide ['weɪvgeɪt] *n.* 波导

atmosphere ['ætməsfɪə] *n.* 大气, 空气

electronic [ɪlek'trɒnɪk] *a.* 电子的

device [dɪ'vaɪs] *n.* 设备

deploy [dɪ'plɔɪ] *v.* 展开

amplify ['æmplɪfaɪ] *v.* 放大, 扩大

regenerate [rɪ'dʒenəreɪt] *v.* 重生, 再生

transform [træns'fɔ:m] *v.* 改变, 转变

generate ['dʒenəreɪt] *v.* 产生, 使发生

via ['viə] *prep.* 经由

accomplish [ə'kʌmplɪʃ] *v.* 完成, 实行

component [kəm'pəʊnənt] *n.* 部分, 成分

portion ['pɔ:ʃn] *n.* 部分

exchange [iks'tʃeɪndʒ] *n.* 交换,交流
 accommodate [ə'kɒmədeɪt] *v.* 使适应,调解,供应,容纳
 transit ['trænsɪt] *n.* 通过,经过,运输
 classify ['klæsɪfaɪ] *v.* 分类
 employ [ɪm'plɔɪ] *v.* 雇佣,使用
 in terms of 根据,就……而论
 a number of 许多,大量
 subscriber premise 用户驻地网
 as well as 也,又
 switching system 交换系统
 transmission equipment 传输设备
 in general 通常,大体说来
 copper wire 铜线
 optical fiber 光纤
 consist of 由……组成,包括
 central office 中心局
 carry out 执行,实施
 trunk network 中继网
 as follow 如下
 subscriber loop 用户环路
 private data network 虚拟数据网
 packet-switching scheme 分组交换模式
 circuit-switching scheme 电路交换模式
 LE Local Exchange 本地交换机
 TE Transit Exchange 汇接交换机(局)
 PSTN Public Switched Telephone Network 公用交换电话网
 IE Interexchange 局间交换机
 PSPDN Packet-Switched Public Data Network 分组交换公众数据网

Notes to the Text

- ① A communication network can be represented in terms of nodes and links to interconnect the nodes.
- a. to interconnect the nodes 是动词不定式作定语。
- b. in terms of 的意思是“根据,以……字眼来表示”,例如:
 In terms of your ability and experience, you are suitable for the post.
 就你的能力和资历来说,你是能胜任那职位的。
- 译文** 通信网络是由节点和节点间的链路组成。
- ② A communication network is required in providing communication services to a multiple number of users dispersed in a wide area.
- dispersed in a wide area 是过去分词短语作定语修饰 users。

译文 通信网是用来向分散在各地的大量用户提供通信业务的。

- ③ ... within the context of the traffic concept, a communication network can be described as a system in which equipment is interconnected to transport traffic originating from various communication services.

- a. within 介词短语作状语。
- b. can be described 情态动词被动语态。
- c. in which... services, 是定语从句修饰 system。
- d. originating... services 现在分词短语作方式状语。

译文 通过上下文有关通信概念的陈述,通信网可比作是一个传输各种通信信号的设备互连系统。

- ④ In general, transmission facilities consist of transmission media such as copper wire, waveguide, atmosphere, and optical fiber, and various electronic devices deployed along the transmission media.

- a. in general“总的说来”,通常放在句首作插入语。
- b. deployed along the transmission media 是过去分词作后置定语。

译文 一般说来,传输设备包括一些传输媒介(像铜线、波导、大气以及光纤)和许多在传输媒介中使用的电子设备。

- ⑤ So the communication information generated from the subscriber equipment is transmitted to the switching systems via transmission facilities and interlinked via switching systems, thus accomplishing communication.

译文 因此,从备用户端产生的通信信息通过传输设备传向交换系统,并通过交换系统实现互通,这样就完成了通信功能。

- ⑥ The basic components of a communication system are as follows.
as follows 的意思是:“如下”,例:

The reaction process is as follows. 该反应过程如下。

译文 通信系统的基本组成如下。

- ⑦ Also, the type of exchange that accommodates subscriber loops is called the local exchange (LE), and the exchange that links only the trunks is called the interexchange (IE) or transit exchange (TE).

- a. 这是一个并列句,由 and 连接。
- b. 两个 exchange 后都有一个 that 从句起定语作用。
- c. is called 是被动语态,翻译时可转为主动形式。

译文 同样,配合用户环路的那类交换机称为本地交换机(局),而仅连接中继线的交换机叫做局间交换机(局)或转接交换机(局)。

Exercises to the Text

1. Answer the following questions according to the passage.

- (1) What is the main idea of this passage?
- (2) Try to describe a communication network using your own words.

- (3) What is communication traffic?
- (4) What is the relation between nodes and links?
- (5) How many components does a communication system consist of? What are they?
- (6) What is the function of the subscriber equipment in a communication system?
- (7) Speak out all transmission media you know.
- (8) Why do electronic devices perform the function of amplifying transmitted signals?
- (9) Are the interoffice transit network and trunk network same in function?
- (10) What is the subscriber loop?
- (11) What does the abbreviation PSPDN stand for?
- (12) Which is the largest network among different communication networks?
- (13) What is the difference between a circuit-switching scheme and a packet-switching scheme?

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

- (1) a communication network
- (2) transmission equipment
- (3) copper wire
- (4) interoffice transit network
- (5) transit exchange
- (6) packet-switching scheme
- (7) private data network
- (8) the local exchange
- (9) 用户驻地网
- (10) 交换体系
- (11) 光缆
- (12) 传输媒介
- (13) 中继网
- (14) 用户环路
- (15) 电路交换模式
- (16) 公用交换电话网

3. Analyze the following sentences and put into Chinese.

- (1) Subscriber equipment is generally located within the subscriber premises and has the role of transmitting and receiving information, as well as controlling signals between subscribers and communication networks.
- (2) The switching system has the function of interconnecting transmission facilities at various locations and adjusting traffic pathways within the communication network.
- (3) If communication networks are classified in terms of traffic, they can be divided into public-switched telephone network (PSTN), packet-switched public data network (PSPDN), private data network, and telex network.
- (4) Among them, PSTN is the largest and employs a circuit-switching scheme, while PSPDN and private data networks are data communication networks that are based on a packet-switching scheme.

- (5) When the communication network is depicted as a combination of nodes and links, the nodes represent communication equipment in the subscriber premises, as well as intraoffice and interoffice transmission equipment while links represent the transmission facilities.
- (6) The portion that links telephone offices is called the interoffice transit network or trunk network, and the portion that links telephone office and the subscriber is called the subscriber network.

4. Fill in the blanks with the words given below. Change the form if necessary.

efficient depend information with error

The function of a communication system is to pass _____ accurately from one place to another. In the past the terminal points of a communication system were human beings but it is now not uncommon, _____ the advent of ADP and automatic control system, for the terminals to be machines. The measure of the effectiveness of a communication system is its _____ in passing information and this is described by the following parameters:

- (1) Accuracy. This is measured in term of speech quality or _____ rate in data systems.
- (2) Quantity of information passed.
- (3) Speed of passing information.

These parameters are measurable and are specified as the basic design criteria of a system, and the final form of the system _____ on the emphasis on each.

Lesson 3

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 medium 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 turned 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 Frequency), or optical fiber. Figure 1 illustrates the concept, and shows the hardware components needed for FDM.

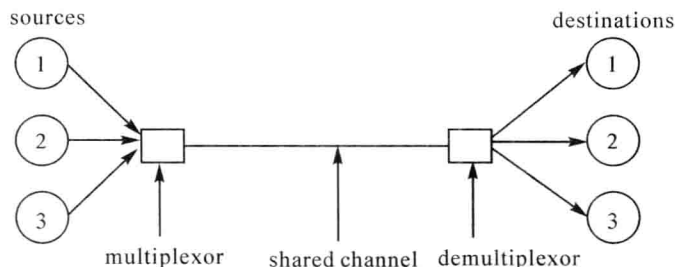


Figure 1 The concept of multiplexing

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.^⑤ To 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.^⑦ For 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 2 illustrates the idea.

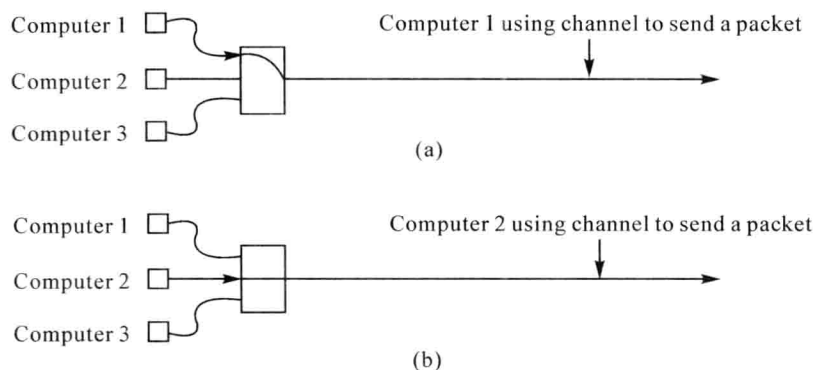


Figure 2 Illustration of multiplexing with packets

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 [ˈmʌltipleksɪŋ] *n.* 多路技术, 复用
- modulated [ˈmɒdjuleɪtɪd] *adj.* 已调的, 被调的
- video [ˈvɪdiəʊ] *n.* 电视, 录像, 视频
- intuition [ˌɪntju(:)ˈɪʃn] *n.* 直觉, 直觉的知识
- fundamental [ˌfʌndəˈmentl] *adj.* 基础的, 基本的
- simultaneously [ˌsɪməlˈteɪniəsli] *adv.* 同时地
- interference [ˌɪntəˈfɪərəns] *n.* 冲突, 干涉
- merely [ˈmiəli] *adv.* 仅仅, 只不过
- shorthand [ˈʃɔːthænd] *n.* 简写