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Unit 4
Circuit Switching

Text A Circuit Switching

Unit 4

- 原文：**Circuit switching has been the dominant technology for both voice and data communications . Communication via circuit switching implies that there is a dedicated communication path between two stations. That path is a connected sequence of links between network nodes.**

- 译文:在语音通信和数据通信中，电路交换是占有优势的技术。通过电路交换建立的通信，意味着在两个通信节点之间有专用的通信链路。该链路是网络节点有序的连接。

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- 原文： **On each physical link. A channel is dedicated to the connection. The most common example of circuit switching is the telephone network.**

- 译文：在每个物理链路上，有专门分配的信道进行连接。电话网是电路交换最常见的例子。

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- 原文：**Communication via circuit switching involves three phases. which can be explained with reference to Figure 4.1.**

- 译文：利用电路交换的通信包括三个阶段，如图4.1所示。

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- 原文：**Circuit establishment Before any signals can be transmitted, an end-to-end (station-to-station) circuit must be established.**

- 译文：在任何数据传输之前，必须有一个端对端的电路建立。

Unit 4

- 原文：**For example, station A sends a request to node 4 requesting a connection already exists. Node 4 must find the next leg in a route leading to E.**

- 译文：例如，节点**A**给节点**4**发送一个请求信息请求一个已经存在的通路。节点**4**必须利用指向节点**E**的路由信息找到下一个节点。

Unit 4

- 原文：**Based on routing information and measures of availability and perhaps cost, node 4 selects the link to node 5,**

- 译文:根据路由表信息和计算各种可能的消耗，节点**4**选择了节点**5**，

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- 原文： **allocates a free channel (using frequency division multiplexing, FDM, or time division multiplexing, TDM) on that link, and sends a message requesting connection to E.**

- 译文：分配了一个空闲的信道（利用频分复用和时分复用技术）并且发送一个连接节点**E**的申请信息。

Unit 4

- 原文：**So for, a dedicated path has been established from A through 4 to 5. Because a number of stations may attach to 4, it must be able to establish internal paths from multiple stations to multiple nodes.**

- 译文：到目前为止，通过节点4和5一个专用的线路已经建立了。因为有可能很多节点连接节点4，所以必须利用节点复用建立内部链路。

Unit 4

- 原文：**How this is done is discussed later in this section. The remainder of the process proceeds similarly. Node 5 dedicates a channel to node 6 and internally ties that channel to the channel from node 4.**
- 译文：如何做到这一点，在本节后面讨论 。其实以后的节点都按那种方法继续进行下去。节点5分配信道给节点6 ，

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- 原文：**Node 6 completes the connection to E. In completing the connection. A test is made to determine if E is busy or is prepared to accept the connection.**

- 译文：节点6连接到目的节点E。在建立连接的过程中，节点E是繁忙或者已经准备好了接受信息必须考虑在内。

Unit 4

- 原文：**Information can now be transmitted from A through the network to E. The transmission may be analog voice digitized network, the use of digital (binary) transmission for both voice and data is becoming the dominant method.**
- 译文：信息现在可以通过网络从节点A传到节点E。根据网络的状态信息可以分为模拟、数字信息和文本信息。这种传输工具发展到整合的数字网络。利用数字网络传输语音数据已经是一种主流方法。

Unit 4

- 原文：**The path is A-4 link, internal switching through 4, 4-5 channel, internal switching through 5, 5-6 channel, internal switching through 6, 6-Elink. Generally, the connection is full duplex, and signals may be transmitted in both directions simultaneously.**
- 译文：路径是A - 4的链接，通过4个内部开关，4-5通道，通过5内部开关，5-6通道，到6的内部开关，6 - E的链接。一般情况下，连接是全双工，可同时在两个方向传输信号。

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- 原文：**After some period of information transfer, the connection is terminated, usually by the action of one of the two stations.**

- 译文：一些信息的传递期间后，连接将被终止，通常是由两站之一的行动。

Unit 4

- 原文：**Signals must be propagated to nodes 4, 5 and 6 to deallocated the dedicated resources.**

- 译文：信号必须传播到节点4，5和6的释放专用资源。

Unit 4

- 原文：**Note that the connection path is established before data transmission begins.**

- 译文：在数据传输以前链路必须是已经连接的。

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- 原文：**Thus, channel capacity must be reserved between each pair of nodes in the path and each node must have available internal switching capacity to handle the requested connection.**

- 译文：因此，信道容量必须保留每一对节点之间的路径和每个节点都必须有可用的内部交换容量来处理请求的连接。

Unit 4

- 原文：**The switches must have the intelligence to make these allocations and to devise a route through the network.**

- 译文：交换机具有在网络中进行链路分配和路由选择的智能。

Unit 4

- 原文：**Circuit switching can be rather inefficient. Channel capacity is dedicated for the duration of a connection, even if no data are being transferred.**

- 译文：电路交换是低效率的，只要链路建立信道容量就一直分配，甚至在没有数据传输时。

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- 原文：**For a voice connection, utilization may be rather high, but it still does not approach 100%. For a terminal-to-computer connection, the capacity may be idle during most of the time of the connection.**

- 译文：对于语音连接，利用率可能相当高，但它仍然没有达到100%。对于一个终端到计算机的连接，容量可能会在连接的大部分时间闲置。

Unit 4

- 原文： **In terms of performance, there is a delay prior to signal transfer for call establishment. However, once the circuit is established, the network is effectively transparent to the users.**

- 译文：根据性能，对于一次通信而言，在信号传输之间存在吸纳好延迟。然而，一旦链路建立，网络就一直为用户传输数据信息以固定速率无延迟的传输，各节点的延迟可以忽略。

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- 原文：**Information is transmitted at a fixed data rate with no delay other than the propagation delay through the transmission links. The delay at each node is negligible.**

- 译文：信息传输在一个固定的数据率与无延迟通过传输链路的传播延迟以外。在每个节点的延迟是可以忽略不计。

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- 原文：**Circuit switching was developed to handle voice traffic but is now also used for data traffic. The best-known example of a circuit-switching network is the public telephone network.**

- 译文：电路交换技术比用来处理语音业务，但现在也用来处理数据业务。公用电话网就是一个电路交换很好的例子。

Unit 4

- 原文：**This is actually a collection of national networks interconnected to form the international service. Although originally designed and implemented to service analog telephone subscribers,**

- 译文：这实际上是一个相互连接，形成国际服务的全国性网络的集合。虽然最初的设计和实施服务的模拟电话用户，

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- 原文：**it handles substantial data traffic via modem and is well on its way to being converted to a digital network.**

- 译文：它通过调制解调器处理大量的数据流量，并在它的途中被转换为数字网络。

Unit 4

- 原文： **Another well-known application of circuit switching is the private branch exchange (PBX), used to interconnect telephones within a building or office.**

- 译文：电路交换的另一个著名的应用专用分支交换（PBX），用于建筑物或办公室内的电话互连。

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- 原文：**Circuit switching is also used in private network. Typically, such a network is set up by a corporation or other large organization to interconnect its various sites.**

- 译文：电路交换也常常被用在私人网络。例如一个公司或组织组建网络来连接它们的每个节点，像这样的网络每一个专线互联的节点对包括一个专用分组交换机。

Unit 4

- 原文： **Such a network usually consists of PBX systems at each site interconnected by dedicated, leased lines obtained from one of the carriers,**

- 译文：这种网络通常包括在租用运营商之一获得线互连每个站点的**PBX**系统，

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- 原文：**such as AT&T. A final common example of the application of circuit switching is the data switch. The data switch is similar to the PBX but is designed to interconnect digital data processing devices, such as terminals and computers.**
- 译文：例如，**AT&T**。数据交换就是一个电路交换很好的应用。数据交换和**PBX**很相像，但是数据交换是用来互联数字数据网设备的。例如，终端和电脑的连接。

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- 原文： **A public telecommunications network can be described using four generic architectural components:**

- 译文：一个公用的电话通信网有四个组成部分：

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- 原文： **Subscribers: The devices that attach to the network . It is still the case that most subscriber devices to public telecommunications networks are telephones, but the percentage of data traffic increases year by year.**

- 译文：用户部分：该设备连接网络，大多数的用户设备还是电话机。但是数据业务的百分比逐年在增加。

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- 原文： **Subscriber line: The link between the subscriber and the network, also referred to as the local loop. Almost all subscriber line connection use twisted pair wire.**

- 译文：用户线路：用户和网络之间的联系，也称为本地环路。几乎所有的用户线连接使用双绞线。

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- 原文：**The length of a subscriber line is typically in a range fron a few kilometers to a few tens of kilometers. The subscriber line is also known as a subscriber loop, or a local loop.**

- 译文：用户线路的长度通常是在几公里到几十公里的范围内，用户线路也被称为一个用户环路或本地环路。

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- 原文： **Exchanges :The switching centers in the network. A switching center that directly supports subscribers is known as an end office. Typically, an end office will support many thousands or subscribers in a localized area.**
- 译文：交换：该部分是网络中的交换中心。每个交换中心都支持用户所知道的末端偏移。在局部一个末端偏移可以支持好几千的用户。

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- 原文：**There are over 19,000 end offices in the United States, so it is clearly impractical for each end office to have a direct link to each of the other end offices; this would require on the order of 2*10∧8 links. Rather, intermediate switching nodes are used.**
- 译文：在**US**有大概**19000**个末端偏移。所以每一个末端偏移之间都连上一条专用链路那是不实际的。如果那样的话就需要大概**2*10∧8**条链路。

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- 原文：**Thunks: The branches between exchanges. Thunks carry multiple voice-frequency circuits using either FDM or synchronous TDM. Earlier, these were referred to as carrier systems.**

- 译文：形式转换程序：该部分是交换之间的分支。利用频分复用和时分复用技术携带复用了的语音信号。该部分在以前是被集成在系统中的。

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- 原文：**Subscribers connect directly to an end office, which switches traffic between subscribers and between a subscriber and other exchanges. The other exchanges are responsible for routing and switching traffic between end offices.**
- 译文：用户不能直接和末端偏移连接。末端将一个用户的业务同另一个用户的业务交换。其他的交换节点都有责任利用路由交换业务信息。

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- 原文：**This distinction is shown in Figure 4.2. To connect two subscribers attached to the same end office, a circuit is set up between them in the same fashion as described before.**

- 译文：这个区别是在图**4.2**所示。要连接两个用户连接到相同的端局，电路设置它们之间以同样的方式如前所述。

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- 原文：**If two subscribers connect to different end offices, a circuit between them consists of a chain of circuits through one or more intermediate offices.**

- 译文：如果两个用户连接不同的末端，通过一个或多个媒介业务，节点之间就会存在电路链路。

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- 原文：**In the figure, a connection is established between lines a and b by simply setting up the connection through the end office.**

- 译文：在图中，建立了连接线A和B之间通过简单的设置，通过端局连接。

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- 原文：**The connection between c and d is more complex. In c's end office, a connection is established between line c and one channel on a TDM trunk to the intermediate switch,**

- 译文：节点C到节点D的连接就比较复杂。在节点C的末端，在链路C和一个利用时分复用的中间交换的信道之间建立一个连接。