

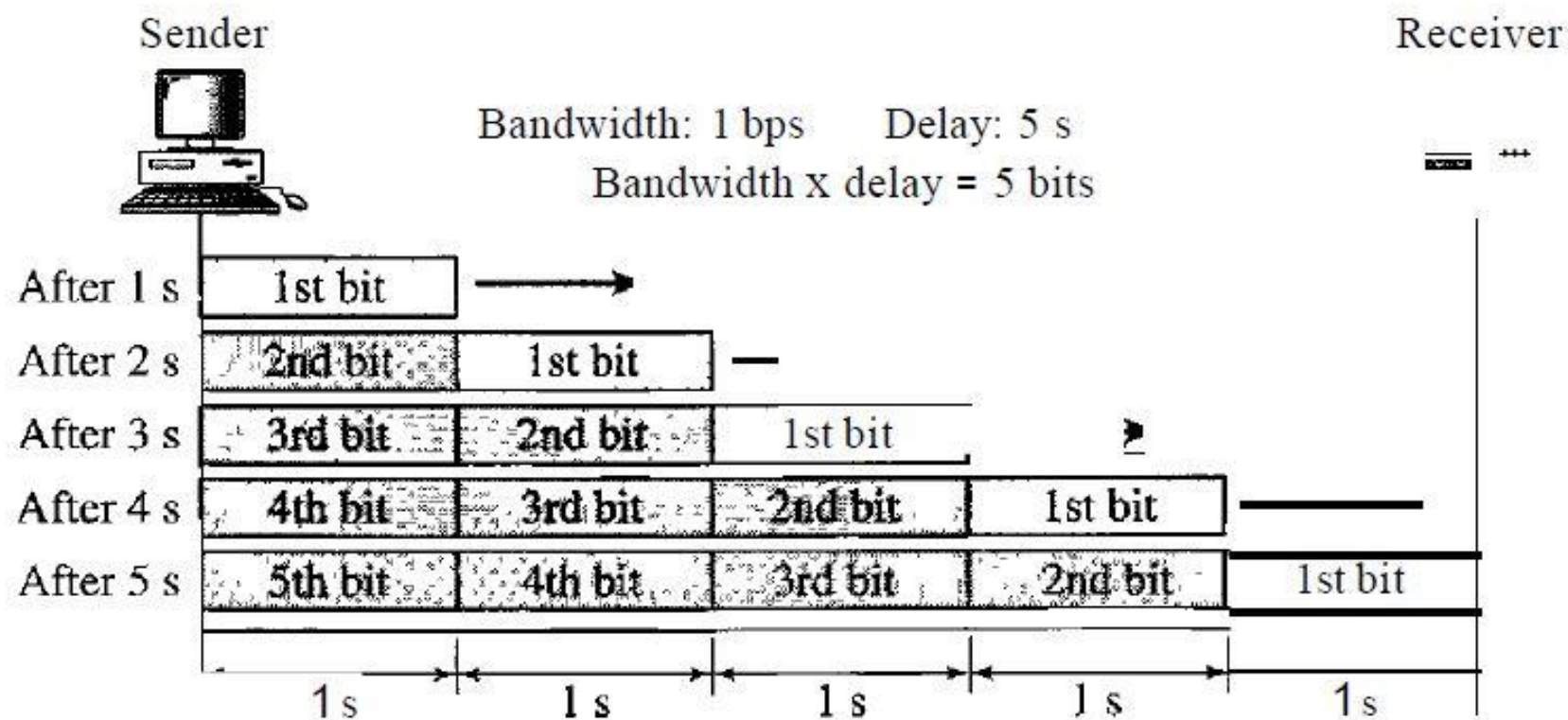
Computer Networks

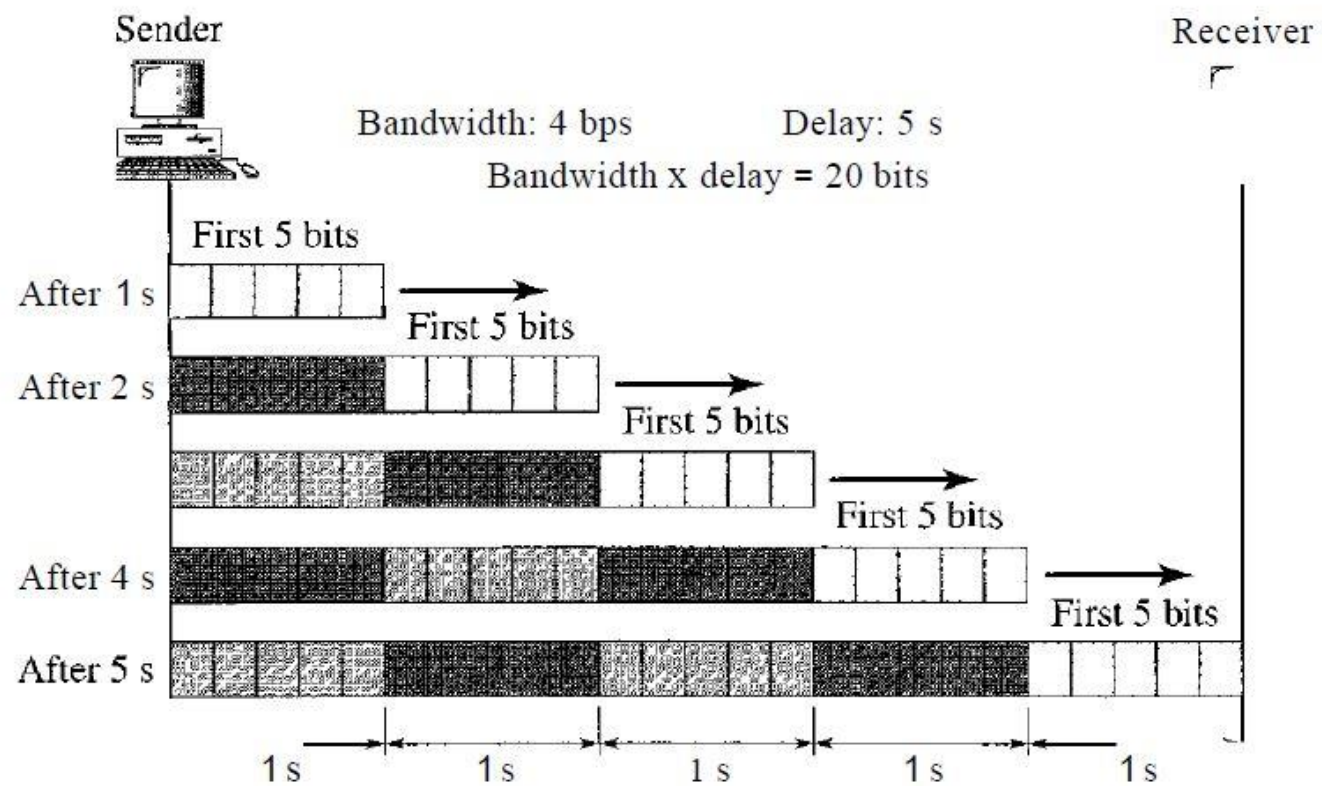
<i>Unit</i>	<i>Equivalent</i>	<i>Unit</i>	<i>Equivalent</i>
Seconds (s)	1 s	Hertz (Hz)	1 Hz
Milliseconds (ms)	10^{-3} s	Kilohertz (kHz)	10^3 Hz
Microseconds (μ s)	10^{-6} s	Megahertz (MHz)	10^6 Hz
Nanoseconds (ns)	10^{-9} s	Gigahertz (GHz)	10^9 Hz
Picoseconds (ps)	10^{-12} s	Terahertz (THz)	10^{12} Hz

Types of Communication

- Unicast
- Multicast
- Broadcast
- Anycast

- Bit Rate
- Baud Rate
- RTT
- TO
- Bandwidth
- Delay
- Bandwidth * Delay Product

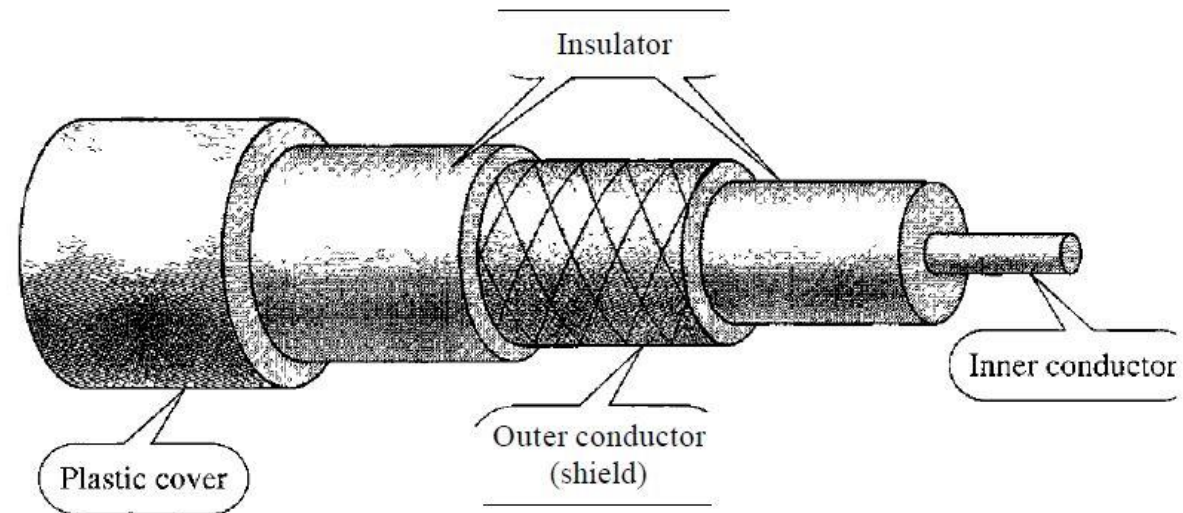
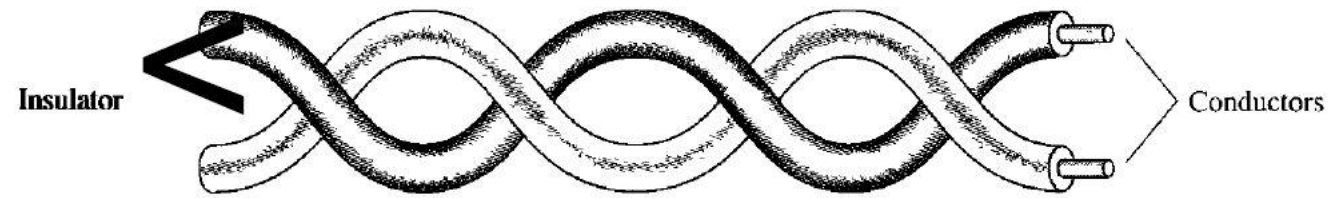




Physical Media

- Transmission Media
 - Guided Media
 - Twisted Pair Cable
 - Coaxial Cable
 - Fiber Optic Cable
 - Unguided Media
 - Free Space

10Base2, 10Base5, 10Base-T, 10Base-F



<i>Category</i>	<i>Specification</i>	<i>Data Rate (Mbps)</i>	<i>Use</i>
1	Unshielded twisted-pair used in telephone	< 0.1	Telephone
2	Unshielded twisted-pair originally used in T-lines	2	T-llines
3	Improved CAT 2 used in LANs	10	LANs
4	Improved CAT 3 used in Token Ring networks	20	LANs
5	Cable wire is normally 24 AWG with a jacket and outside sheath	100	LANs
SE	An extension to category 5 that includes extra features to minimize the crosstalk and electromagnetic interference	125	LANs
6	A new category with matched components coming from the same manufacturer. The cable must be tested at a 200-Mbps data rate.	200	LANs
7	Sometimes called SSTP (shielded screen twisted-pair). Each pair is individually wrapped in a helical metallic foil followed by a metallic foil shield in addition to the outside sheath. The shield decreases the effect of crosstalk: and increases the data rate.	600	LANs

<i>Characteristics</i>	<i>lOBase5</i>	<i>lOBase2</i>	<i>lOBase-T</i>	<i>IOBase-F</i>
Media	Thick coaxial cable	Thin coaxial cable	2UTP	2 Fiber
Maximum length	500m	185 m	100m	2000m
Line encoding	Manchester	Manchester	Manchester	Manchester

Performance Factor

- Throughput
- Latency
 - Queuing Delay
 - Processing Delay
 - Transmission Delay
 - Propagation Delay
- Jitter

A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?

What is the propagation time if the distance between the two points is 12,000 km? Assume the propagation speed to be 2.4×10^8 mls in cable.

What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 mls.

What are the propagation time and the transmission time for a 5-Mbyte message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 mls.