SPECIAL ENGLISH

上海市普通高校优秀教材

高等学校专业英语教材

通信工程

专业实用英语

（第2版）

Communication Engineering Specialty English Course

☆ 陶亚雄 主编 ☆

☆ 徐 振 副主编 ☆ 刘南平 主审☆

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内 容 简 介

本书为“上海市普通高校优秀教材”。

相比普通大学英语，专业英语以培养学生的职业岗位综合能力为目标，根据相关行业的发展趋势和就业需求，有针对性地对学生进行职业技能培养。

本书在第一版教材基础上，注重实际、强调应用，结合专业技术变迁和发展进行内容的增删和调整，形成了“基本通信概念与系统”、“常见通信业务”、“最新通信技术及其应用”三个部分，共16个单元。

本书尽量结合实际通信系统的原理与技术进行编写，并在每单元附有1～5篇英文行业资讯作为阅读材料，以及形式多样的课后练习和答案，可以帮助读者有效学习和自我拓展。既可作为本科电子与通信类专业英语的教学用书，也可作为计算机通信、网络类专业相关工程技术人员参考用书。

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前　言

随着信息、通信技术的飞速发展，电子、通信专业引进了大量国外先进的行业相关标准、技术与设备，对通信从业者的专业英语阅读、理解能力要求越来越高，通信专业英语教学的重要性也日趋明显。

专业英语以大学英语为基础，但在词汇、语法及文风上带有浓厚的专业特色，相比普通大学英语，专业英语更注重培养学生的职业岗位综合能力。目前国内本科通信专业英语教材在选题上普遍倾向计算机（网络）通信方向，侧重于介绍通信网络的结构、类型、组成原理和协议等，与实际通信技术专业的基础理论和行业热点联系松泛，不利于学以致用。

本教材紧密围绕电子通信专业实际应用技术和最新行业资讯，由浅入深，精心组织、编撰，受到读者普遍好评，第一版经几年的使用，被评为“上海市普通高校优秀教材”。

本版教材在第一版教材基础上，继续突出“注重实际，强调应用”这一特点，结合本专业领域近年来的技术变迁和发展，进行了增删、调整和改编，形成了“基本通信概念与系统”、“常见通信业务”、“最新通信技术及其应用”三个部分，具有如下特色：

1.“基本通信概念与系统”部分由第 1～7 单元、第 15 单元构成，是将第一版中有关基础理论、技术的单元进行了合并、精简，形成。内容包括现代通信的基本概念和技术，如通信系统的组成、通信频段划分、线性/非线性调制理论，编码技术、多址接入技术、带限信道的信号传输、扩频调制、2G 移动通信技术、电信增值服务等。

2.“常见通信业务”部分由第 8～14 单元构成，主要介绍目前通信行业的最新主流技术及其应用，包括 3G/4G 移动通信系统、电路交换/分组交换、光纤传输技术和系统、物联网技术、VOIP 技术、嵌入式技术等。

3.“最新通信技术及其应用”部分主要针对的是目前大热的汽车电子技术，本书在 16 单元针对其相关概念和应用进行了介绍，以期为未来在该领域就业的同学进行基础铺垫。

4. 针对学生理论基础水平参差不齐的状况，第二版教材依然在每单元附有 1～5 篇英文行业资讯，以便教师根据情况有选择地组织教学拓展。

5. 此外，该书还附有形式多样的课后练习以及免费的电子课件和习题答案。一方面可以帮助读者有效地复习课程中所学的内容；另一方面也便于学有余力的学生在课后进行自我拓展训练。

本教材参考学时为 64～80 学时，是通信、电子类教学用书，同时也可作为计算机通信、网络类专业相关工程技术人员的参考用书。

本书由上海师范大学天华学院陶亚雄教授主编、徐振副主编，天津师范大学刘南平教授主审，上海师范大学天华学院工学院的朱国权、刘伟、赵兰、徐会彬、王永明老师，以及重庆电子工程职业学院通信工程学院的黄祎、曾晓宏、刘良华、刘之舟老师参与了其中部分单元的编写、校对及资料收集等工作。

该书在编写过程中得到了各位参编老师及上师大天华学院领导的大力支持和帮助，在此表示衷心的感谢；同时也对提供文献参考资料的专家、学者表示深深的谢意。

由于水平、精力有限，书中疏漏甚至错误在所难免，欢迎各位读者批评指正。

编　者

2013 年 11 月

目　录

Unit 1 Brief Introduction of Modern Communication

1.1 Text

1.1.1 Communication

Modern communication means a technology using light wave and electromagnetic wave to transmit or exchange information from one place to another rapidly and accurately, so it's also called ***telecommunication*** technique.

Along with the unceasing development and fusion of communication technique, computer technique and control technology, performance of communication systems have enormously expanded, such as visible text, electronic mail-box, video telephone and conference, etc., accompanied with the communicating content extension from simplex voice and text signals to multimedia information including sound, text, data, picture and so on. Not only efficient information transmission, but also information collecting, processing, storage and displaying are carried out by modern communication network.

Classification of modern communication systems is different along with the different classifying manners.

1. Simplex & Half-duplex & Full-duplex Communication

According to the information direction transmitted in channel, modern communication systems can be divided into the ***simplex communication*** systems, ***half-duplex communication*** systems, and ***full-duplex communication*** systems.

In simplex communication systems such as radio and television broadcasting, signals can only flow in one direction. In half-duplex communication systems, signals can flow in both directions, but only one direction at a time (not simultaneously). Typically, once a party begins to receive a signal, it must wait for the transmitter to stop transmitting, before replying. Full-duplex systems are employed in many communication networks, in which signals can flow in both directions.

2. Serial & Parallel Communication

According to the number of information communicating approaches, modern communication systems can be divided into the ***serial communication*** systems and the ***parallel communication*** systems.

Serial transmission is the process of sending data one bit at one time, sequentially, over a communication channel, as shown in Fig 1-1(a). Parallel transmission is mainly employed in real-time communication and data communication between computer and its peripherals, in which several data bits are packed together and transmitted simultaneously as shown in Figure.1-1(b).

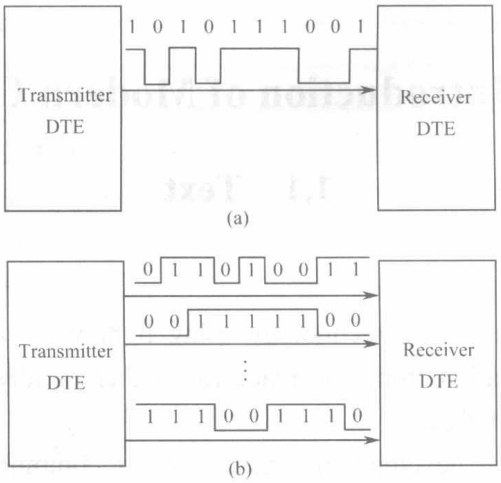

Figure 1-1 Serial communication and Parallel communication

3. Synchronous & Asynchronous Communication

According to the control methods of information transmitted in channels, modern communication systems can be divided into the ***synchronous communication*** systems and the ***asynchronous communication*** systems.

In asynchronous communication system, every symbol is transmitted independently at variable data rate, only one symbol at one time. A start bit (e.g. logic level 1) serves to represent the start of a new symbol, and a stop bit (e.g. logic level 0) serves to the represent the end of a symbol. Usually, the start bit length takes one bit while the stop bit length required by the system can be 1, 1.5 or 2 bits as shown in Figure1-2. Since the transmission of every symbol usually requires 2~3additional bits, asynchronous transmission usually lacks efficiency.

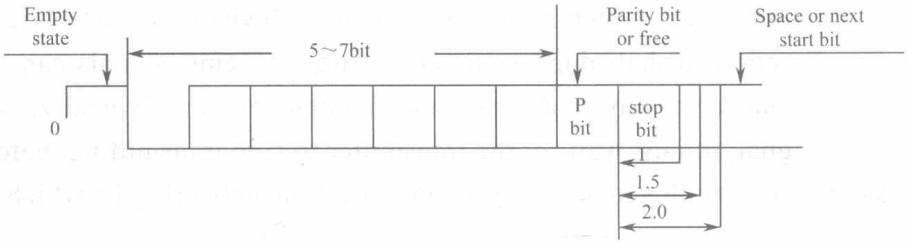

Figure 1-2 Asynchronous communication

In synchronous communication system, information is transmitted in forms of data block. Each block has a preamble bit and postamble bit respectively for symbolizing the start and end of block. Apparently, synchronous communication system is more efficient than asynchronous communication system, and is more adaptive for high speed data transferring .

4. Point-to-point & one-to-multi-points & multi-to-multi-points Communication

According to the line connecting modes and signal interacting ways between signal source and destination, modern communication systems can be divided into ***point-to-point communication***

systems, ***one-to-multi-points communication systems*** and ***multi-to-multi-points communication*** systems.

In point-to-point communication system shown in Figure1-3(a), the connection between the terminals, such as terminal A and B, was generally implemented through a dedicated line. In point-to-multipoint communication system shown in Figure1-3(b), connection between every terminals (such as terminal A, B,..., et al.) is accomplished via a transferring equipment. In multipoint-to-multipoint communication system, data is transmitted flexibly between several terminals through a switching device, with the direct or stored-and-transferred method.

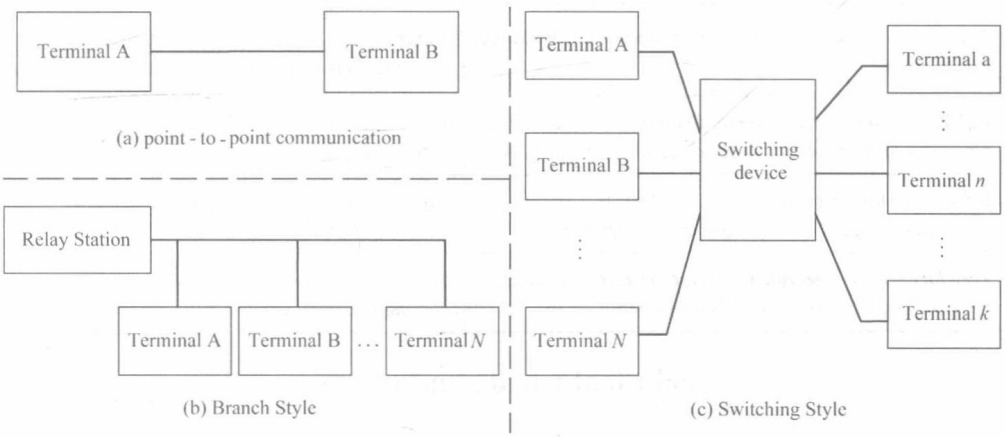

Figure 1-3 point & one-to-multi & multi-to-multi points communication

1.1.2 History of Modern Communication

Communication comes up along with the history of humanity since people have to transmit information and exchange their views each other. Since the invention of electric battery by Alessandro Volta in 1799, people had begun to try to communicate making use of electricity. The development of modern communication can be illustrated by those milestone events listed in the following Table 1-1.

Table 1-1 Memorabilia of modern communication

Age	Event	Significance
1837	Samuel Morse invented the electric telegraph	Beginning of a new era that electricity being used by people for long-distance information transmission
1876	A.G.Bell invented telephone	Transmitting voice signals by using current intensity directly
1864, 1887	Maxwell predicted the existence of electromagnetic radiation in 1864, and was verified experimentally by Hertz it in 1887	Providing modern wireless communication with theory basis
Early 20th century	Amplitude modulation (AM) appeared	Changing communication signal from simplex audio signal to hybrid signal of voice, music, picture signals
1933	Frequency modulation (FM) appeared	Improved communicating quality by overcoming the bug that AM signal is prone to interference, and impelled the development of mobile communication

（续）

Age	Event	Significance
1928 1937	***Nyquist's Theorem*** was proposed; A.H.Reeves invented pulse code modulation (PCM) communication technique	Development of communication from analog to digital transmission; Analog signal being digitally transmitted via PCM technique, and improving the ability of communication system to anti-jamming
1940s-1950s	Shannon Formula, ***Non-distortion Coding Principle***, ***Error-correction Coding Principle***, Signal and Noise Theory, Modulation Principle, Signal Detection Theory appeared	Providing communication validity and reliability with theory basis, promoting communication technology to be mature and progressive
1960	The first satellite for communication launched successfully	Breaking the new path for international communication, bringing on the rapid development of space communication
1960s	***Cable television***, ***laser communication***, radar, computer network and digital communication technology appeared	***Photoelectricity processing technology*** and ***radio astronomy*** getting great development
1970s	***large-scale-integrated circuit*** (***LSI***), Private (Automatic) Branch exchange, microprocessor developed rapidly	Commercial ***satellite communication***, optical fiber communication getting rapid development
1980s	***Very-large-scale-integrated circuit*** (***VLSI***), Integrated Services Digital Network (ISDN) appeared	Mobile communication and optical fiber communications coming into application

Technical words and phrases

communication [kəmju:ni'keiʃən] *n.* 通信；联络
electromagnetic [i'lektrəumæg'netik] *adj.* 电磁的；电磁学的
telecommunication ['teli-kəmju(:)ni'keiʃən] *n.* 电信，无线电通信；电信学
unceasing [ʌn'si:siŋ] *adj.* 不停的，持续的
visible ['vizəbl] *adj.* 看得见的；明显的，显而易见的
video [vidiəu] *adj.* 视频的；录像的
telephone ['telifəun] *n.* 电话；电话机
channel ['tʃænl] *n.* 信道，频道
simplex ['simpleks] *adj.* 单纯的，单一的
simplex communication 单工通信
half-duplex *n.* [计]半双工
half-duplex communication 半双工通信
duplex ['dju:pleks] *adj.* 双倍的，复式的，[电信、计]双工的，双向的
full-duplex communication 全双工通信
serial ['siəriəl] *adj.* 连续的；系列的；按顺序的
serial-communication 串行通信
parallel [pærəlel] *adj.* 平行的，相同的，类似的，并联的
parallel-communication 并行通信
synchronous ['siŋkrənəs] *adj.* 同时发生的；同步的
asynchronous [ei'siŋkrənəs] *adj.* 不同时的；[电]异步的
signal ['signəl] *n.* 信号
source [sɔ:s] *n.* 来源，水源；消息来源

point-to-point communication　点到点通信
one-to-multi-points communication　点到多点通信
multi-to-multi-points communication　多点到多点通信
Amplitude modulation (AM)　幅度调制，调幅（常规双边带调幅）
Frequency modulation (FM)　频率调制，调频
Nyquist's Theorem　奈奎斯特定理
pulse code modulation (PCM)　脉冲编码调制
Shannon Formula　香农公式
Non-distortion Coding Principle　不失真编码原理
Error-correction Coding Principle　纠错编码原理
Signal and Noise Theory　信号和噪声理论
Modulation Principle　调制原理
Signal Detection Theory　信号检测理论
Very-large-scale-integrated circuit (VLSI)　超大规模集成电路
large-scale-integrated circuit (LSI)　大规模集成电路
Integrated Services Digital Network (ISDN)　综合业务数字网
optical fiber communications　光（纤）通信
photoelectricity　[fəutəuilek'trisiti]　[物]光电(学)；光电现象
PBX (Private Branch Exchange)　专用分局交换机
PABX (Private Automatic Branch eXchange)　自动用户小交换机
microprocessor　微处理器
principle　['prinsəpl]　*n.*　法则，规则，原则；原理，定理
satellite communication　卫星通信
space communication　宇宙通信，空间通信

1.2 Reading Materials

1．Google Wins Internet Advertising Contract with China Telecom

Search giant, Google Inc., is poised to increase its share of the Chinese internet advertising market, due to a new agreement with China Telecom.

Google has won the right to place ads of 400 of the telecom giant's websites, giving it valuable leverage against Microsoft, and leading local rival, Baiducom.

"This is a big win for Google because Microsoft and Baidu both wanted this agreement with China Telecom", said Analysis International internet analyst, Foo Xinghua, in a telephone interview. "China Telecom likely picked Google because they have better technology for Web ads."

China's internet advertising market will surge to US$3.1 billion in 2011, from $420 million in 2005, according to estimates.

（Source: teleclick）

2. Google, China Telecom Form Online Ad Alliance

Google has inked an agreement with China Telecom to sell online advertising on 400 of its web sites. This venture will allow Google into a new market space, as it will provide Google with entry into China Telecom's network of web sites that reached out to a domestic audience.

China Telecom has revealed that its subscriber base touches 30.5 million broadband users. Under the terms of the agreement the companies will share the revenue generated, though the specific financial details of the deal were not divulged.

This is the third time both the companies are coming together to do business. Google wants to tap the burgeoning Chinese market.

(Source: sda-india)

3. China to Launch Mobile Phone TV Satellites in 2008

China is going to launch two satellites for mobile multimedia broadcasting in May 2008, revealed an expert involved in the formulation of China Mobile Multimedia Broadcasting (CMMB) system, the recommended industrial standard announced by the country's broadcasting regulator in late October.

The commissioning of the satellite system is considered to be a significant step for the operation of China's independently-developed mobile multimedia broadcasting system, as the country plans to build a CMMB network with large-scale satellite signal as a major mode of signal coverage and the transmission on the ground as a complement, in view of the country's vast extension of territories with different development stages.

Remarkably, the nation's broadcasting administration will adopt the experience of the telecom department in building the network for the next-generation telecommunications in the CMMB network project.

It will start to build a ground test network by the end of this year, and complete the test network in the middle of next year and by then start system testing; to complete the building of the ground network for commercial use and start commercial operation test by the end of next year; and will form a nationwide CMMB network with the commissioning of the satellite system in the first half of 2008 and by then officially start providing mobile multimedia broadcasting services, before the opening of Beijing Olympics.

(Source: stocknews.com.cn)

4. Asia Pacific region plans for next-generation networks (NGN)

Geneva, 12 April 2007—ITU and the Asia Pacific Telecommunity (APT) jointly organized a workshop in Bangkok, Thailand to plan for the implementation and development of Next-Generation Networks (NGN) in the region. Over 180 experts from 24 countries representing APT and ITU Members, international organizations and the private sector joined the forum, which was inaugurated by Mr Kraisorn Pornsutee, Permanent Secretary, Ministry of Information and Communication Technology, Royal Government of Thailand.

NGN is a catch phrase for the network infrastructure that will enable advanced new services offered by mobile and fixed network operators in the future, while continuing to support all existing services. This next-generation architecture will help leverage new technologies to dramatically reduce the cost of market entry, increase flexibility and accommodate seamlessly in a single multiservice network both voice and data.

Mr Malcolm Johnson, Director of the ITU Telecommunication Standardization Bureau, said, "NGN has the potential to accelerate the deployment of telecommunication networks and services in developing countries."As cost and revenue are the drivers of this development, the capital cost of deploying NGN technology, both in the core of the network, and the operating costs are significantly lower than circuit switched technologies. "This will enable rapid expansion of network capabilities," Mr Johnson added. "NGN will also enable a range of multimedia services to be provided more easily and with less cost, and so increase potential revenues. It offers the opportunity for developing countries to leapfrog several generations of technology." He also stressed the importance of "bridging the standardization gap" by planning for NGN at regional levels.

5. International steps taken to build global Information Society

Geneva, 20 July 2006—Implementation of the outcomes of the recently concluded World Summit on the Information Society (WSIS) gathered momentum with the launch of the United Nations Group on the Information Society (UNGIS). High level representatives of twenty-two UN agencies met on Friday, 14 July 2006 at ITU Headquarters in Geneva under the chairmanship of ITU Secretary-General Yoshio Utsumi to facilitate the process.

UNGIS will serve as an interagency coordinating mechanism within the UN system to implement the outcomes of WSIS. The Group will enable synergies aimed at resolving substantive and policy issues, avoiding redundancies and enhancing effectiveness of the system while raising public awareness about the goals and objectives of the global Information Society. UNGIS will also work to highlight the importance of ICTs in meeting the Millennium Development Goals.

To maximize its efficiency, the Group agreed on a work plan in which it would concentrate its collective efforts each year on one or two cross-cutting themes and on a few selected countries.

1.3 Exercises

1. Please translate the following Chinese words into English, and write out the corresponding English abbreviation if existing.

（1）单工通信系统
（2）全双工通信
（3）同步通信
（4）异步通信
（5）点到点通信
（6）串行通信
（7）并行通信