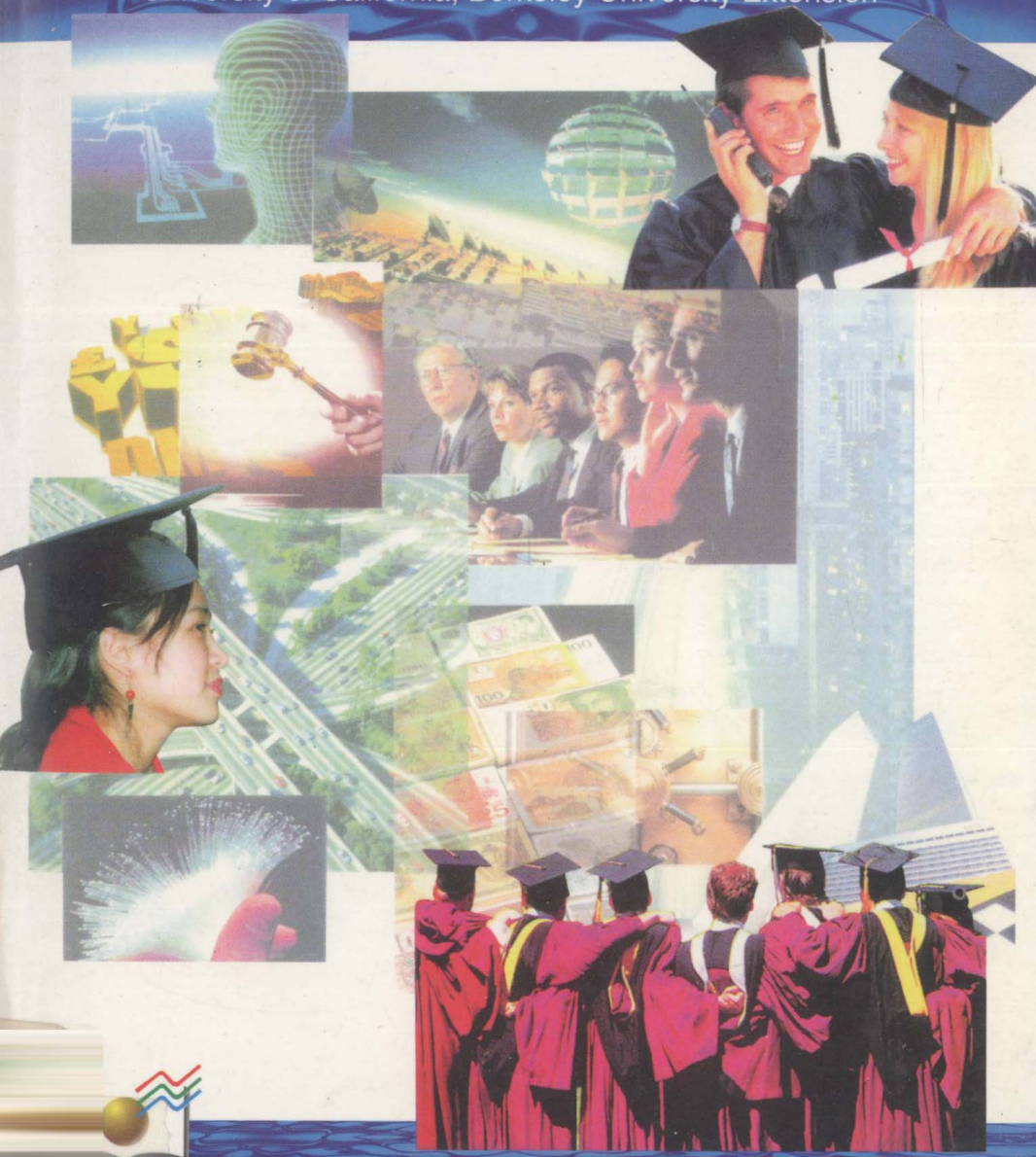
Toward the Next Century
Face to the World
跨越世紀 面向世界 500

3

Information Technology in the Year 2000

University of California, Berkeley University Extension



Central Radio and TV University Press

Information Technology in the Year 2000 (3)

University of California,
Berkeley University Extension

China Central Radio and TV University Press

(京)新登字 163 号

像字:01-1996-014 号

图书在版编目(CIP)数据

二十一世纪的信息革命(3):英文/美国加州大学柏克利分校著 .-北京:中央广播电视大学出版社,1997.2
(跨越世纪、面向世界 500 讲)
电视教育系列课程
ISBN 7-304-01365-6
Ⅰ.二… Ⅱ.美… Ⅲ.信息革命-电视教育-教材-英文
Ⅳ.G202
中国版本图书馆 CIP 数据核字(97)第 02314 号

Information Technology in the Year 2000
(3)

中央广播电视大学出版社出版发行
社址:北京市复兴门内大街 160 号 邮编:100031
北京印刷二厂印刷
开本 850×1168 1/32 印张 14.375 千字 462
1997 年 2 月第 1 版 1997 年 2 月第 1 次印刷
印数 1—3000
定价 15.00 元
ISBN 7-304-01365-6/G·239

出版说明

距世纪之交，仅仅剩下四年了。下一个世纪，究竟是谁人的世纪？

中国，犹如一头醒狮，带着5000年的文明，闪耀着新时期的灿烂，准备再造辉煌。

人们在寻找着跳板，一块能跨越世纪之壑，腾飞强国之林的跳板。人才，人才，还是人才。只有加速培养千千万万个跨世纪的、与国际接轨的、具有全球意识的复合型人才，我们的国家才能兴旺，我们的民族才能再现辉煌。

人们在寻找着窗口，一扇能折射当代科技文明结晶，预示未来世纪变幻的窗口。

大型电视教育系列课程《跨越世纪、面向世界500讲》正是这样的窗口，一扇不出国门，就能领略当今世界经济、科学发展趋势，共享国际一流教育资源的窗口。

由美中远程教育合作发展基金会、中国科学技术发展基金会、上海法学教育发展基金共同资助策划，上海市教育发展基金会参与发起，国家教委电化教育音像出版社、中央广播电视大学出版社出版发行的大型电视教育系列课程《跨越世纪、面向世界500讲》，共分五大序列：《二十一世纪的信息革命》、《现代化城市管理》、《现代企业与商业的经营管理》、《金融财税业的现代化管理》、《国际商务民事法规通则》。每一序列电视课程分别为80～100讲，每一讲约为50分钟，每序列文字教材共分三册，近一百万字。分中文版与英文版共计三十册。

担任授课的学校为世界一流的美国加州大学柏克利分校和美国斯坦福大学法学院以及在美国商学院中名列前茅的加州旧金山州立大学商学院。主讲教授均为本学科领域内公认的权威人士，他们不仅有着资深的教学经验，同时还具备丰富的实践经验。

大型电视教育系列课程《跨越世纪、面向世界500讲》全部在美国实景拍摄。本次教学活动采用了最先进的多媒体手段，在讲课过程中既有课堂教学，又有情景示范；既有实例演示，又有问题研究；既有历史演变过程，又有最新发展成果；既有理论深度，又有实践指导意义。本课程教学大纲，曾征询了北京大学、清华大学、中国人民大学、上海大学等全国四十多所大学以及中国继续教育联合学院等三十余个成人教育机构从事实践工作的专家、学者、领导们的意见，并进行了补充与调整，使之更符合中国的实际需求。为了进一步把好视听教材与文字教材的质量关，我们除了聘请一批具有教授、副教授、译审、副译审职称的相关专业的专家学者进行编译、审校之外，国家教委电化教育音像出版社和中央广播电视大学出版社还成立了出版工作委员会，具体指导、督促视听及文字教材的出版发行工作。

大型电视教育系列课程《跨越世纪、面向世界500讲》一推出，就受到了社会各界的广泛欢迎。北京大学、清华大学、中国人民大学、复旦大学、中山大学、南开大学、吉林大学、西安交通大学、上海大学等一百余所大学及成人教育机构，纷纷签约购买了本课程的教学使用权。国家人事部、国防科工委、中国科协向全国各省市、部委发文，把此系列课程作为全国专业干部继续教育的一项重要内容。司法部、上海市等一些部委和地区的主要领导，不仅全力支持，而且还要求有关领导干部带头学习，掌握更多的现代化科技管理和法律知识，更好地实施科教兴国战略。

本系列课程中文教材，是在保持原作者讲课内容的基础上，根据英文原稿编译而成的。由于时间仓促，难免有不当之处，敬请指正。教材中的内容均为作者自身的观点，并不代表编译出版者的立场，因此仅供参考。

编者

一九九六年十月二十五日

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Telecommunications: Development and Management

4.1 Overview

4.1.1 Standards Organizations and Development of Standardization

There are many standards organizations. There are standards organizations within countries, within industry groups, and international standards groups who have responsibilities throughout the world. These groups all interact and seek to coordinate their efforts and their standards.

A. CCITT (Consultative Committee on International Telephones and Telegraph)

One of the most influential standards organizations is the Consultative Committee on International Telephones and Telegraph, or CCITT. The main focus of this organization is on telephone and data communications. You will also frequently see the CCITT recommendations in accord with the ITU recommendations. The ITU, International Telecommunications Union, is an arm of the United Nations.

There are other committees that focus on different radio frequencies. This is important because wireless telecommunications is a high-growth area. As the wireless technologies advance in different regions around the world, the nature of business and

industry is such that the wireless service providers will seek to ever expand their service area. At this point, they will probably begin crossing boundaries between countries, so there will a need for some type of international oversight of wireless communications that cross countries or span continents. We are also seeing a resurgence in the use of satellite communications—not only for one-way video programming but for interactive data, and increasingly for the new area known as "personal communications services." By the late 1990s (1998 is the date projected for the launch of most of these new satellite-based personal communication service providers) we will have single services that span the globe. The standards will no doubt be overseen by many organizations, but the Consultative Committee on Radio will also play an influential role.

B. ISO (International Standards Organization)

Finally, there is the International Standards Organization, or in Europe, the International Organization for Standardization. These are the influential ISO provisions that you see in all types of products—everything from quality assurance programs to technical specifications to safety guidelines. The ISO is a communications standard for all types of telecommunications technology. The group coordinates again with the CCITT, and there is a strong working relationship between these groups.

C. ANSI (American National Standards Institute)

The United States has a large technology-development and manufacturing base in Northern California, in the area known as Silicon Valley. This research and development area is—for the world actually—a fairly good cross representation of research and development, with companies from around the world developing new products. In consequence, some local and regional standardization organizations play an influential role in the development of standards, especially in the area of new computer-based technologies and digital-telecommunication technologies.

The American National Standards Institute, or ANSI, similarly focuses on data communications in general and looks at standards across the industry. It could be considered similar to the International Standards Organization for the breadth of the technologies that it addresses. Sometimes the technologies are very

specific; other times, more general, covering broad areas.

D. Electronic Industries Association

The Electronic Industries Association is an industry group. This is a influential body, in which representatives from different manufacturing industry segments have agreed to come together and develop internal standards, which then can be applied out to the group. The impetus for such development is both technical and economic. At the technical level, it is easier to work together than to continually redevelop technologies with a slightly different edge. There is also an economic incentive, because consumers will not purchase a technology if they know it is incompatible with other technologies that they need to communicate with. So this group has been influential in standardizing the specifications for technical electronic devices, ensuring that the devices will interoperate.

E. Impetus of the U.S. Government

There is also the impetus of the government of the United States, which has specified that if it is going to purchase equipment, all the equipment must interoperate. The equipment must work together. Large purchasers of equipment were basically tired of purchasing equipment that would only work with other equipment from a certain manufacturer. When equipment was purchased from different manufacturers, there were extensive time requirements, financial requirements, and so on to get the equipment to work together. So through collaborative efforts such as the Electronic Industries Association, we now have cooperative technologies being developed. Even when technologies are developed as a proprietary technology, they are being released to the public sector with the knowledge that the company that invented the technology will lose some prestige. If it is a "hot" product, at the same time, they will gain the prestige of the industry by making their product open. And, more importantly, consumers are demanding open standards.

F. IEEE (Institute of Electrical and Electronic Engineers)

The Institute of Electrical and Electronice Engineers is a professional organization that is both technical and academic in perspective, representatives of the academic community as well as influential industry leaders participate. This is an organization for

engineers—for those developing standards perhaps—in a research-and-development laboratory. It's also for those who then take those new technologies and develop working products for the marketplace. Perhaps the most easily recognized developments from this group are the 802 LAN standards: the local area networking standards that define the way computers interact on a local area network. This includes the standards for Ether Net, for Token Ring, for FDDI, as well as some of the metropolitan area networking, and even wide area networking standards and interfaces.

G. National Bureau of Standards

The National Bureau of Standards is a government organization. It registers standards and types and keeps this information on file so that industry, government, and the general public can access at a single location the recorded specifications.

There are also user forums, where users interact with vendors, and these groups are influential because they feed information to the different standards-setting groups. (Increasingly, in all electronics we are seeing an intense focus on the customer.) These groups are mechanisms through which the potential purchase of the technology can let the manufacturer know what it is customers are looking for: the type of product, the desired capabilities, and the desired interactions with other types of products.

H. European Manufacturers Association

One of the "standards organizations"—one of the more influential ones—is the European Manufacturers Association, which again focuses on computer end-data communication standards. This group then feeds information into the ISO, the International Standards Organization.

I. Corporation for Open Systems

The Corporation for Open Systems also focuses on computer and data communications.

J. Manufacturing Automation Protocol

The Manufacturing Automation Protocol is a standards-setting body for manufacturing of office communications. This, as the "Mac" protocol, has also become influential in the manufacturing

process as it integrates with office information systems. In fact, this protocol has now become a standard for the interface of office information technology and manufacturing technology.

K. Technical Office Protocol

The Technical Office Protocol is a similar system that looks at the way office machines interact. You often see these two protocols and these two groups working together, to ensure that there is a good handoff or a good tradeoff between the functioning of the overall flow of information in the industry. The two groups that initially piloted these efforts are the automobile manufacturing industry and the aerospace manufacturing industry.

4.1.2 Standards and Protocols

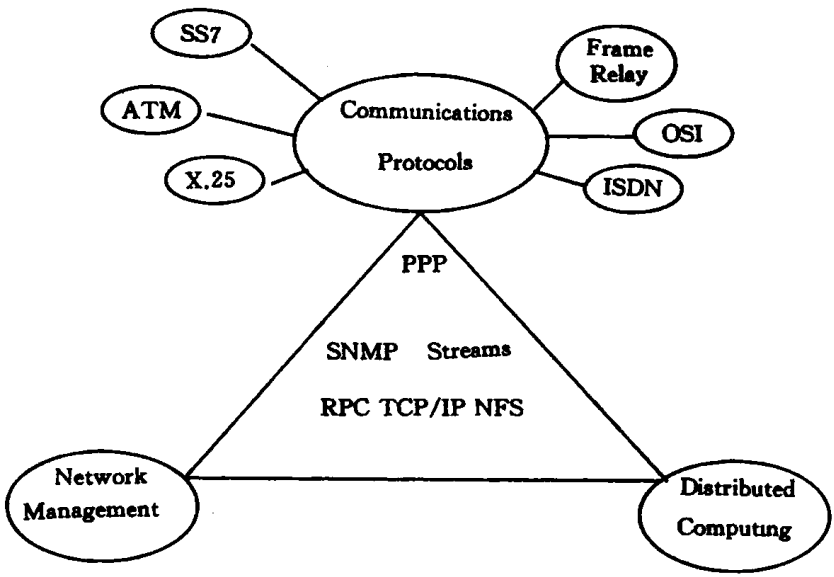

Fig 4.1-1 Telecommunications Standards

A. SS7 (Signaling System 7)

One of the most important standards is invisible to most users. The SS7 standard (Fig 4.1-1), or Signaling System 7, allows all

telephone operations throughout the world to interact. If you place an international phone call, throughout the routing of that call there will be a number of digital switches. There needs to be a signaling system to set up the call for the users. This is the SS7, technically called the "out-of-band signaling system," whereby, when you place a call, the SS7 protocol goes, for example, from China into the United States. Then, if someone picks up the phone, the SS7 protocol goes back and provides the connection. Then the voice transmission begins. So the SS7 is a digital-signaling protocol that sets up and terminates the telephone call connections and anything that operates over a telephone network—data, video, conferencing systems, advanced calling features—all these digital capabilities of the telephone system are embedded in and made possible through this SS7 protocol.

B. ATM (Asynchronous Transfer Mode)

The ATM, or Asynchronous Transfer Mode, digital switch is an important communication protocol and standard that writes the SS7 protocol. It also routes the X. 25 protocol, so these different communication protocols work together.

Simile Frame Relay—which is the X. 25 packet networking, the first of the "fast packet" technologies—is a result of communication protocol standard setting.

C. ISDN (Integrated Services Digital Network)

ISDN, the global standard for consumer and small-business digital communications, is also a direct result of work by the United Nations and the International Telecommunications Union, who wanted to develop a single worldwide standard for all digital telephone communications: the Integrated Services Digital Network.

D. OSI (Open Systems Interconnection)

The OSI is another very important standard. The Open Systems Interconnection model is the base reference for all communication protocols. The development of OSI is interesting because it has taken a somewhat different twist in its development than was originally planned. Initially, OSI was to be the unifying protocol replacing all other protocols. Most of these other protocols,