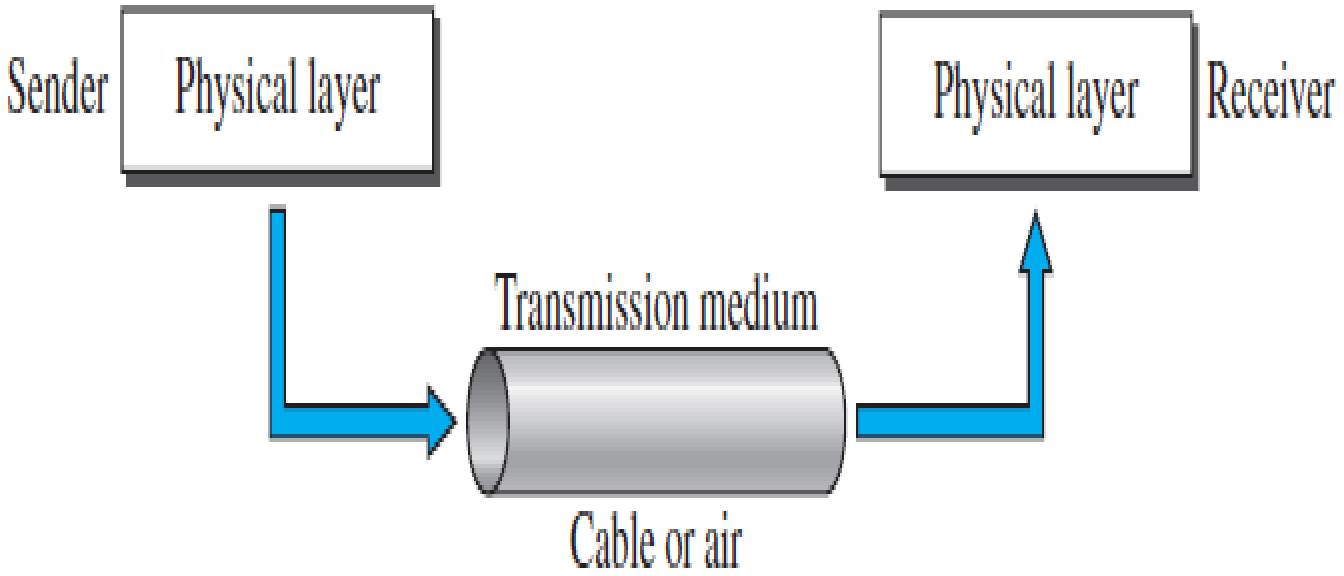
Transmission Media Guided

CSE306

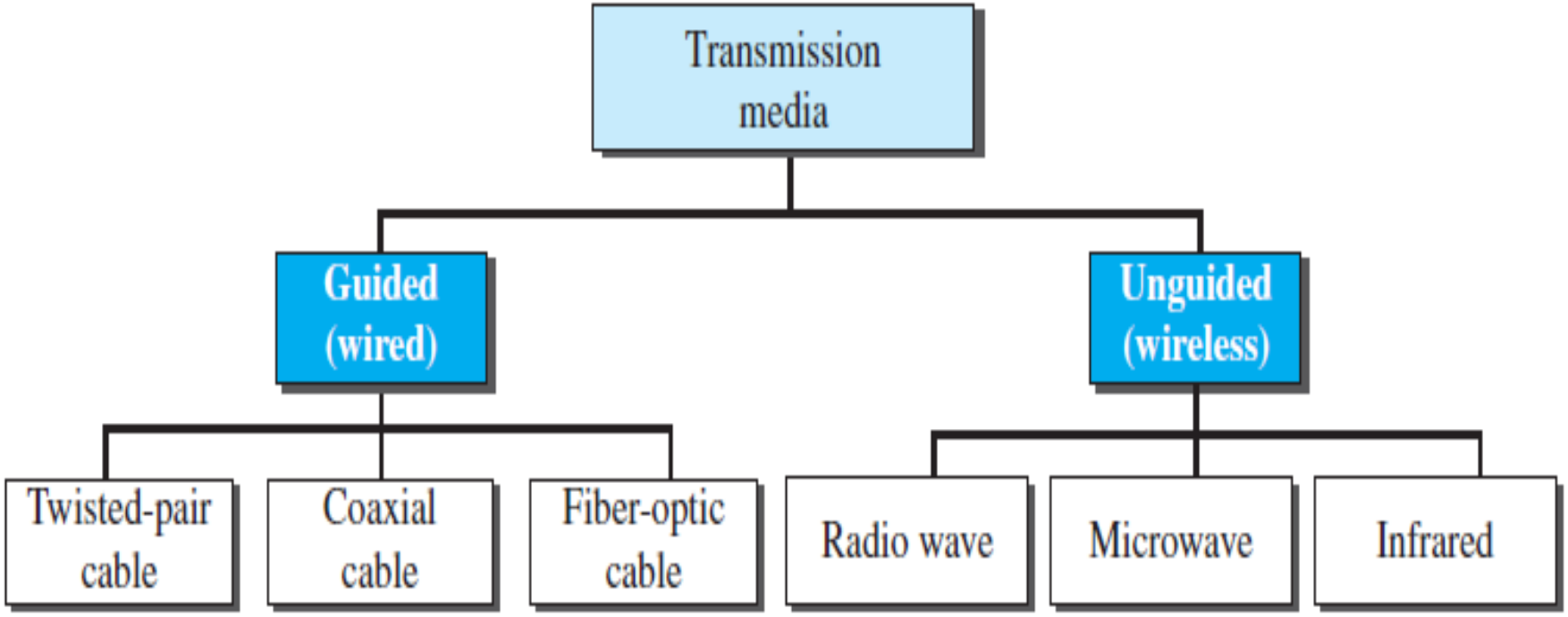
Presented by: Dr. Amandeep Singh

- A transmission **medium** can be broadly defined as anything that can carry information from a source to a destination.

- For example, the transmission medium for two people having a dinner conversation is the air.


Sender
Physical layer
Physical layer
Receiver
Transmission medium
Cable or air

Classes of transmission media



POLL 1

- Which of the following is **NOT** an example of transmission Media

a) Twisted-Pair Cable
b) Coaxial Cable
c) Microwave
d) None of the above

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

Unguided media transport electromagnetic waves without using a physical conductor.

POLL 2

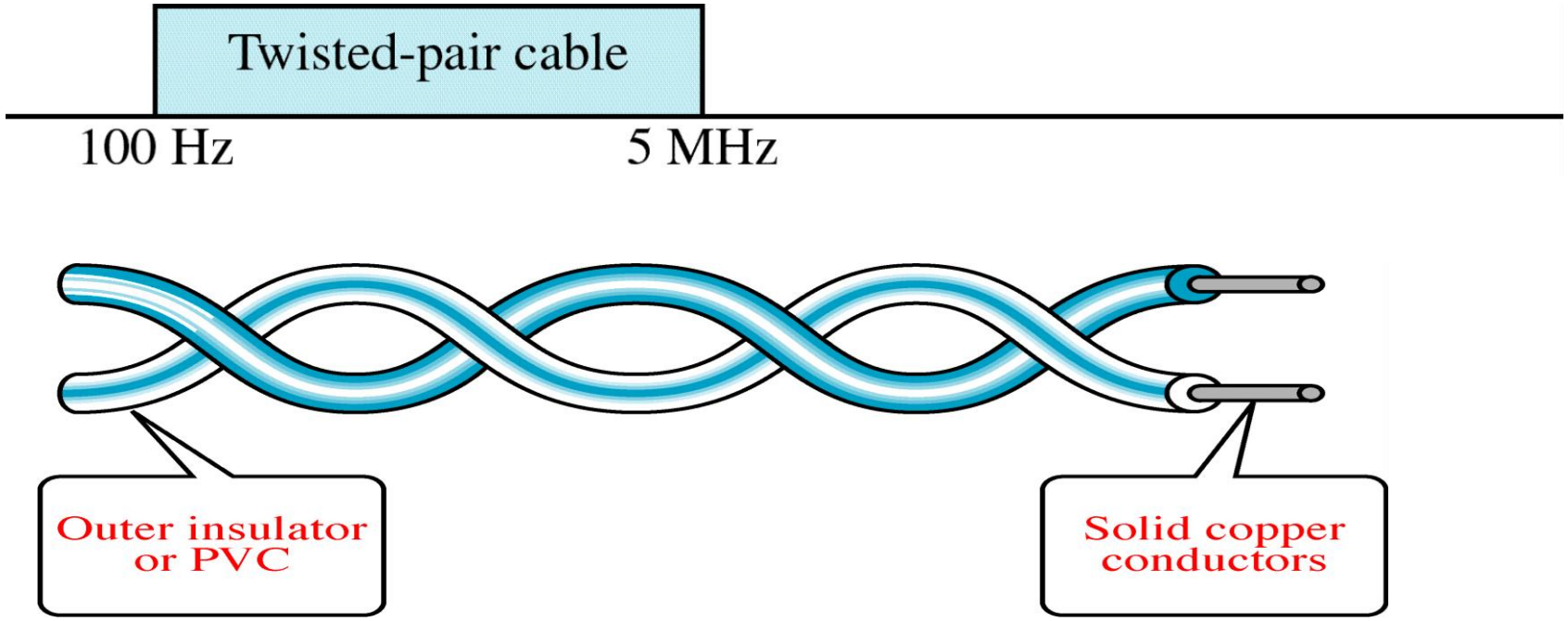
- Is Vacuum a type of transmission media

a) Yes

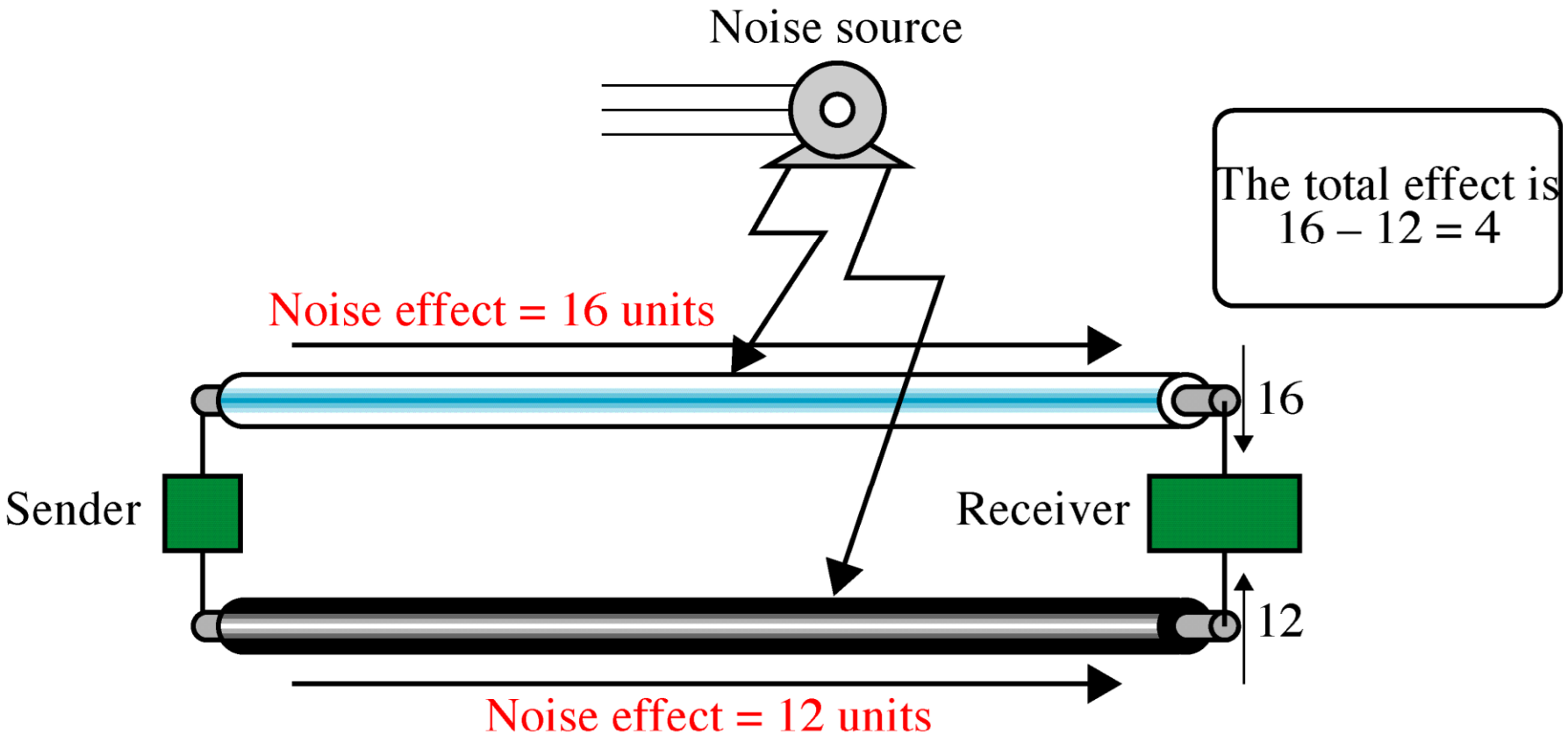
b) No

Twisted-Pair Cable

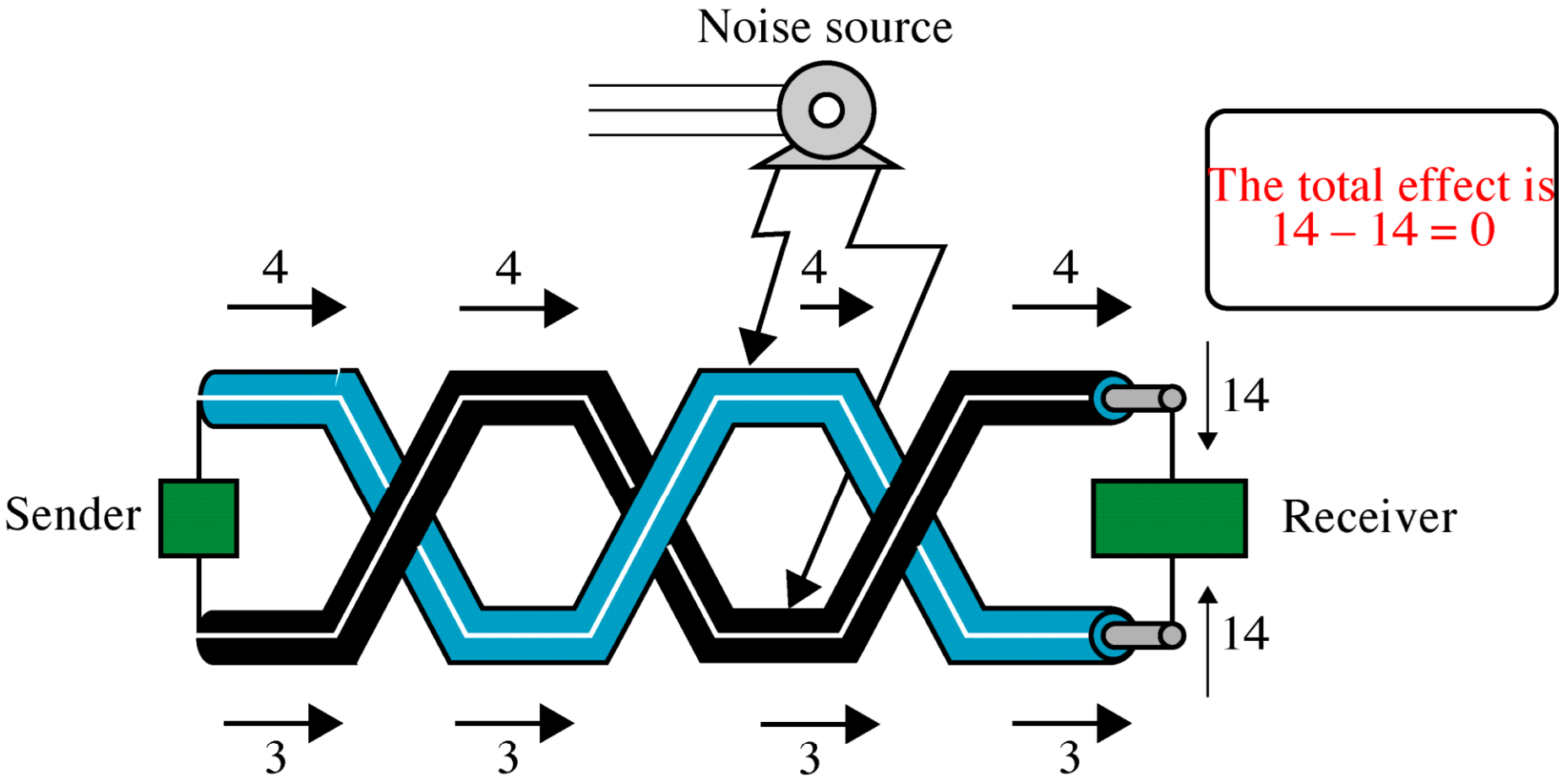
Twisted Pair and Coax use metallic(Copper) conductors that accept and transport the signals in the form of Electrical Current.



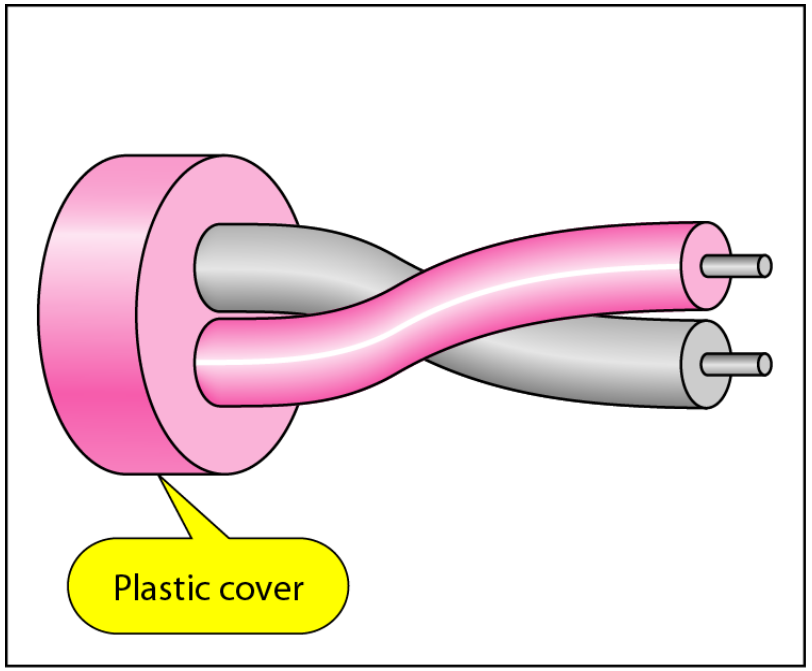
Effect of Noise on Parallel Lines



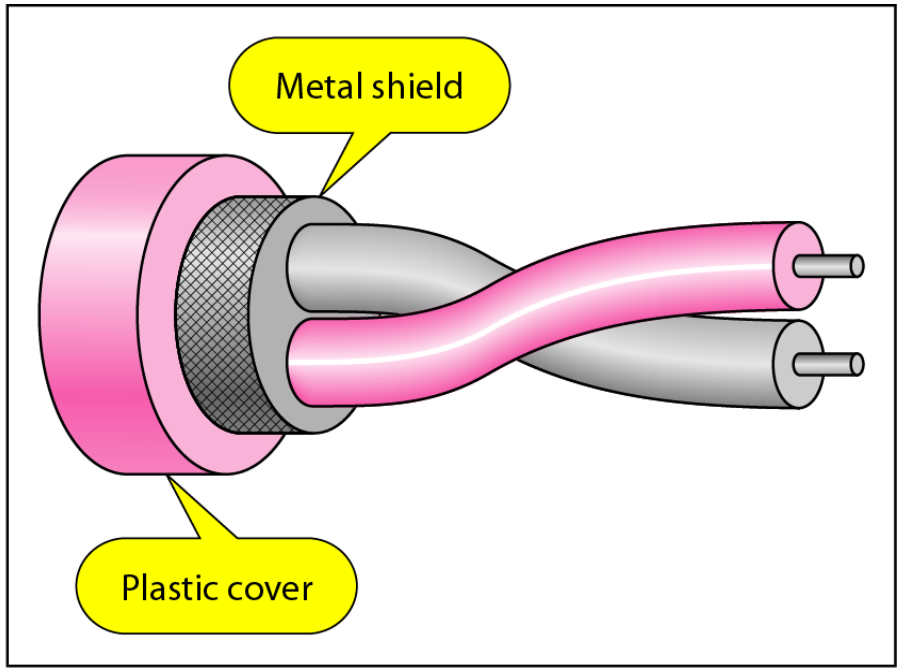
Noise on Twisted-Pair Lines



UTP and STP cables



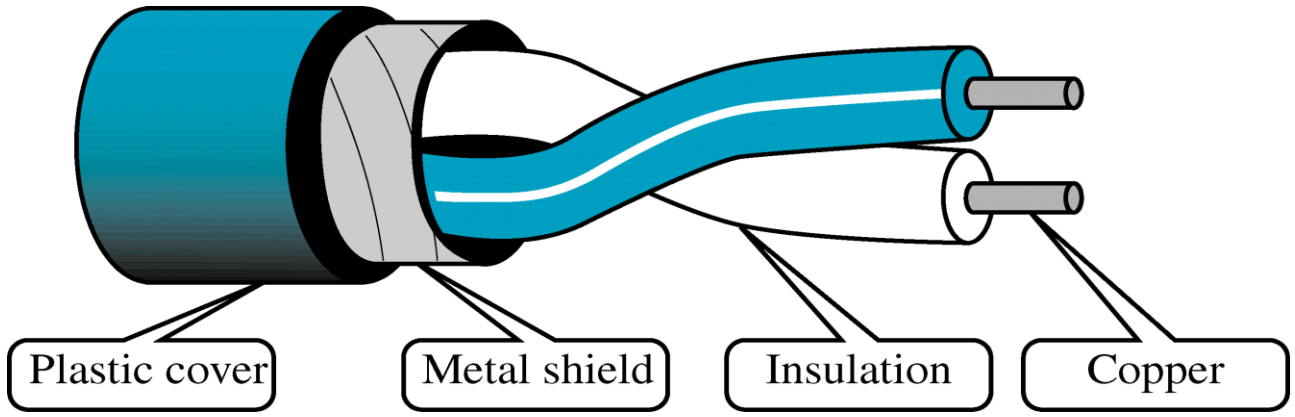
a. UTP



b. STP

Shielded Twisted-Pair Cable

- Metal casing prevents the penetration of electromagnetic noise.
- Eliminate the phenomenon , called CROSSTALK



Type	No of Pairs	Transmission Rate	Implementation
Category 1	1	Voice Grade	• used in telephone industry • not suitable for long distance data transmission(used only for short distance)
Category 2	2	4 Mbps	• used for both data and voice transmission
Category 3	4	10 Mbps	• required 3 twist per foot • used for 10 base networks. • used for voice • communication
Category 4	4	16 Mbps	• required 3 twist per foot • used in IBM token ring networks
Category 5	4	100 Mbps	• used in Ethernet and 100 Base-X networks
Category 6	4	100 Mbps and higher	• used in Ethernet and 1000 Base-X networks

Advantages :

1. Cheaper
2. Less susceptible to electrical interference caused by nearby equipment or wires.
3. In turn are less likely to cause interference themselves.
4. Because it is electrically "cleaner", STP wire can carry data at a faster speed.

Disadvantages :

1. STP wire is that it is physically larger and more expensive than twisted pair wire.

Unshielded Twisted-Pair Cable

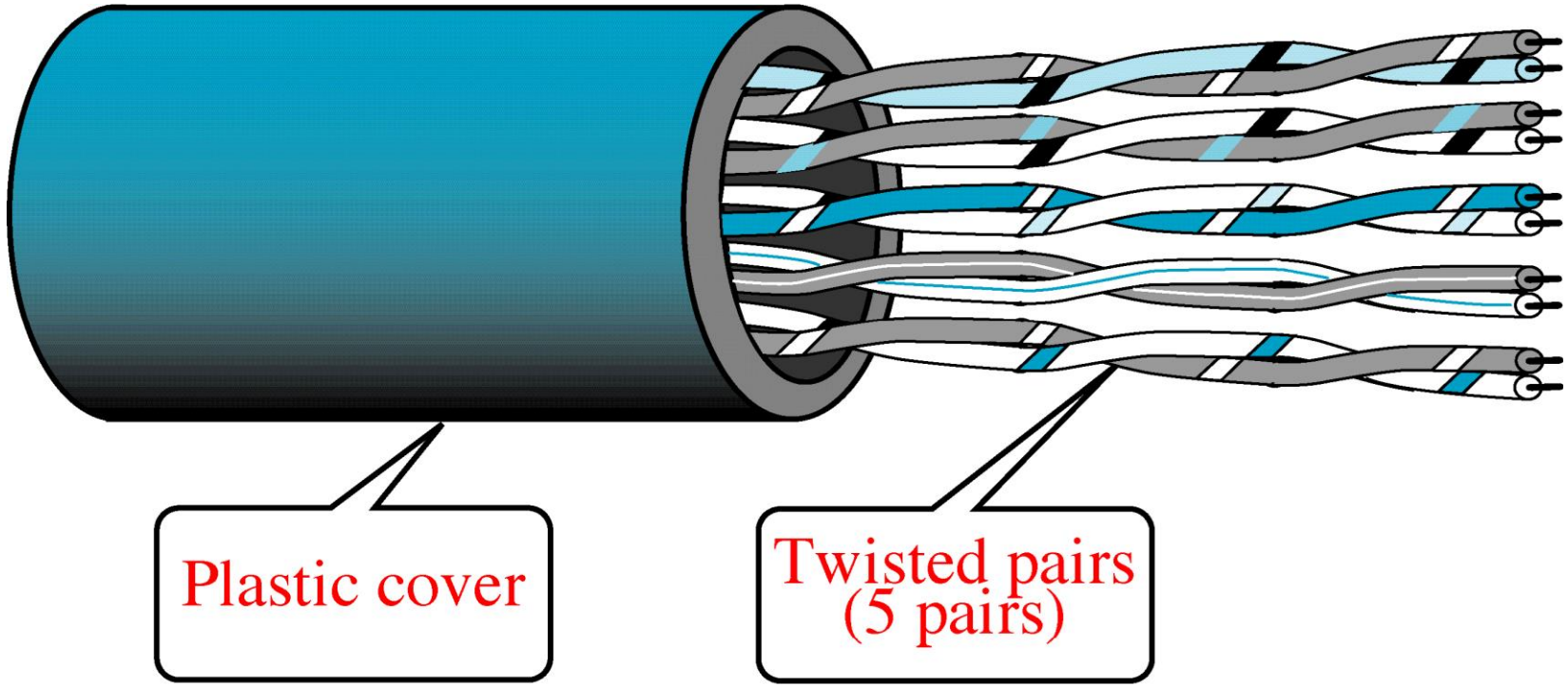
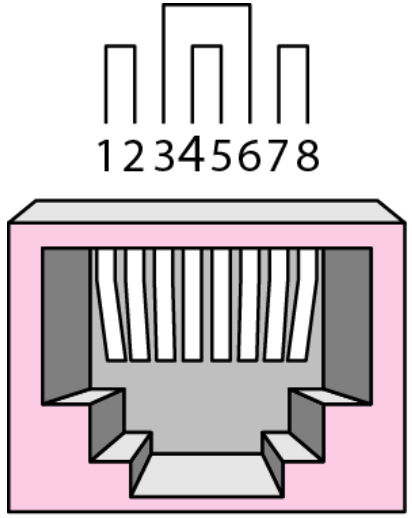


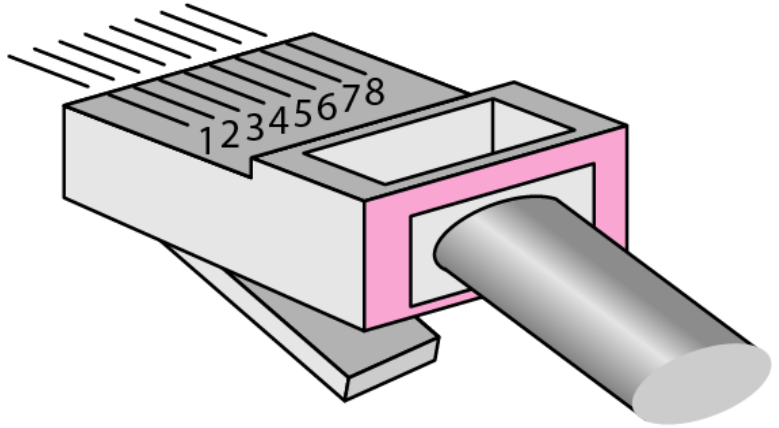
Table 7.1 *Categories of unshielded twisted-pair cables*

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

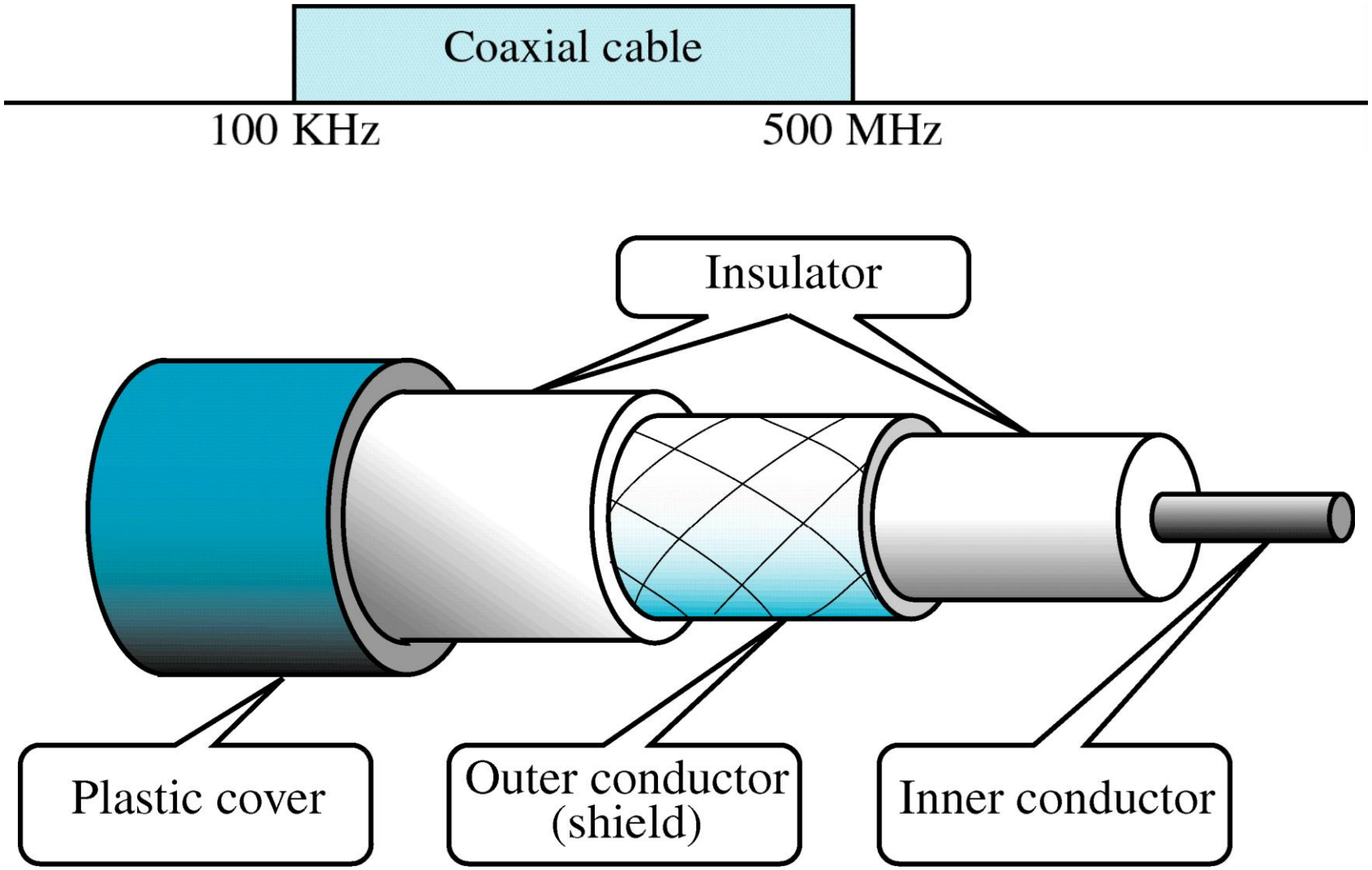


RJ-45 Female



RJ-45 Male

Coaxial Cable



Two kinds of coaxial cable

- ✓ One kind, 50-ohm cable, is commonly used when it is intended for digital transmission from the start.
- ✓ The other kind, 75-ohm cable, is commonly used for analog transmission and cable television.
  - ✓ Cable TV operators began to provide Internet access over cable, which has made 75-ohm cable more important for data communication.

- High bandwidth
- Excellent noise immunity.
- The bandwidth possible depends on the cable quality and length.
- Used within the telephone system, cable television and MAN
- For long-distance lines, but have now replaced by fiber optics on long distance routes.

Categories of coaxial cables

Category	*Impedance*	*Use*
RG-59	75 Ω	Cable TV
RG-58	50 Ω	Thin Ethernet
RG-11	50 Ω	Thick Ethernet

RG-59 (***RADIO GUIDE***) used for low-power video and RF signal
RG-58 (***RADIO GUIDE***) used for low-power video and RF signal
RG-11 (***RADIO GUIDE)***Wide Broadband with considerable signal transmission distance

Optical Fiber Cable

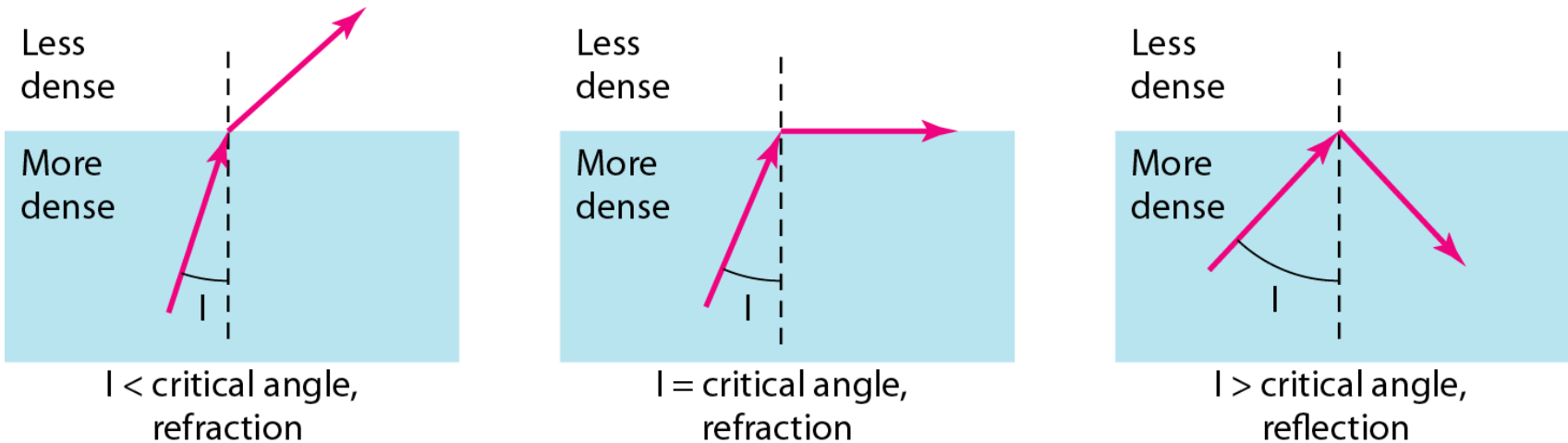
Optical Fiber is a **glass or plastic** cable that accept and transport the signals in the form of Light.

Advantages:

- Noise Resistance
- Less Signal Attenuation
- Higher BW

Disadvantages:

- Cost
- Installation/Maintenance
- Fragility(Broken Wire)

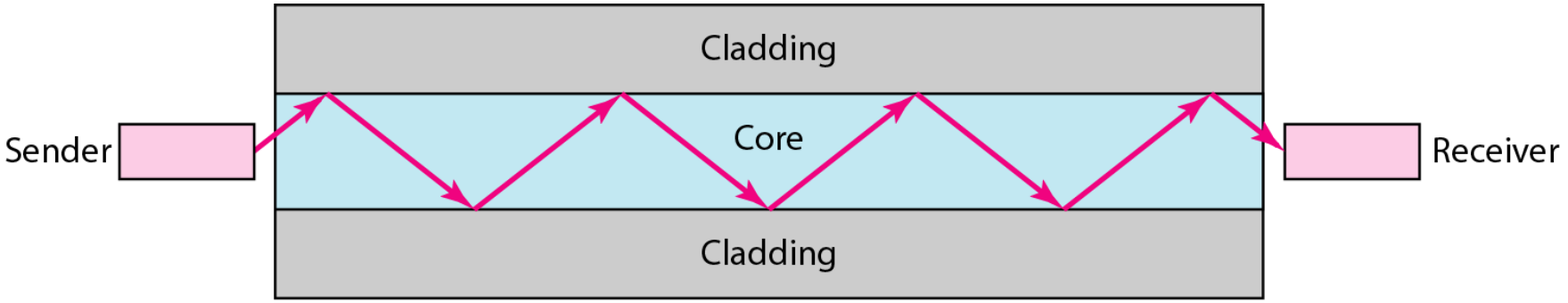

Less dense
More dense
I
I < critical angle, refraction
Less dense
More dense
I
I = critical angle, refraction
Less dense
More dense
I
I > critical angle, reflection

POLL 3

- For Total internal reflection to take place

a) Incidence angle > critical angle
b) Incidence angle < critical angle
c) Incidence angle = critical angle
d) Independent of Incidence angle and critical angle

Optical fiber



POLL-4

- Light transmission takes place at

a) Cladding

b) Core