

PROJECT

KOMUNIKASI DATA

SUSMINI INDRIANI LESTARININGATI, M.T

DATE

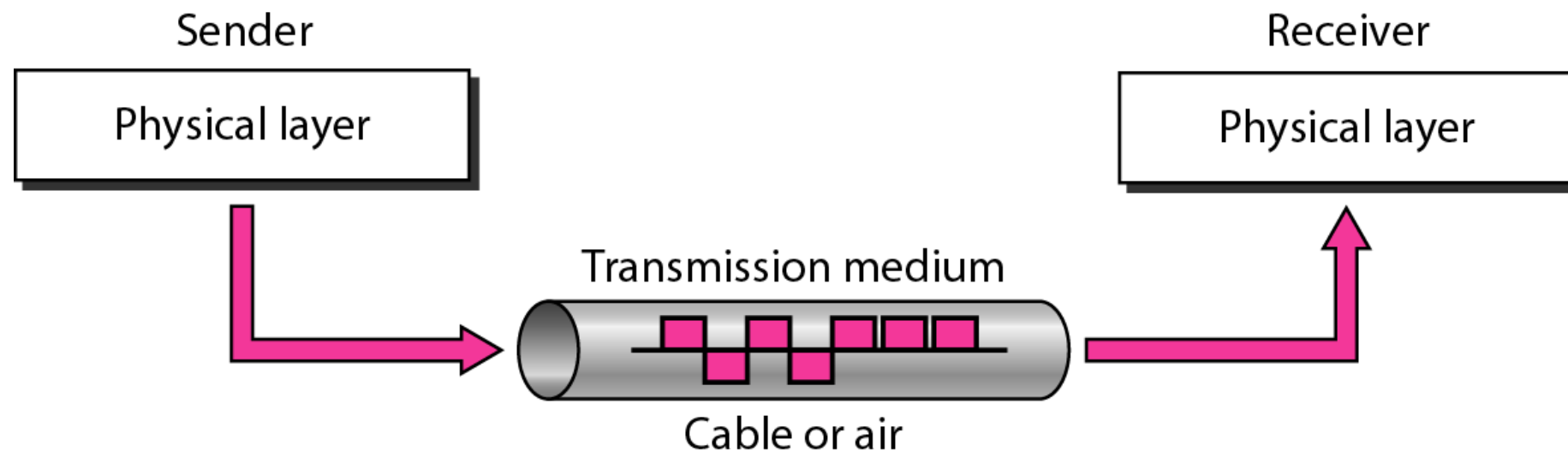
GENAP 2013/2014

MATERI

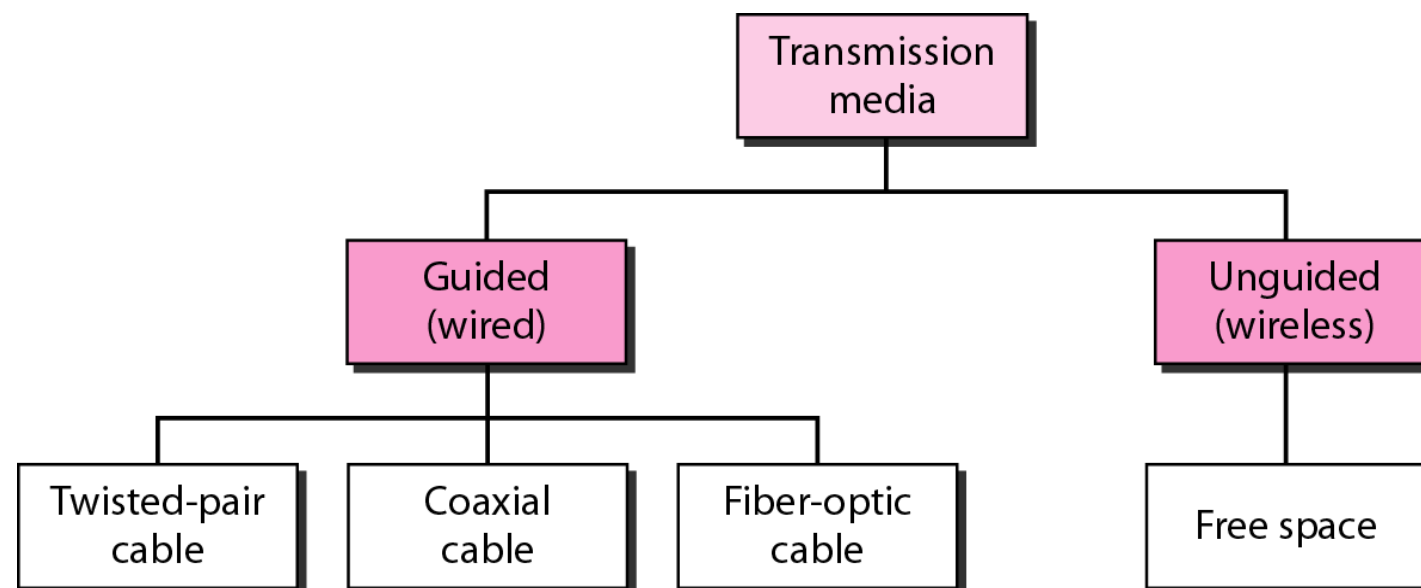
11. TRANSMISSION MEDIA

Medium Transmisi dan Physical Layer

- Transmission media are actually located below the physical layer and directly controlled by the physical layer

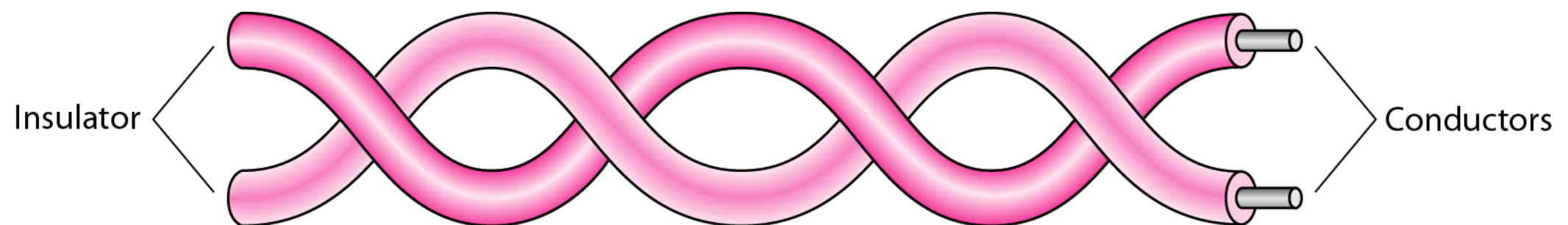


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- Transmission media divided into two categories:
 - **Guided Media:** Guided media, which are those that provide a conduit from one device to another, include **twisted-pair cable, coaxial cable, and fiber-optic cable.**
 - **Unguided Media:** Unguided media transport electromagnetic waves without using a physical conductor. This type of communication is often referred to as wireless communication.



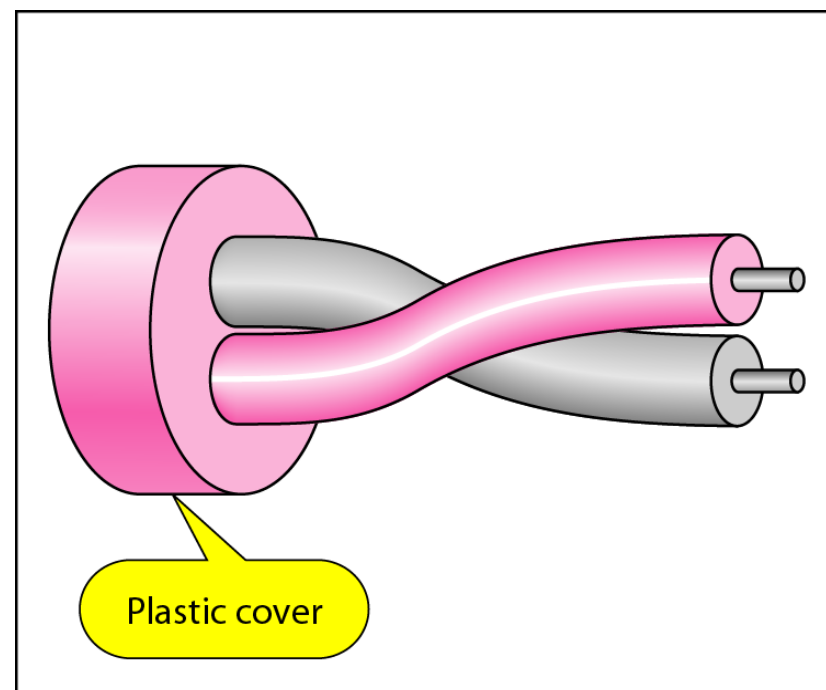
Guided Media - Twisted Pair Cable

- A twisted pair consist of two conductors (normally coppers), each with its own plastic insulation, twitted together.
- One of the wires is used to carry signal to the receiver, and the other is used only as a ground references

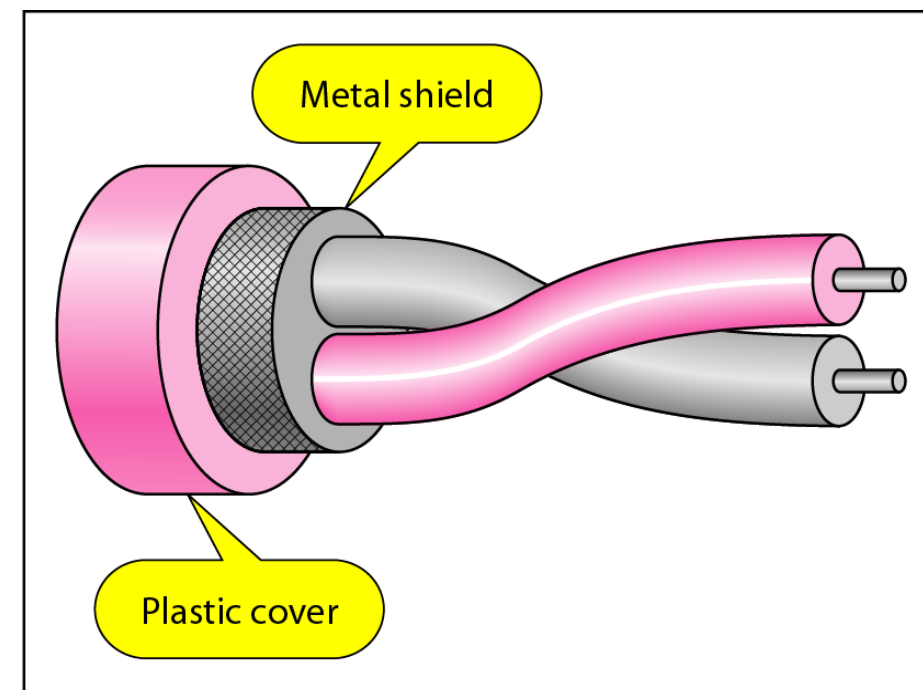


Unshielded vs Shielded Twisted Pair Cable

- Twisted Pair Cable:
 - Unshielded Twisted Pair (UTP)
 - Shielded Twisted Pair (STP)



a. UTP

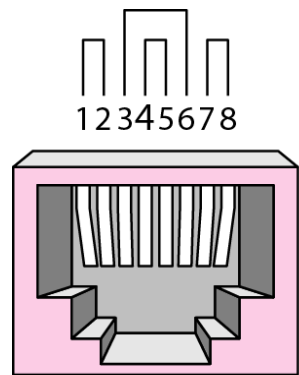


b. STP

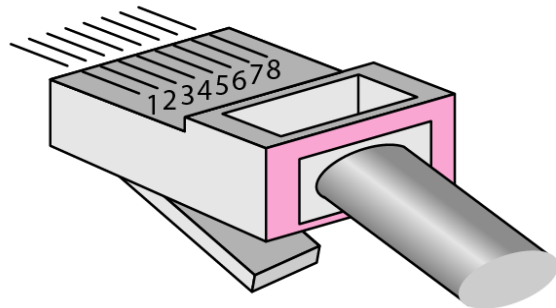
EIA standards of UTP Cable

<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-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

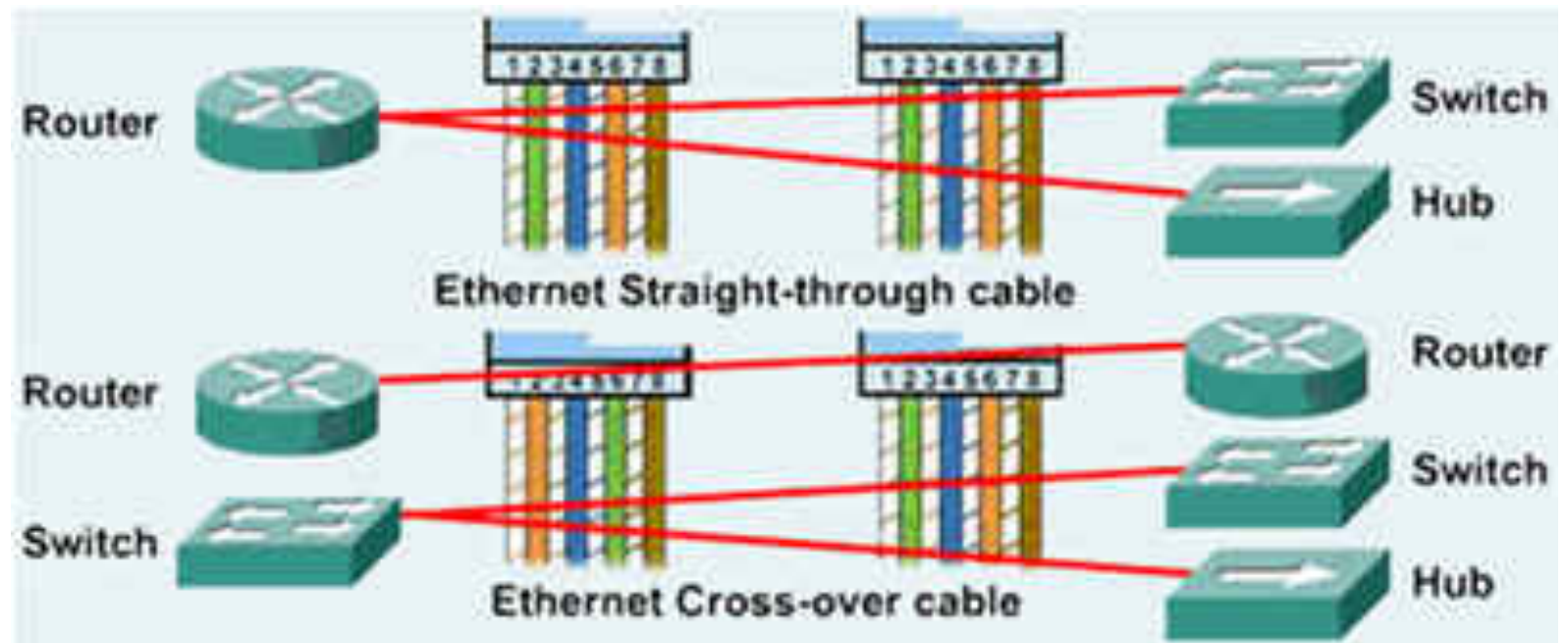
The most common UTP (cat 5)



RJ-45 Female

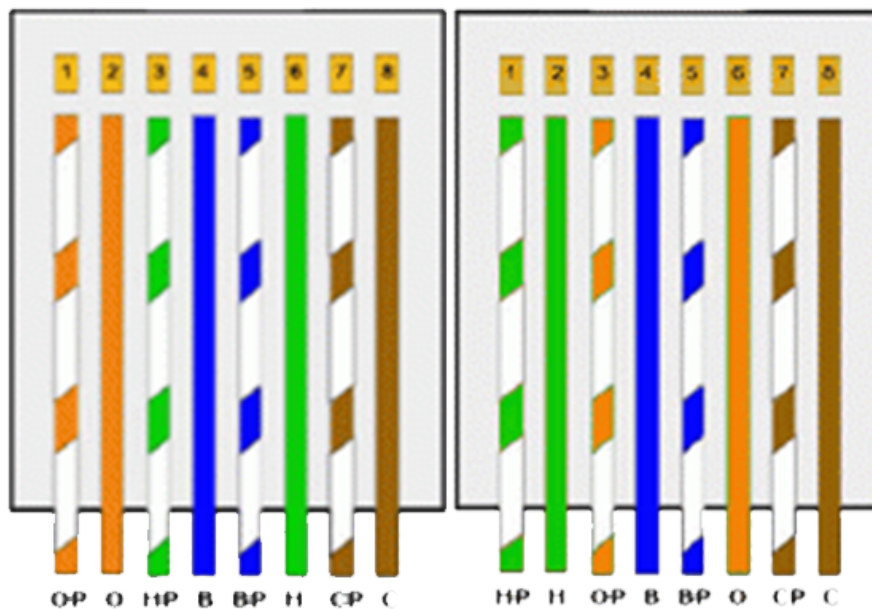


RJ-45 Male



KABEL STRAIGHT

KABEL CROSS

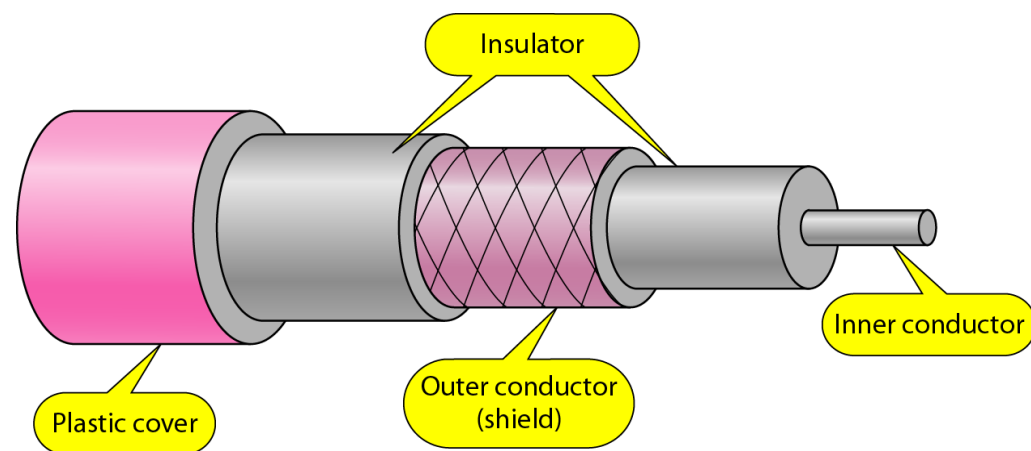


Applications

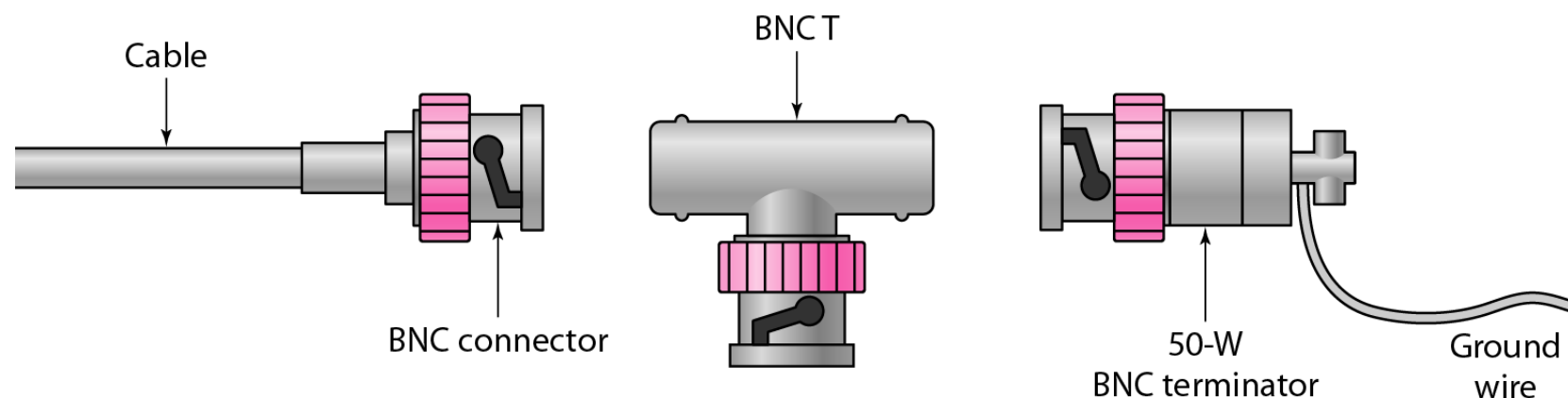
- Twisted-pair cables are used in telephone lines to provide voice and data channels. The local loop-the line that connects subscribers to the central telephone office commonly consists of unshielded twisted-pair cables.
- The DSL lines that are used by the telephone companies to provide high-data-rate connections also use the high-bandwidth capability of unshielded twisted-pair cables.
- Local-area networks, such as 10Base-T and 100Base-T, also use twisted-pair cables.

Guided Media - Coaxial Cable

- Coaxial cable (or coax) carries signals of higher frequency ranges than those in twisted- pair cable.
- Coaxial cables are categorised by their **radio government (RG)** ratings. Each RG number denotes a unique set of physical specifications

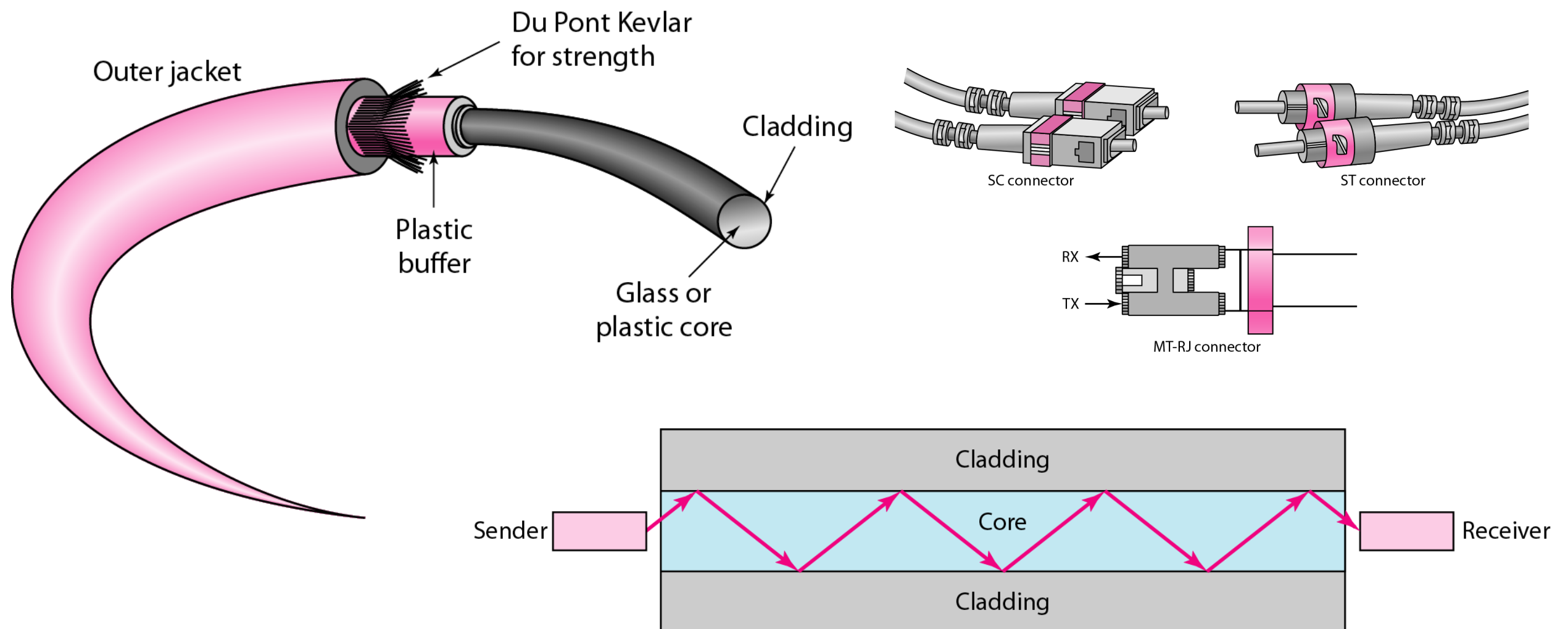


<i>Category</i>	<i>Impedance</i>	<i>Use</i>
RG-59	75 Ω	Cable TV
RG-58	50 Ω	Thin Ethernet
RG-11	50 Ω	Thick Ethernet



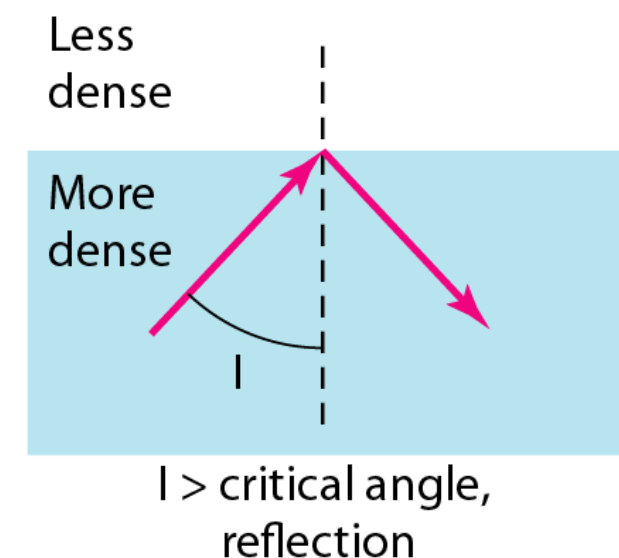
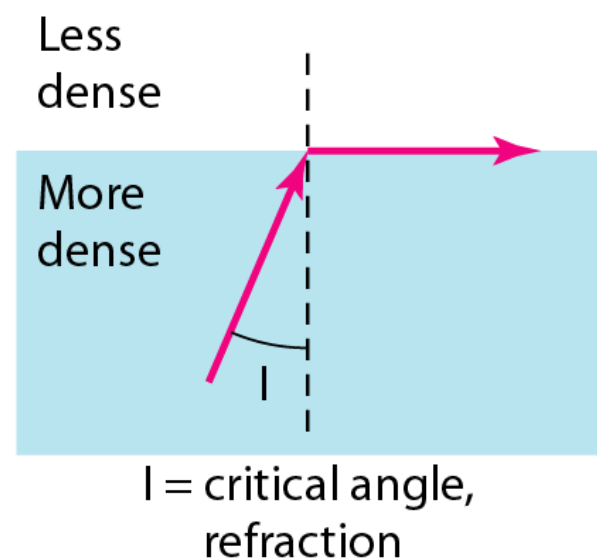
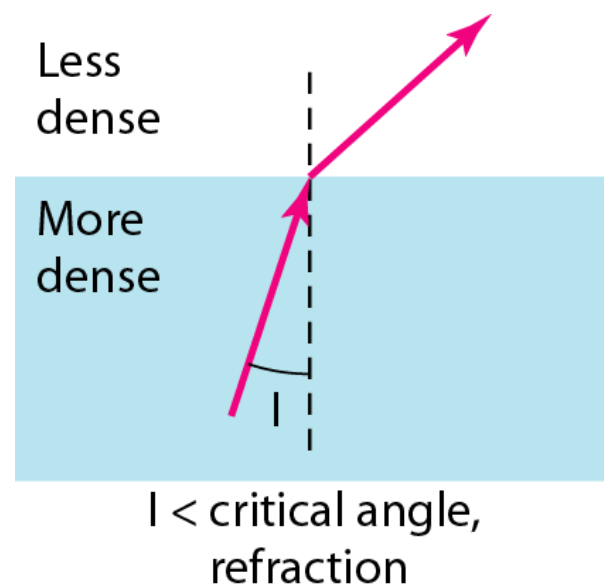
Guided Media - Optical Fiber

- A fiber-optic cable is made of glass or plastic and transmits signals in the form of light. To understand optical fiber, we first need to explore several aspects of the nature of light.

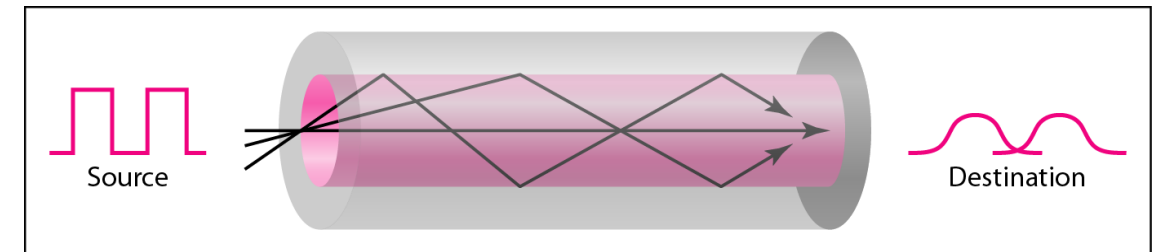
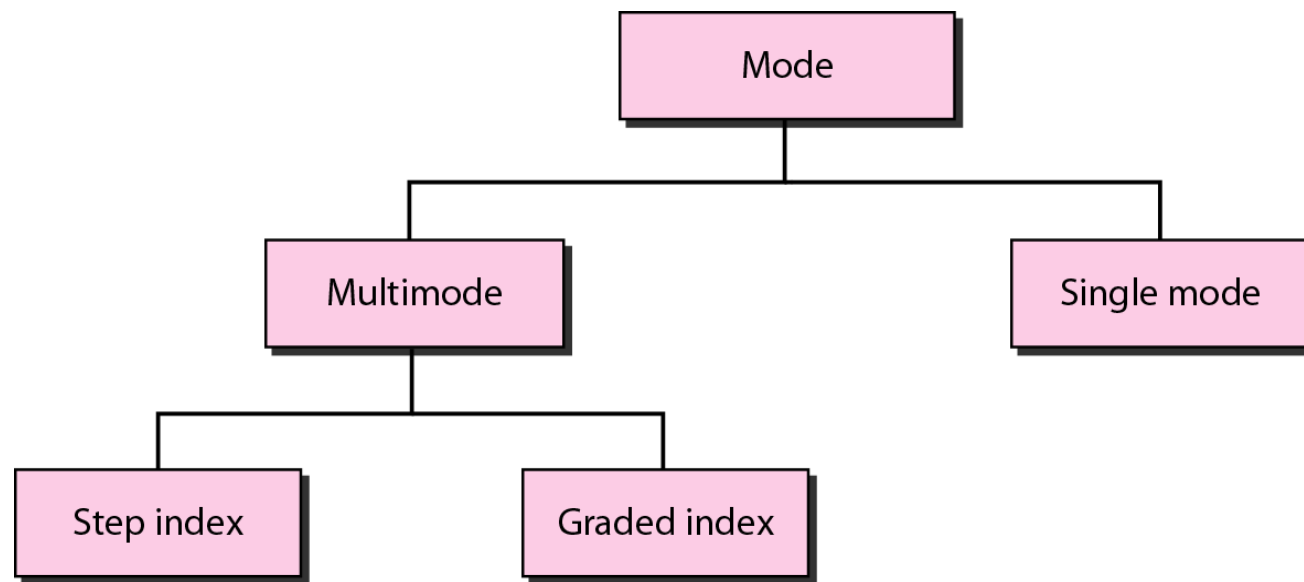


Nature of Light

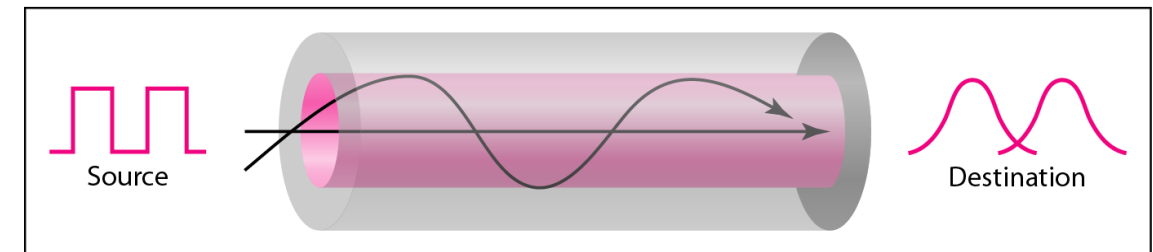
- Light travels in a straight line as long as it is moving through a single uniform substance. If a ray of light traveling through one substance suddenly enters another substance (of a different density), the ray changes direction. Figure below shows how a ray of light changes direction when going from a more dense to a less dense substance.



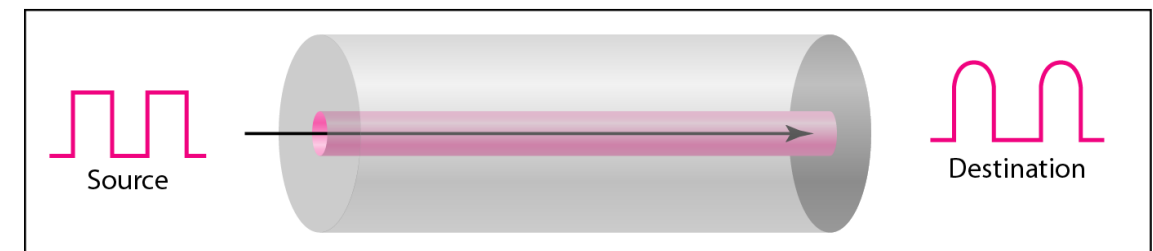
Fiber Types



a. Multimode, step index



b. Multimode, graded index

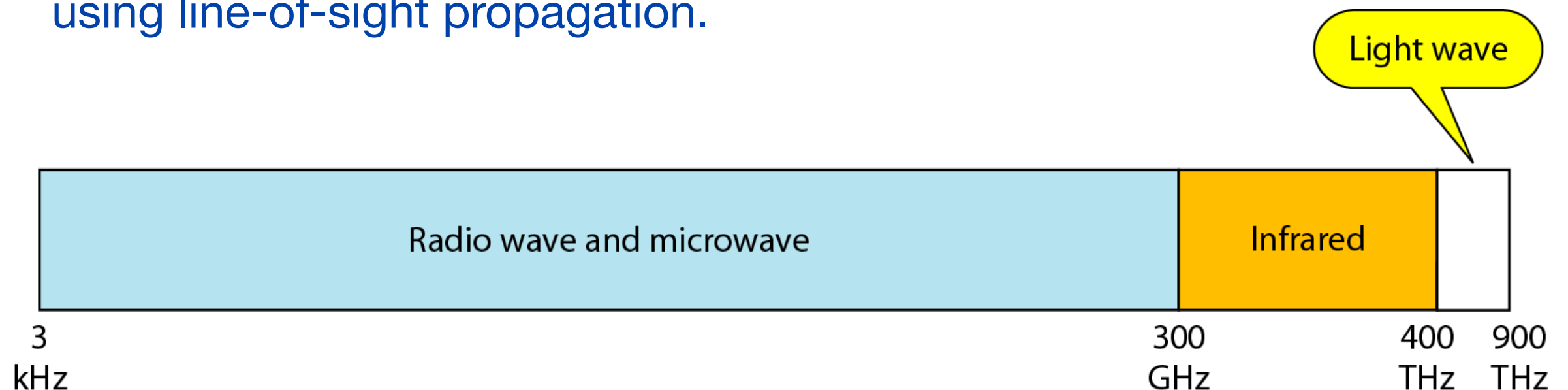


c. Single mode

<i>Type</i>	<i>Core (μm)</i>	<i>Cladding (μm)</i>	<i>Mode</i>
50/125	50.0	125	Multimode, graded index
62.5/125	62.5	125	Multimode, graded index
100/125	100.0	125	Multimode, graded index
7/125	7.0	125	Single mode

Unguided Media

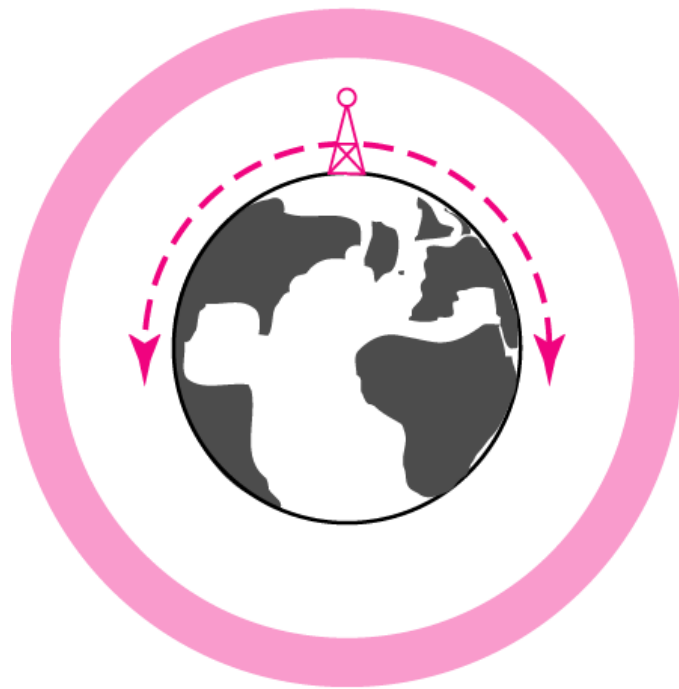
- Unguided Media:
 - **Radio waves**, are used for multicast communications, such as radio and television, and paging systems.
 - **Microwaves**, are used for unicast communication such as cellular telephones, satellite networks, and wireless LANs.
 - **Infra Red**, can be used for short-range communication in a closed area using line-of-sight propagation.



<i>Band</i>	<i>Range</i>	<i>Propagation</i>	<i>Application</i>
VLF (very low frequency)	3–30 kHz	Ground	Long-range radio navigation
LF (low frequency)	30–300 kHz	Ground	Radio beacons and navigational locators
MF (middle frequency)	300 kHz–3 MHz	Sky	AM radio
HF (high frequency)	3–30 MHz	Sky	Citizens band (CB), ship/aircraft communication
VHF (very high frequency)	30–300 MHz	Sky and line-of-sight	VHF TV, FM radio
UHF (ultrahigh frequency)	300 MHz–3 GHz	Line-of-sight	UHF TV, cellular phones, paging, satellite
SHF (superhigh frequency)	3–30 GHz	Line-of-sight	Satellite communication
EHF (extremely high frequency)	30–300 GHz	Line-of-sight	Radar, satellite

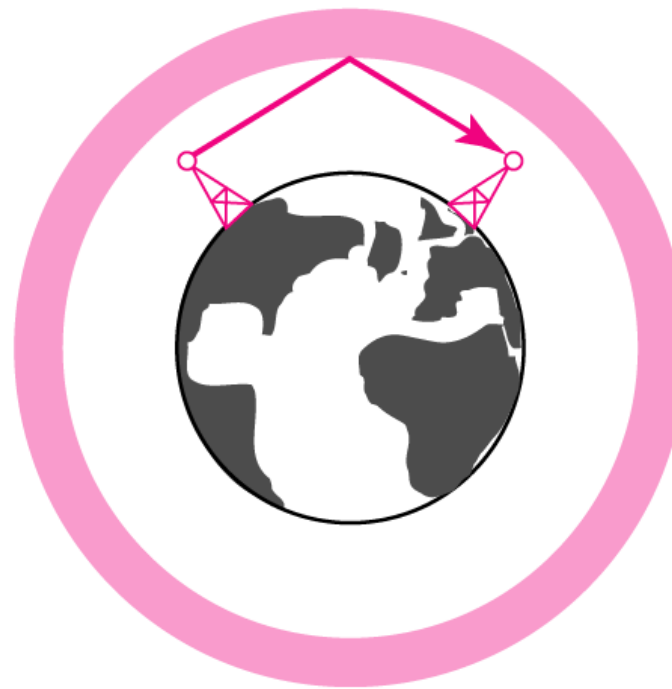
Propagation

Ionosphere



Ground propagation
(below 2 MHz)

Ionosphere



Sky propagation
(2–30 MHz)

Ionosphere



Line-of-sight propagation
(above 30 MHz)