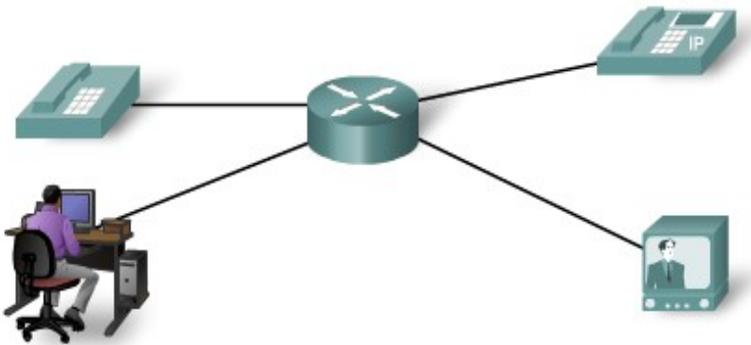


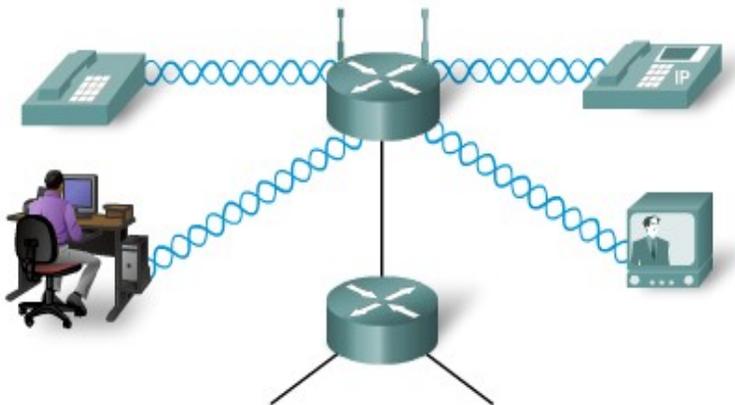
ELEMENTS OF NETWORK AND MULTIPLEXING

Elements of Network:

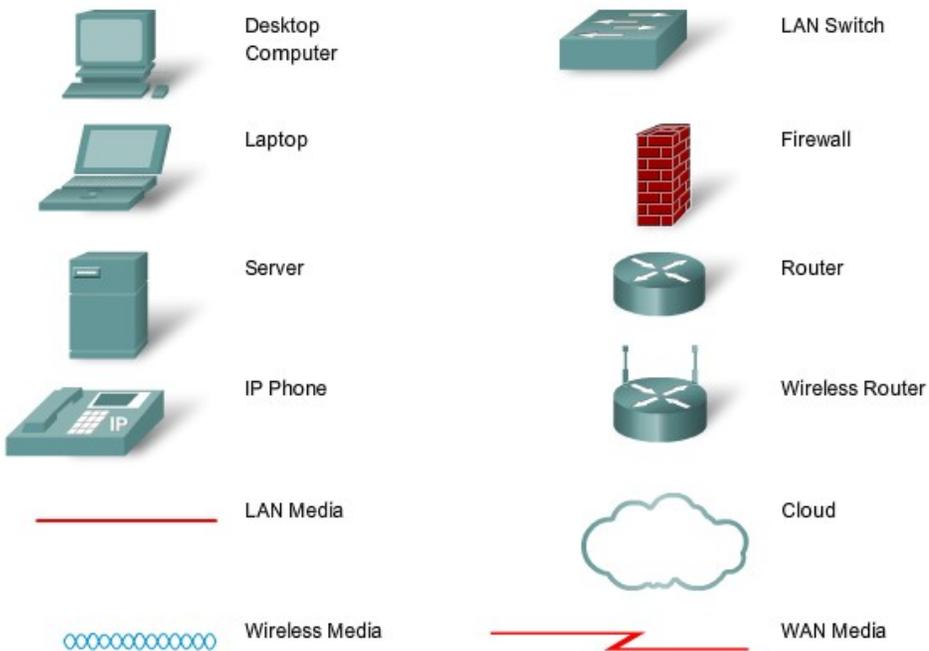
Wired networks used physical cables to connect devices.



Wireless networks use radio waves to communicate between devices.



Wireless networks are also connected to wired networks, at some point.



Multiplexing:

Basic concept of multiplexing

Frequency division multiplexing

Wavelength division multiplexing

Time division multiplexing

- Synchronous
- Asynchronous

Inverse TDM

Simplex:

A form of communication in which signals are sent in only one direction. This is different from duplex transmission, in which signals can simultaneously be sent and received by a station, and from half-duplex transmission, in which signals can be sent or received but not both at the same time. Simplex transmission occurs in many common communication applications, the most obvious being broadcast and cable television. It is not used in true network communication because stations on a network generally need to communicate both ways. Some forms of network communication might seem to be simplex in nature, such as streaming audio or video, but the communication actually takes place using bidirectional network traffic, usually Transmission Control Protocol (TCP) traffic. Simplex communication is not included in the V series recommendations of the International Telecommunication Union (ITU).

Duplex

A telecommunications term referring to bidirectional communication. In full-duplex communication, both stations send and receive at the same time, and usually two communication channels are required. However, you can also achieve full-duplex communication using a multiplexing technique whereby signals traveling in different directions are placed into different time slots. The disadvantage of this technique is that it cuts the overall possible transmission speed by half.

In half-duplex communication, only one station can transmit at any given time while the other station receives the transmission. The opposite of duplex communication is simplex communication, which can occur only in one direction.

Half-duplex

A mode of communication in which data can be transmitted or received, but cannot be transmitted and received simultaneously. The simplest example is a walkie-talkie: You have to press a button to talk and release the button to listen. When two people use walkie-talkies to communicate, at any given moment, only one of them can talk while the other listens. If both try to talk simultaneously, a collision occurs and neither hears what the other says.

Communication through traditional Ethernet networks is another example of half-duplex communication. When one station on an Ethernet transmits, the other stations detect the carrier signal and listen instead of transmitting. If two stations transmit signals simultaneously, a collision occurs and both stations stop transmitting and wait random intervals of time before retransmitting.

In contrast, full-duplex communication enables stations to transmit and receive signals simultaneously, with the advantage of providing twice the bandwidth of equivalent half-duplex technologies. However, full-duplex requires two communication channels to achieve these results—one to transmit and one to receive signals.

A third mode of communication is called simplex, which involves transmission in one direction only, with one station transmitting signals and the other receiving them.