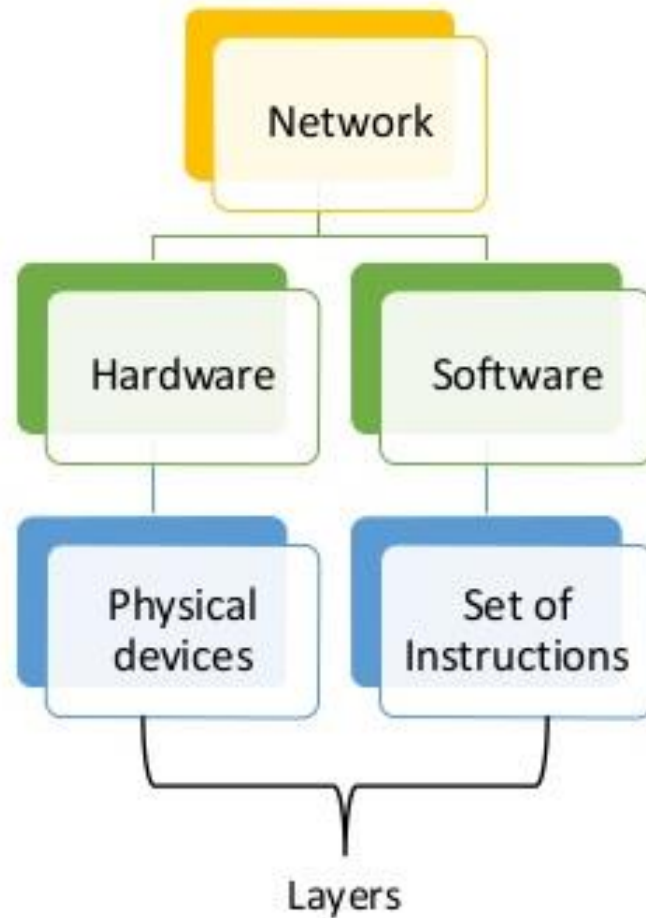# Transmission Media
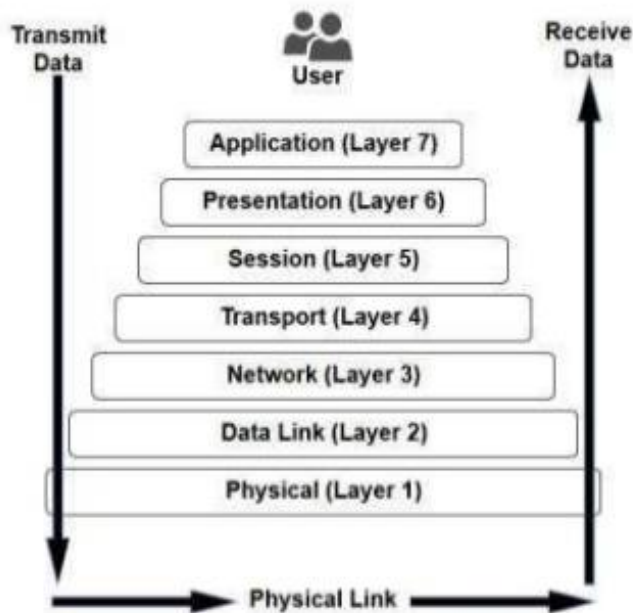
Layered Concept
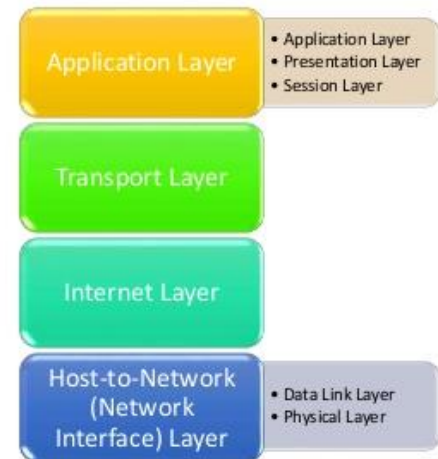
Layered Concept Cont.

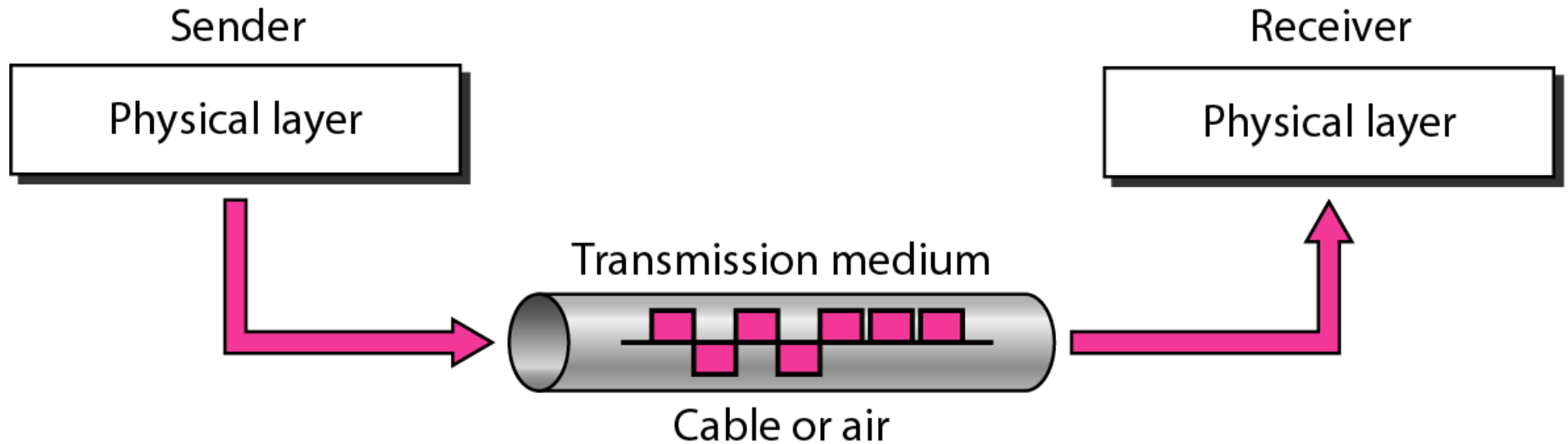## The 7 Layers of OSI

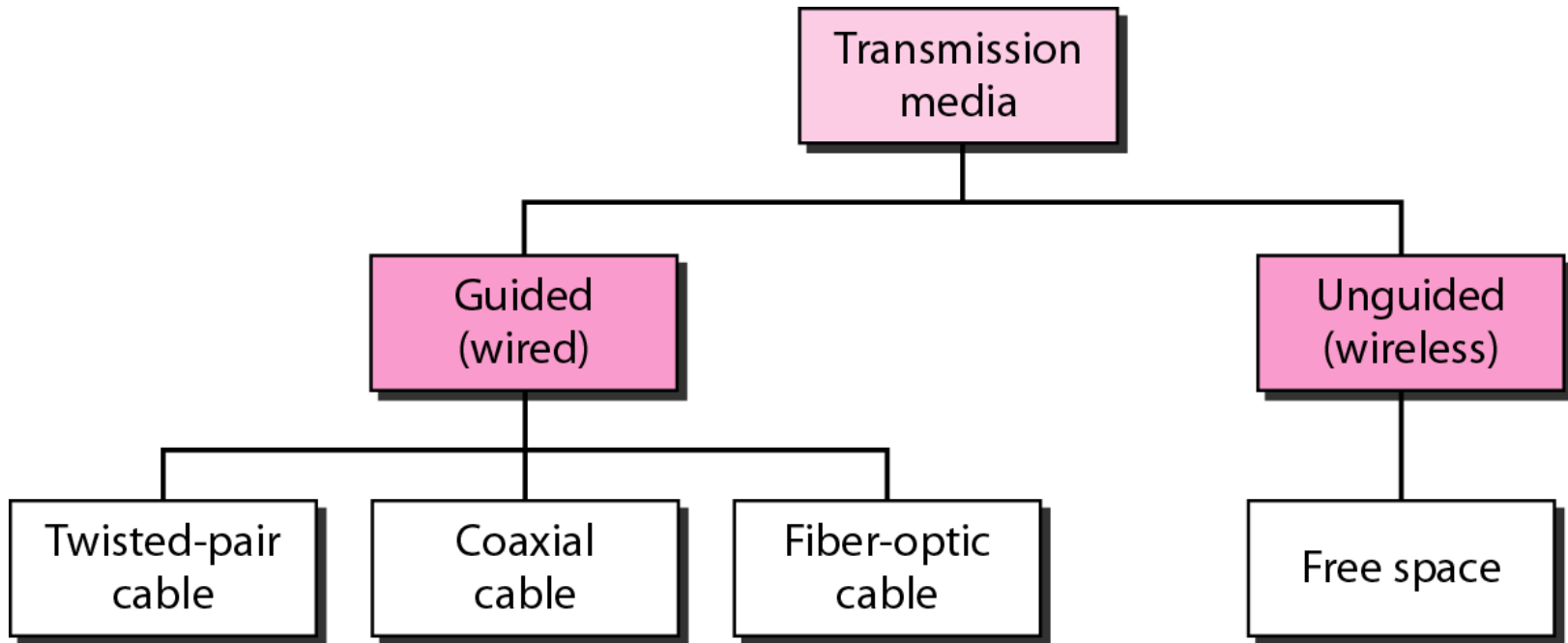Transmit Data → ↓

Receive Data → ↑

User

| Application (Layer 7) |
| Presentation (Layer 6) |
| Session (Layer 5) |
| Transport (Layer 4) |
| Network (Layer 3) |
| Data Link (Layer 2) |
| Physical (Layer 1) |

Physical Link

TCP/IP

- Transmission Control Protocol / Internet Protocol.
- Four Layers:

Application Layer	• Application Layer • Presentation Layer • Session Layer
Transport Layer	
Internet Layer	
Host-to-Network (Network Interface) Layer	• Data Link Layer • Physical Layer

Transmission medium and physical layer

Sender

Physical layer

Receiver

Physical layer

Transmission medium

Cable or air

Classes of transmission media

Transmission media Cont.

- Characteristics and quality determined by medium and signal
- For guided, the medium is more important
- For unguided, the bandwidth produced by the antenna is more important
- Key concerns are data rate and distance
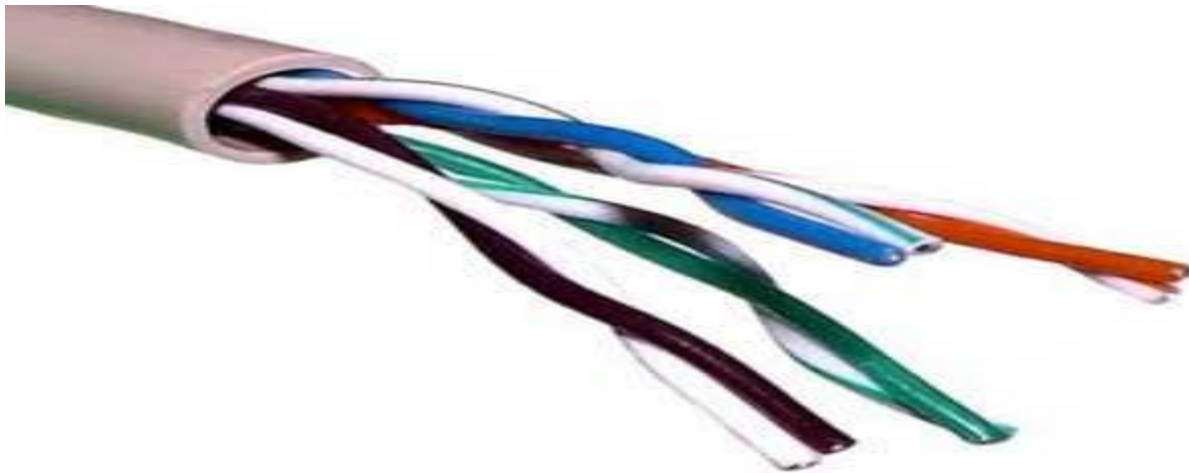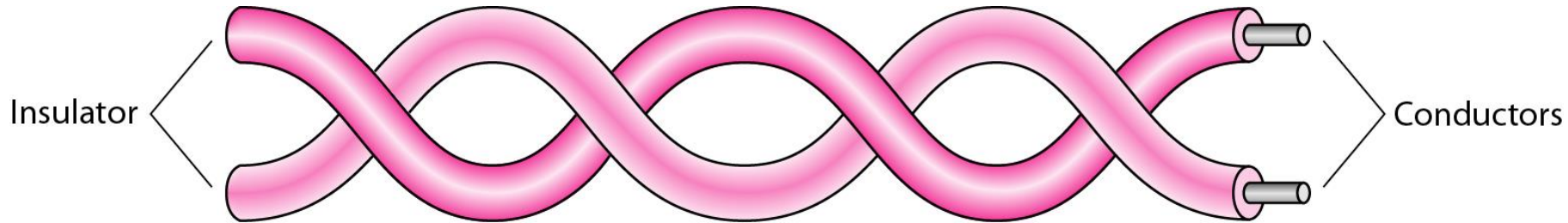
GUIDED MEDIA

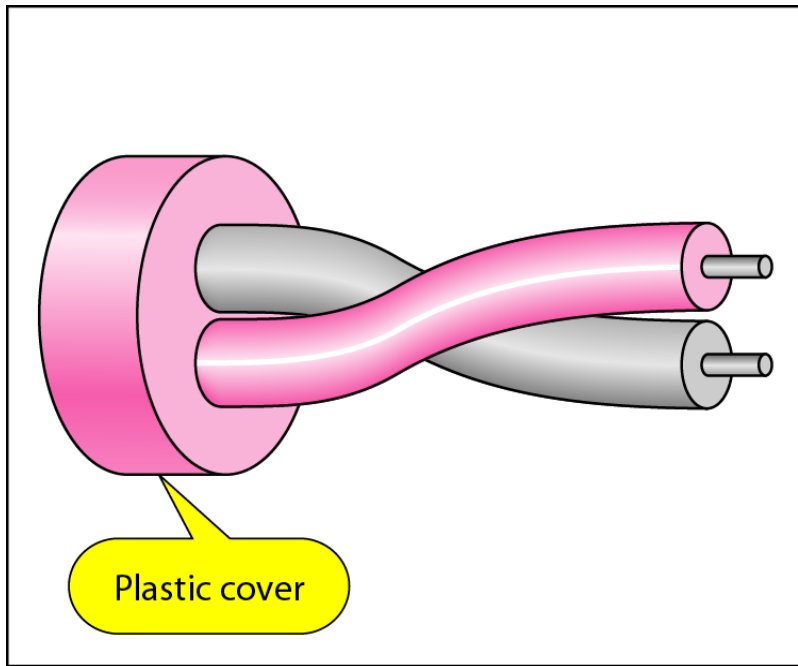*Guided media, which are those that provide a conduit from one device to another*

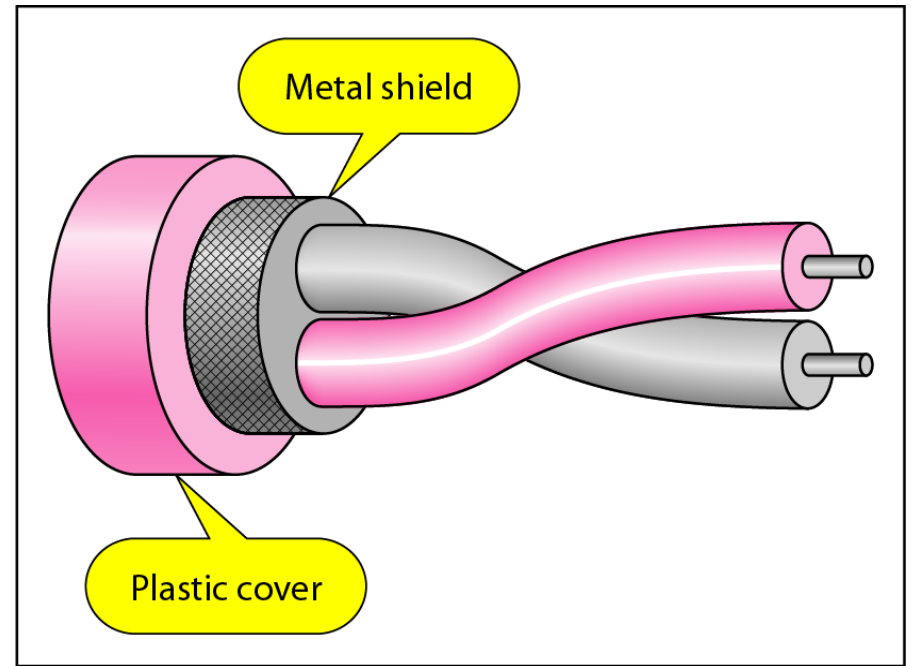**Twisted-Pair Cable**
Coaxial Cable
Fiber-Optic Cable

Twisted-pair cable

Insulator — Conductors

UTP and STP cables

a. UTP

b. STP

Categories of unshielded twisted-pair cables

| Category	Specification	Data Rate (Mbps)	Use
1	Unshielded twisted-pair used in telephone	< 0.1	Telephone
2	Unshielded twisted-pair originally used in T-lines	2	T-1 lines
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
5E	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

UTP connector
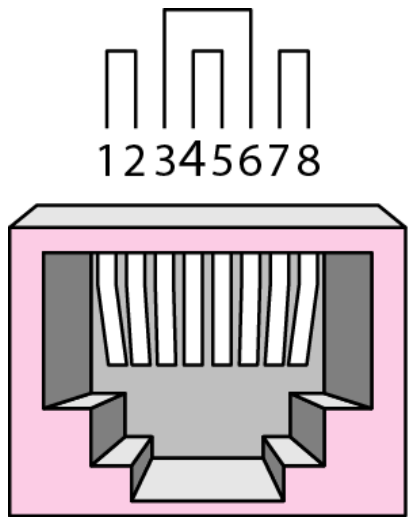
RJ-45 Female
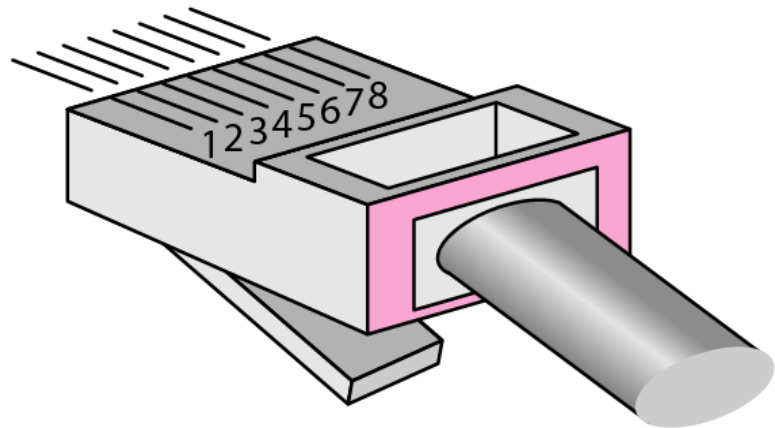
RJ-45 Male

UTP performance
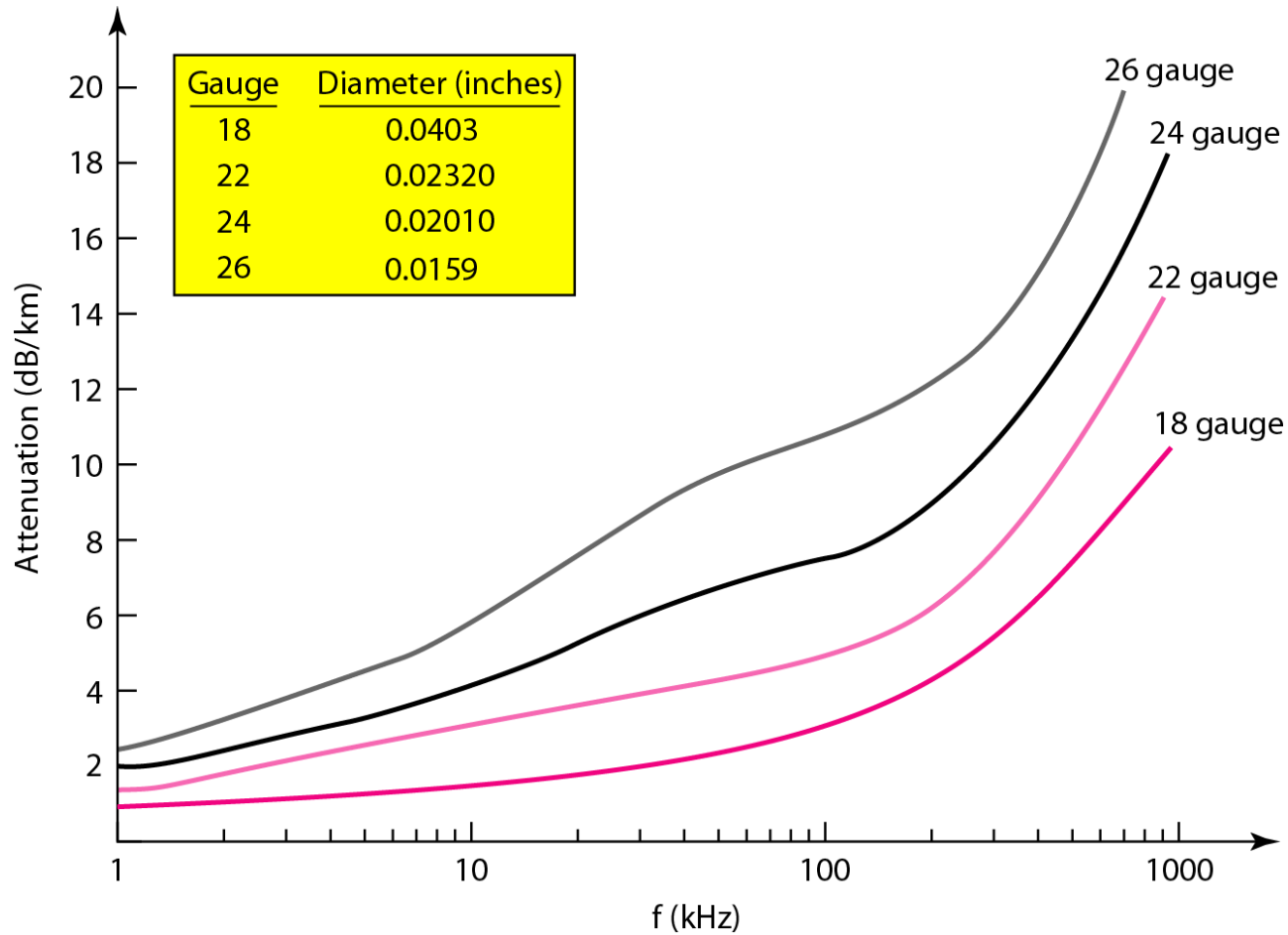
Applications

- Most common medium
- Telephone network
  - Between house and local exchange (subscriber loop)
- Within buildings
  - To private branch exchange (PBX)
- For local area networks (LAN)
  - 10Mbps or 100Mbps

Pros and Cons

- It supports analog as well as digital transmission
- Inexpensive
- Flexible and easy to install

- Noise prone
- Transmission limits
- Tapping of data is easy

Twist

Helps us to reduce noise, because there can be from 2 to 12 twists in one feet area.

Twisted pair cable divide the effect of the noise between two wires twists

When noise will interfere data transmitting process, twist will have half of the time noise and then half of the time noise free.

By this way at the end noise can be reduced.

Differerent twisted rate reduces the possibility of crosstalk issue.