高等学校教材
专业英语系列教程

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杨 奇 主编

电子信息技术英语

English For Information And Electronic Technology

西北工业大学出版社

高等学校教材

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English for Information and Electronic Technology

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【内容简介】 本书旨在使学生能够熟悉并掌握电子信息技术方面的基本英语词汇，并提高与此相关专业英文文献方面的阅读能力。

本书共四部分，内容的选材力求丰富多样，涉及电子信息技术各方面的内容，包括网络与通信、信息处理、计算机基础理论与应用、微电子学、嵌入式系统等，本书的特点是内容和专业词汇的涵盖面广，选取的文章具有代表性和新颖性以及实用性和参考性，阅读材料包括最近10年一些新技术的介绍，从而使教师在选择教学内容方面有极大的灵活性和应用性。

本书适合于电子信息、信号处理、通信、计算机网络、信息管理与信息系统等相关专业的本、专科生作为专业英语课程的教材，并有助于从事电子信息领域的专业技术人员提高阅读外文专业文献的能力。

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前 言

随着时代的发展，电子信息技术已渗透到人们工作和生活的各个方面。电子信息英语也随之独立成为一门专业外语，并在电子信息技术应用中发挥巨大的交流作用。

一个电子信息方面的人才除了要掌握电子信息科学的基本理论和技能以外，更重要的是具备快速获取新的信息科学方面知识的能力。而电子信息英语（尤其是阅读能力）则是体现这种能力的一个重要方面。本着让学生读懂并了解相关课题，掌握必要的专业英语知识和专业术语，因此教材的选材也尽量选择概述性、介绍性论文。本书正是在这种指导思想下编写的。

1. 编写目的

· 使学生熟练掌握电子信息技术方面的基本专业词汇。

· 提高学生的电子信息专业英文文献的阅读能力。

2. 本书特点

· 系统性：本书涵盖了电子信息技术各方面的内容，包括微电子、嵌入式系统、网络通信、3G、多媒体通信、信号处理、数据库、计算机理论及应用等。

· 新颖性：本书体现出 20 世纪 80 年代到 21 世纪初关于电子信息科学的成熟及最新技术。

· 代表性：本书选取的文章在内容上具有一定的代表性，基本体现了电子信息科学的典型技术。

· 广泛性：本书专业词汇的涵盖面广。

3. 本书结构与内容

第一部分重点介绍 SM，3G，ATM，下一代移动及无线访问技术等已成熟的通信技术；第二部分内容包括数字信号系统的基本概念、多媒体信号处理的方法和应用、人工智能和专家系统的基本概念和应用、虚拟现实技术的概念和应用等方面；第三部分讲解计算机基础理论、数据库技术等；第四部分涉及微电子科学及嵌入式系统。

4. 读者对象

本书适合于电子信息、信号处理、通信、计算机网络、信息管理与信息系统等相关专业的本、专科生作为专业英语课程的教材，也可供从事于电子信

息领域的专业技术人员阅读参考。

本书主编杨奇，副主编朱岩、周巍、谢红梅、王建平。其中杨奇、王建平负责编写第一部分，周巍编写第四部分，朱岩编写第三部分及第四部分，谢红梅编写第二部分及第三部分中的数据库等内容。在本书的编写和出版过程中，西北工业大学出版社的同志为使本书尽快出版付出了辛勤的劳动，在此表示感谢。

由于编者水平有限，加之时间仓促，对于本书中出现的错误，欢迎广大读者批评指正。

编　者

2005 年 5 月

目 录

Part I Communication

Part II Signal and Information Processing

Part III Computer

Communication

Unit 1 General Network Topologies

Physical topology defines the interconnection of physical nodes by physical transmission links. A node is a network element, such as an ATM switch, a router, or a multiplexer. We also refer to a node as a device, and to a link as a transmission path. A link represents a connection between two nodes, either physical or logical. Therefore, a link may be either a physical connection, such as a dedicated private line, or a logical, or virtual, connection such as a Permanent Virtual Connection (PVC).

Logical topology defines connections between two or more logical nodes (or simply interfaces) which may be of either a point-to-point, or point-to-multipoint configuration in ATM. Furthermore, each connection may be either unidirectional or bidirectional. A leaf is the terminating point of a unidirectional point-to-multipoint topology with originations at the root. A spatial point-to-multipoint connection has at most one leaf per physical port, while a logical point-to-multipoint connection may have multiple leaves on a single physical port. When all nodes have a point-to-multipoint connection, then a broadcast logical topology results. Figure 1.1 illustrates each of these logical topologies. Other technologies, such as Ethernet, support a broadcast medium where all other stations receive any one station's transmission. Additional protocols and configurations are required to support the broadcast logical topology.

The most commonly used physical topologies for computer and data communications networks are: point-to-point, multipoint (or common bus), star, ring (or loop), and mesh. The text provides illustrated examples of each network topology.

1.1 Point-to-Point

The point-to-point topology is the simplest, comprised of a single connection between two nodes composed of one or more physical or logical circuits. Figure 1.2 shows three examples of a point-to-point topology. The first example shows a single physical circuit connecting Node A and Node B. The second example depicts a single physical circuit between Node A and Node B carrying multiple logical links. The third example depicts a single

connection path between Node A and Node B with multiple physical circuits, each carrying multiple logical links. Typically, network designers employ this configuration when the separate physical circuits traverse diverse routes, in which case any single physical link or circuit failure would not completely disconnect nodes A and B.

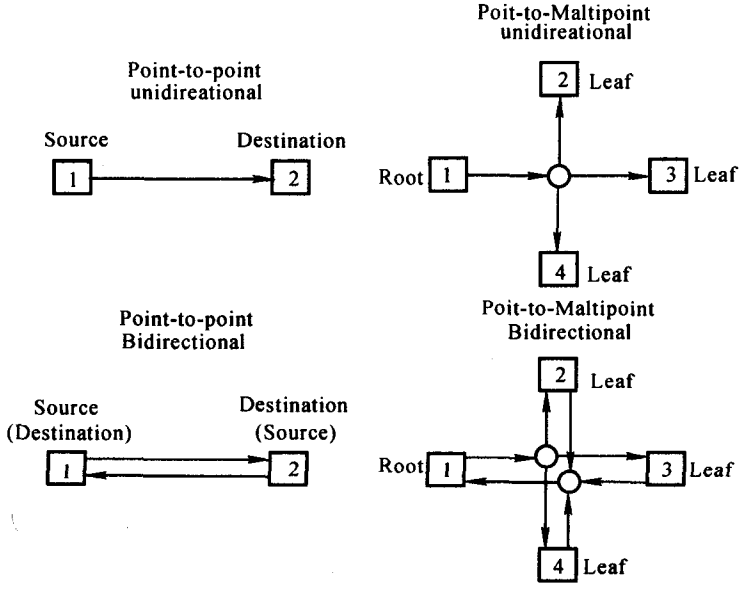

Figure 1.1 Conceptual Illustration of Logical Topologies

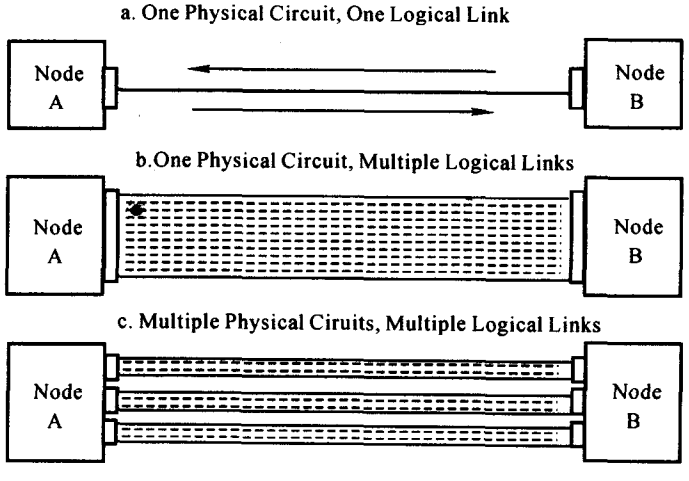

Figure 1.2 Point-to-Point Topology Examples

Point-to-point topologies are the most common method of connectivity in Metropolitan and Wide Area Networks (MANs and WANs). User access to most MAN or WAN network services has some form of point-to-point topology. Examples of the point-to-point topology are private lines, circuit switching, and dedicated or dial-up access lines to packet switched

services, frame relay, and ATM.

1.2 Multipoint and Broadcast

A common realization of the multipoint topology is a network where all nodes physically connect to (and logically share) a common broadcast medium. Figure 1.3 shows the multipoint topology, where Node A through F communicate via a shared physical medium. Sometimes the shared medium is also called a common bus. Most Local Area Networks (LANs) utilize a broadcast (or multipoint) topology. Indeed, the IEEE 802.4 Token Bus, the IEEE 802.3 Ethernet, and the IEEE 802.6 Distributed Queue Dual Bus (DQDB) protocols define different means of logically sharing access to the common physical medium topology. Radio and satellite networks also implicitly employ the broadcast topology due to the inherent nature of electromagnetic signal propagation.

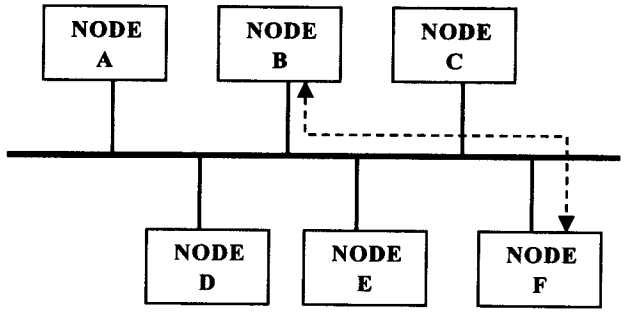

Figure 1.3 Shared Medium (Common Bus) Multipoint (Broadcast) Topology

A multidrop analog line is commonly used for legacy SNA SDLC loop access. In this example, an analog signal is broadcast from a master station (usually a mainframe front end processor) to all slave stations. In the return direction the slaves share the common broadcast medium of the multidrop line. The SNA SDLC polling protocol involves the host polling the slave stations in a round-robin manner, thus preventing any two slaves from transmitting at the same time. Other networks, notably the Ethernet protocol, also work on a broadcast medium, but don't provide for orderly coordination for transmission like the SNA SDLC loop does. Instead, these protocols empower stations to transmit whenever they need to as long as another station isn't already sending data. When a collision does occur, a distributed algorithm uses the bandwidth at approximately 50 percent efficiency. Figure 1.4 illustrates other conceptual examples of the multipoint topology. Another commonly used multipoint topology is that of broadcast, or multipoint-to-multipoint, which is the case where many other nodes receive one sender's data. Yet another example is that of "incast", or multipoint-to-point, where multiple senders' signals are received at one destination — as in a slave-to-master direction. In this conceptual illustration note that the multipoint-multipoint

(i. e. , shared medium, or multicast) topology is effectively the combination a full-mesh of multipoint-point topology connections for each of the four nodes. The figure also illustrates emulation of a point-to-multipoint topology via multiple point-to-point links for comparison purposes.

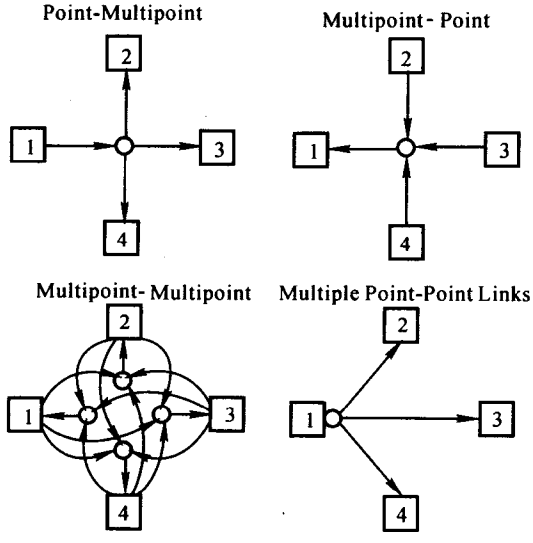

Figure 1.4 Conceptual Illustration of Multipoint Topologies

1.3 Star

The star topology developed during the era when mainframes centrally controlled most computer communications. The voice switching world also employs a star topology when multiple remote switching nodes, each serving hundreds to even thousands of telephone subscribers, home-in on a large central switch. This network radiates in a star-like fashion from the central switch through the remote switches to user devices. The central node performs the communication switching and multiplexing functions in the star topology. Nodes communicate with each other through point-to-point or multipoint links radiating from the central node. The difference between this topology and the multipoint topology is that the central node only provides point-to-point connections between any edge node, on either a physical or logically switched basis.

Figure 1.5 shows a star topology, where Node A serves as the center of the star and Node B through E communicate via connections switched to and through the central Node A. An example of a star topology is many remote terminal locations, or clients, accessing a centralized server through the central node as illustrated in the figure. The physical star topology is widely used to connect devices to a central hub in LANs, and thus is often called a "hub and spoke" topology. The central hub may logically organize the physical star as a logical bus or ring as is commonly done in LAN wiring hubs. A key benefit of the physical