

ENGLISH FOR TELECOMMUNICATION
AND COMPUTER TECHNOLOGY

通信与计算机专业英语

冯春燕 李金岭 陈 雪 徐塞虹 编著
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序

相信这是一本受人欢迎的书，因此我愿为它作序。

人们常说，二十一世纪是信息的世纪。世界将由于信息广泛、迅疾的传递而变小，整个地球将宛若一个小小的村落。通信科学与技术、计算机科学与技术以及其它信息科学技术将是这样一个世界的支柱；英语作为一种国际交流通用的语言将是这样一个“村落”里最重要的信息载体之一。生活在这样一个世界上、并涉足信息领域的科技工作者（包括应用型专业技术人员）若无比较深厚的通信和计算机方面的专业英语功底，势将举步维艰，更谈不上有什么大的成就。因此我愿向广大读者推荐此书。

公共英语和专业英语是相通的，但又是相互区别的。公共英语是基础，专业英语是补充。对于所有科技工作者而言，专业英语是其知识、能力和素质结构中必不可少的重要组成部分。专业英语不仅含有大量的专业词汇，而且往往伴随着一些明显不同于公共英语的语法特征和行文特色。专业英语有时显得枯燥一些，但它甚为周密严谨，别具美感；专业英语的句子有的很简洁，有的则很冗长，仿佛是各种语法现象的大串演……这些特点需要我们在不断的学习中认真体味。即使是一位英文专家，不管他（她）如何精通公共英语，如无专业背景、且未经过任何专业英语的训练，也往往会在专业性很强的笔译或口译工作中显得力不从心，难以胜任。由此足见学习专业英语

的必要性。

通信和计算机是信息领域密切相关的两个重要分支，也是当今最热门、最活跃的两个专业范畴。随着“信息高速公路”建设的浪潮汹涌而来，通信和计算机的发展已呈交融汇流之势。游离于网络之外的计算机已经远远不能满足人们的需要，计算机的威力在于网络化，计算机网络化的实现靠通信；同时，没有计算机的通信作为一段历史已成为过去，计算机技术对于智能化、多媒体的现代通信系统已成为须臾不可离开的东西。本书把通信和计算机两个方面的专业英语知识结合起来介绍，符合这一专业发展趋势。

本书的几位作者都是工作在通信和计算机专业教学科研第一线的年轻学者，风华正茂，勤于耕耘。她（他）们不仅在自己的专业领域中取得了显著的成绩，而且在专业英语教学方面也积累了较多的经验。她（他）们当中有的曾编写、出版过《程控交换专业英语》教材，有的长期主讲《科技英语》课程。她（他）们身处重点高校良好的国际学术交流的环境之中，并曾分别赴英、美、日等国家留学或进修，具有较高的专业英语素养。通览全书，可以看出她（他）们苦心孤诣、求新求精的敬业精神。

本书的突出特点在于选材。本书所选编的英文文章均很新，其内容基本覆盖了通信和计算机专业的各个主要方面，集中地反映了当今国际上通信和计算机技术发展的最新动向。仅就其内容本身，就很吸引人；同时，这

些文章又均是“原汁原味”、“天然去雕琢”的专业文章。通过“真刀真枪”地研读这些文章，读者可以体会到实际工作中可能遇到的专业英文文章的真实难易程度，可以受到地道的、经得起实践检验的专业英语训练，而不必担心只是学了一些不切实际的“花架子”。

本书的作者们在对课文的注译、解说和练习题的编写等方面倾注了大量的心血，付出了创造性的劳动。她（他）们注重研究一般读者的认知规律，注重揭示和分析专业英语本身的特点，在专业英语的教学方面作出了积极的探索。

本书内容充实，编写规范，灵活性强，适用面广。既可作教材，也可供自学之用。

综上所述，这是一本很实用且很有特点的书，我衷心地希望它能够成为广大读者和专业英语教学工作者的朋友！

任晓敏

一九九七年十月于北京

前 言

众所周知，先进的科学技术是人类共有的财富，但语言的不同却为人类彼此的交流和学习设置了一道天然沟壑。

近年来，通信和计算机事业发展迅猛，对整个世界乃至每个人都带来了不可估量的影响。通信网基本实现了从模拟到数字，从话音业务到非话业务，从单一网到综合网的过渡；计算机也不再仅仅是作为一种控制技术应用于通信、自控、机械等领域，而且作为一种进行办公自动化、信息处理的最便利的手段渗透到社会的各个领域，乃至家庭。

翻开本书的读者，想必您具有一定的英语基础，并且对通信和计算机技术充满兴趣。不论您是一位专业技术人员，还是关心通信和计算机发展的一位普通读者；不论您是想通过学习它提高专业外语水平，还是把它作为普通的英语读物来了解通信与计算机方面的相关知识和最新发展，本书选材之新，内容之广都能使您从书中获得满足。希望本书能够为您跨越语言的沟壑去接近最新技术铺就一座桥梁。

本书精心组织了通信和计算机两方面的内容，所有文章均选自原版书籍和期刊杂志。全书按主题分为十六个单元。内容包括：通信发展概述、通信网、交换技术、卫星通信、移动通信、光纤通信、接入网、ISDN、智能

网、多媒体、计算机发展、计算机组成、计算机工作原理、计算机接口技术、计算机通信、计算机应用——办公自动化。

每单元包括精读课文、泛读课文、补充阅读材料和基本语法，读者可按自身的需要选读。

精读课文是每一主题的精华部分，为了帮助读者深入领会，该部分给出词汇、短语、难句注释、翻译技巧、练习和参考译文。

泛读课文是对相应主题内容的扩充，除给出了词汇、短语外，还给出了练习，便于读者阅读理解。

补充阅读材料供读者自学用，只给出词汇和短语。

全书由北京邮电大学培训中心冯春燕主编，第一、二、三、八、九、十课由冯春燕编写，第四、五课由北京邮电大学培训中心李金岭编写，第六、七课由北京邮电大学电信工程系陈雪编写，第十一、十二、十三、十四、十五、十六课由北京邮电大学计算机系徐塞虹编写。北京邮电大学培训中心区惟煦教授对全书进行了审校，北京邮电大学副校长任晓敏教授在百忙中为本书作了序，在此表示衷心地感谢。

由于时间仓促，加之作者水平有限，书中错误在所难免，请广大读者批评指正。

编 者

1997年10月

LESSON 1 The Progressive Push

TEXT

Evolution of Telecommunications Networks

The first phase in the evolution of communication networks is dominated by the wide spread of telephony and covers over 90 years (see Fig. 1. 1). However, the telegraph preceded the telephone by more than 30 years and the teletypewriter by half a century. In 1844, Samuel Morse, the telegraph's inventor, sent the first telegraph message from Washington D. C. to his colleague Alfred Vail in Baltimore, Maryland. Shortly after the invention of the telephone by Alexander Graham Bell in 1876, it was realized that telephone wires had to converge on central points where telephone-to-telephone connections could be made¹. These points were manual switch-boards, staffed by operators. This was followed by the introduction of electromechanical switching and in 1889, Almond B. Strowger invented the first two-motion step-by-step switch. In a step-by-step switch, a call was established and routed in a set of progressive electromechanical steps, each under the direct control of the user's dialing pulses. It remained as the workhorse of central office switching well into the 1970s. The first crossbar switch was used in 1932 in Sweden. The Bell System introduced the No. 1 Crossbar System in 1938. Crossbar switching was carried

out by a special circuit called a marker, which provided common control of number entry and line selection for all calls².

The golden age of automatic telephony occurred after World War II when the entire long-distance network was automated. The invention of the transistor spurred the application of electronics to switching systems and led to the deployment of the first electronic switching in the late 1950s. Electronic switching made it possible to design and build switches with greater capacity³.

In the mid 1930s, analog point-to-point radio-relay transmission was possible by extending high-frequency (HF) communication technology into the very-high-frequency (VHF) range. During World War II, the operating frequency bands of the analog radio-relay systems were extended into the ultra-high-frequency (UHF) range. The first link with over 100 repeater stations was placed into commercial service in 1951 between New York and San Francisco, operating in the 4 GHz band with a 20 MHz band. This was followed by a growth of medium and high-capacity analog radio-relay systems worldwide. By the early 1970s, digital microwave radio had gained importance and, by the 1980s, quadrature amplitude modulation (QAM) methods were widely used as the modulation scheme for digital radio-relay systems.

The second phase of networking, which occurred in the 1960s, included three major milestones: software switching, digital transmission, and satellite deployment. In 1965, American Telephone and Telegraph (AT&T)⁴introduced the

first stored-program control (SPC) local switch, the 1 ESS* switching system. With the use of software control, a family of custom calling services (speed calling, call waiting, call forwarding and three-way calling, etc.) was made possible. The first software program for the 1 ESS switching system had approximately 100,000 lines of code; today switches may contain ten million lines of code.

The principle of converting analog signals to digital signals became popular with the introduction of pulse code modulation (PCM); consequently, the known rate for telephone-quality speech (4 KHz bandwidth) is 64 kbps⁵. During the 1960s and 1970s, a hierarchy of digital transmission channels based on the 64 kbps channel was established and still forms the backbone of today's digital network. One of the popular digital transmission systems is called the T1 carrier, which supports 24 voice channels, each 64 kbps, resulting in a total of 1.544 Mbps.

Satellite communication was first proposed in 1945 by the British science fiction writer, Arthur C. Clarke. Satellite communications became a reality with the launching of the Russian satellite Sputnik⁶ (in 1957) and the American satellite Explorer⁷ (in 1958). The AT&T Telstar⁸ was the first experimental satellite capable of relaying television (TV) programs across the Atlantic Ocean. It was launched from Cape Canaveral (now Cape Kennedy) on July 1962. The first global civil communications satellite, INTELSAT⁹ I (Early Bird), was launched in April 1965.

* ESS is a trademark of AT&T.

The third phase of the evolution of communication networks occurred in the 1970s and is characterized by the introduction of data networks and packet switching technology. The concept of packet switching was first published in a 1964 report by Paul Baran of the Rand Corporation for the U. S. Air Force. In 1966, under the sponsorship of the Advanced Research Project Agency (ARPA)¹⁰ of the U. S. Department of Defense (DOD)¹¹, an experimental packet-switching network, ARPANET, was set up and was put into service in 1971. ARPANET¹² led to the development and the widespread use of packet switching technology under the direction of Larry A. Roberts. Commercial offerings of packet-switched services rapidly followed the lead of the experimental networks, both in the United States and abroad. For example, in 1973, Bolt, Beranek and Newman (BBN), Inc. founded TELENET, the first public packet-switched network, linking host computers and dial-up terminal users. The Canadian DATAPAC¹³ network was developed during the 1973–1977 period. The French Institute for information and automatic research, in 1973, set up the CYCLADES¹⁴ and CIGALE¹⁵ networks. As data networks advanced from terminal-oriented systems to packet-switched, computer-to-computer linkups, the protocols necessary to make networks function also grew more complex¹⁶. Two fundamental standards were essential for the advancement in data networks. The first is the American Standard Code for Information Interchange (ASCII)¹⁷, which was approved in 1964 and became the common method of coding

• ARPANET was retired as of July 1990 after over 20 years of service.

data for communications. The second standard is the Electronics Industries Association (EIA)¹⁸ recommended standard (RS) RS – 232D. Its first version, issued in 1969, specified how the encoded¹⁹ information would be transmitted by modem over a telephone network²⁰.

To achieve compatibility between computers and packet-switched networks, the International Telegraph and Telephone Consultative Committee²¹ (CCITT* from the French acronym) established a world-standard protocol, called X. 25 in 1976. This led to several other international protocols for the interconnections between data networks. The widespread adoption of X. 25 opened the door for the growth of packet-switched networks in the United States and other countries. Working closely with CCITT, the International Organization of Standardization (ISO)²² in 1978 approved its seven-layer framework of protocols for data communications, called the *open-system-interconnection* (OSI)²³ reference model²⁴. The purpose of the OSI reference model is to allow any computer anywhere in the world to communicate with any other, as long as both obey the OSI standards²⁵.

This phase of networking is also characterized by the introduction and wide acceptance of local area networks (LANs). The oldest and best known of all LANs is the Ethernet²⁶, which started as a laboratory project in 1974 by R. M. Metcalfe and his colleagues at Xerox Corporation's Palo Alto

* As of 1993, CCITT has become the International Telecommunications Union-Telecommunication Standardization Sector (ITU-TSS)

Research Center. Ethernet was inspired largely by Alohanet²⁷, a packet-switched radio network developed by Norman Abramson at the University of Hawaii.

The invention of the laser (which stands for light amplification by simulated emission of radiation) in 1959 led to major technical developments in the field of optical communication. In 1970, Corning Glass Works reported on the first low-loss optical fiber (doped-silica clad fiber) that achieved 20 dB/km loss.

The fourth phase of communication networking, which began in 1980, is characterized by the availability of the integrated services digital networks (ISDN) and mobile communications. ISDN can be regarded as a general-purpose digital network capable of supporting a wide range of services such as voice, data, and image. A key ingredient in ISDN is the provision of a common integrated digital access between the customer's premises and the ISDN to support this multiplicity of services.

Mobile communications entered a new era with the introduction of the cellular concept. In 1981, the Federal Communications Commission (FCC)²⁸ allocated 50 MHz of the spectrum (824—849 MHz and 869—894 MHz) to mobile radio cellular systems. By 1990, the U. S. cellular service has over five million subscribers.

The four phases of the evolution of communications networks are shown in Table 1. 1.

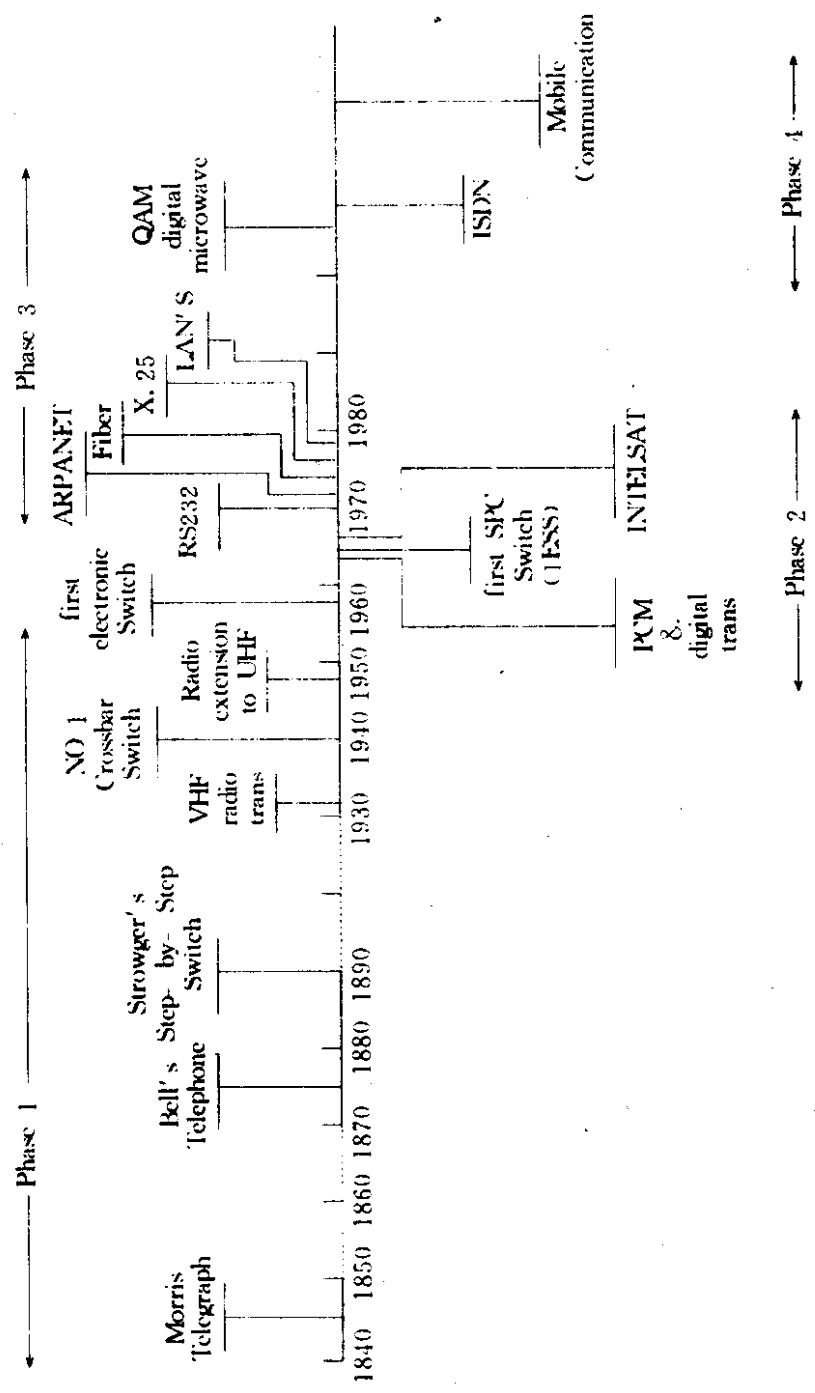


Figure 1.1 Snapshot of communications networks evolution.

TABLE 1.1 The Four Phases of Communications Networks

	Telephony	Digital Network	Data Networks	Integrated Digital Networks
Year	1880s	1960s	1970s	1980s
Type of traffic	Voice	Voice	Data	Voice, data video, imaging etc.
Switching technology	Circuit switching (analog)	Circuit switching (digital)	Packet switching	Circuit, packet, and fast packet switching
Transmission media	Copper, then microwave	Copper, microwave, satellite	Copper, microwave, satellite	Copper, microwave, satellite, fiber optics

NEW WORDS AND PHRASES

telecommunication [ˈtelikəmju(:)niˈkeɪʃən] *n.*

电信(讯), 无线电通讯

communication [kəmju:niˈkeɪʃən] *n.* 通讯, 通信, 通信系统

telephony [tiˈleɪfəni] *n.* 电话(学), 通话

telegraph [ˈtelɪgrɑ:f] *n.* 电报, 电报机

telephone [ˈtelɪfəʊn] *n.* 电话(机), 受话器

teletypewriter *n.* 电传打字(电报)机

message [ˈmesɪdʒ] *n.* 信息, 消息

connection [kəˈnekʃən] *n.* 连接, 联结, 接线

switchboard [ˈswɪtʃbɔ:d] *n.* (电话)交换台

operator [ˈɒpəreɪtə] *n.* 话务员, 报务员

electromechanical [iˈlektroumiˈkænikəl] *a.*

机电的, 电动机械的

switching [ˈswɪtʃɪŋ] *n.* 交换, 转换

step-by-step *a.* 步进的, 逐步的

switch [swɪtʃ] *n.* 接线器, 开关, *v.* 交换, 变换

route [ru:t] *vt.* 路由选定, 确定路线 *n.* 路由, 通路
 dialing pulse 拨号脉冲
 crossbar ['krɒsbɑ:] *n.* 纵横, 交叉
 marker ['mɑ:kə] *n.* 标志器, 标号器
 transistor [træn'sistə] *n.* 晶体管, 半导体三极管
 spur [spə:] *v.* 激励, 推动 *n.* 刺激, 促进
 electronics [ilek'trɒniks] *n.* 电子学, 电子仪器, 电子设备
 analog ['ænələg] *n.* 模拟, 模拟量
 point-to-point 点到点
 radio-relay transmission 无线电中继传输
 transmission [trænz'miʃən] *n.* 传输, 传送
 high-frequency (HF) 高频
 very high-frequency (VHF) 甚高频
 ultra-high-frequency (UHF) 超高频
 repeater [ri'pi:tə] *n.* 转发器, 中继器
 microwave ['maikrəweiv] *n.*; *a.* 微波 (的)
 quadrature ['kwɒdrətʃə] *n.* 正交, 90°相位差
 quadrature amplitude modulation (QAM) 正交幅度调制
 software ['sɔftwɛə] *n.* 软件, 方案
 satellite ['sætələit] *n.* 卫星 追随者 *a.*
 卫星的, 伴随的
 program ['prɒgræm] *n.* 程序, 方案
 service ['sə:vis] *n.* 业务, 服务
 stored-program control (SPC) 存储程序控制
 pulse code modulation (PCM) 脉冲编码调制
 speech [spi:tʃ] *n.* 话音
 bandwidth ['bændwidθ] *n.* (频) 带宽 (度)
 hierarchy ['haira:ki] *n.* 分层, 层次

channel ['tʃænl] *n.* 信道, 通路
carrier ['kæriə] *n.* 载波
packet ['pækɪt] *n.* 包, 组 *vt.* 做成包裹
terminal ['tɜ:mɪnl] *n.* 终端, 终端设备
information [ɪnfə'meɪʃən] *n.* 信息, 情报, 消息
protocol ['prəʊtəkəl] *n.* 协议, 草案
recommend [rekə'mend] *vt.* 建议, 推荐
encode [ɪn'kəʊd] *v.* 编码, 构码
transmit [trænz'mɪt] *v.* 传送, 发送
compatibility [kəmpeɪtə'bɪləti] *n.* 兼容性, 相容性
interconnect ['ɪntəkə'nekt] *v.*; *n.* 相互连接, 互连
open-system-interconnection (OSI) 开放系统互连
local area networks (LANs) 局域网
laser ['leɪzə] *n.* 激光, 受激发射光
optical ['ɒptɪkəl] *a.* 光的
fiber ['faɪbə] *n.* 纤维
mobile ['məʊb (ə) ɪl] *a.* 移动的, 游动的
access ['ækses] *n.* 入口, 接入
customer *n.* 用户
cellular ['seljʊlə] *a.* 蜂窝状的, 格形的
spectrum ['spektrəm] *n.* 频谱
subscriber [səb'skraɪbə] *n.* 用户
copper ['kɒpə] *n.* 铜

※ ※ ※

converge on 集中于, 聚集在...上
be regarded as 被认为是
as long as 只要, 如果