The Public Telephone Network (cont.)

**PBXs and Key Systems**  
In many large businesses, telephones are connected to a Private Branch Exchange (PBX) or a Key System. A PBX is basically a small switch, that performs the switching functions, provides features (such as Call Transfer, Conference, etc.) and performs call management for an organization or company. A Key System functions in a similar manner. The PBX is connected to the Public Network to complete calls outside the company or location.
The Public Telephone Network (cont.)

Data Connections
Likewise, data connections to the public network are not always a direct connection. In most corporate environments, data connections are through some corporate system, such as a Local Area Network (LAN), switch, multiplexor or modem bank.

The Pipeline
In the public network, the actual physical route by which the transmission gets from the source to the destination is the transmission route. This route is sometimes referred to as a pipeline, or pipe. It may be as simple as the direct connection of a telephone to a Central Office switch by twisted pair wiring, as shown below.
The Public Telephone Network (cont.)

In most cases, the path will be a combination of components. Twisted pair might connect to a service provider equipment that connects back to the switch using higher capacity pipelines, as shown below.

In some cases, microwave transmission is used.
The Public Telephone Network (cont.)

The Pipeline (cont.)

In some cases, satellites become involved:

In other cases, cellular transmission is used:

Technology Never Rests, Inc.
A relatively new method of providing telephone service is with cable TV systems. As a result of the 1996 Telecommunications Act, cable TV companies are now permitted to begin offering telephone services. Several cable TV providers are now offering telephony services in selected metropolitan areas, and more are expected to do so in the near future. This technology is still relatively young, so expect to see changes in this area. Much of the technology today involves coax cable, fiber or a combination of coax and fiber, called Hybrid Fiber Coax (HFC).
The Public Telephone Network (cont.)

Analog vs. Digital

Introduction The Public Telephone Network was originally designed as network for switching and connecting analog signals and transmissions. The network is evolving to a digital network, as we will discuss below.

What is the Difference Between Analog and Digital? Good question. We need to spend some time on this subject.

Service providers offer services across the Public Network in two categories; analog and digital.

An analog signal, by definition, is a signal that changes in a nondiscrete manner (smooth transitioning to different levels). If you were to measure an analog signal electrically, it might look something like figure below.

Examples of analog signal devices include residential voice telephone service, radios, TVs, and some music formats, such as LP records and tapes. These analog devices transmit or record an input signal in as close to the original form as possible, within the constraints of the media. Analog signal transmission is reliable and quite embedded as part of our communications infrastructure. Analog transmission is susceptible to electrical interference problems, and is not a secure method of information transfer from the standpoint of privacy and security.
The Public Telephone Network (cont.)

**Digital**

A digital signal is defined as a two discrete state channel. These states may be "on" or "off", "open" or "closed", or more commonly "0" or "1". If we were to measure a digital signal electrically, it might look the figure below.

![Digital Signal](image)

Examples of digital devices include computers, CD music players and many forms of data transmission. An example of the transmission of information involving both digital and analog is the use of modems. A modem is a device that performs analog-digital signal conversion, as illustrated below.

![Modem Diagram](image)

Of course, there is much of the Public Network that is based on purely digital transmission and services, which we will discuss later.