SAXONY EGYPT UNIVERSITY
FOR APPLIED SCIENCE AND TECHNOLOGY

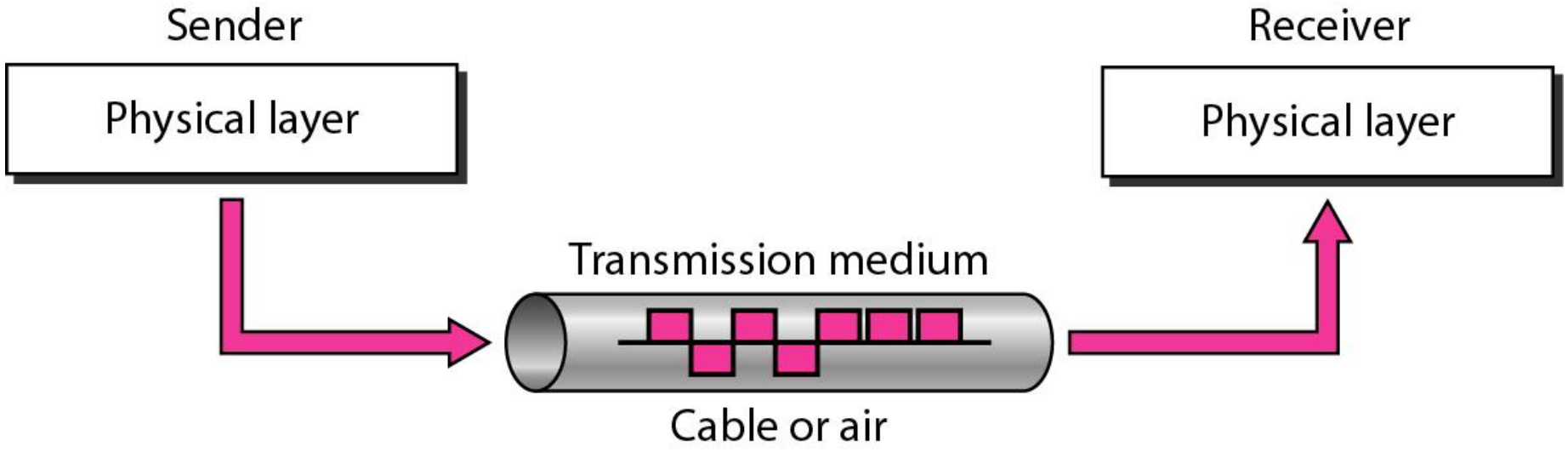
Networks and Communications Technologies

Course code: ECT 141

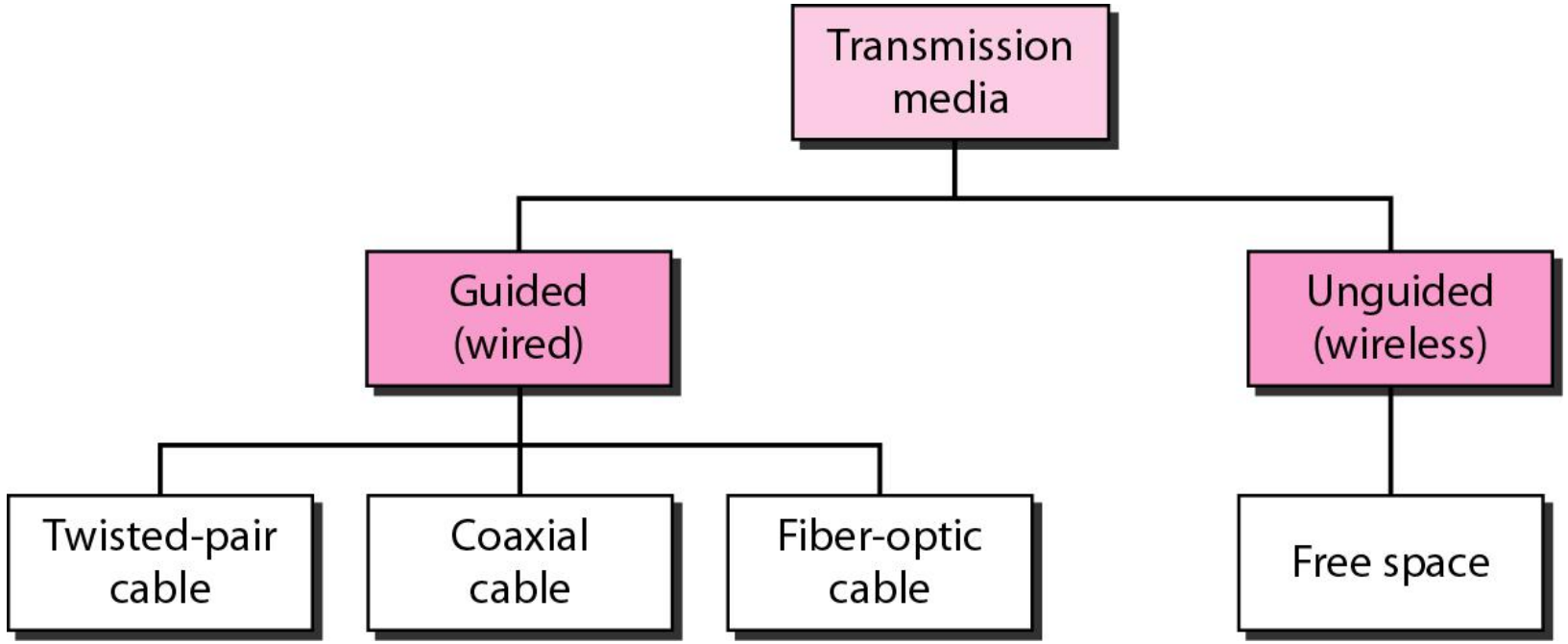
Lecture (5) Transmission Media

INTRODUCED BY: DR. SARA MAHMOUD

Transmission medium and physical layer



Classes of transmission media



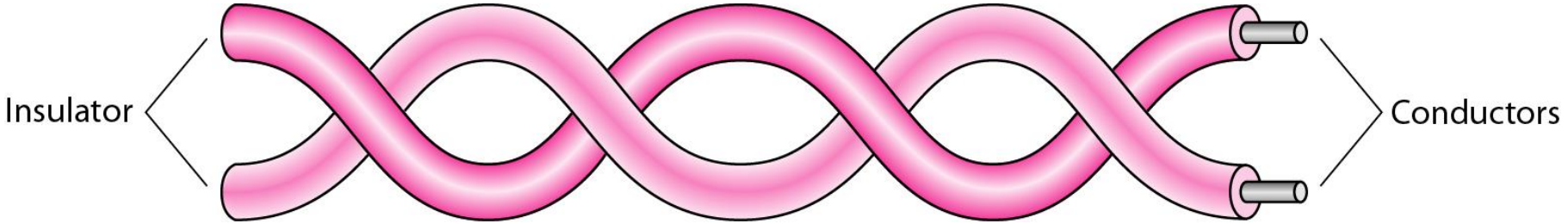
1) GUIDED MEDIA

Guided media, which are those that provide a conduit from one device to another, include twisted-pair cable, coaxial cable, and fiber-optic cable.

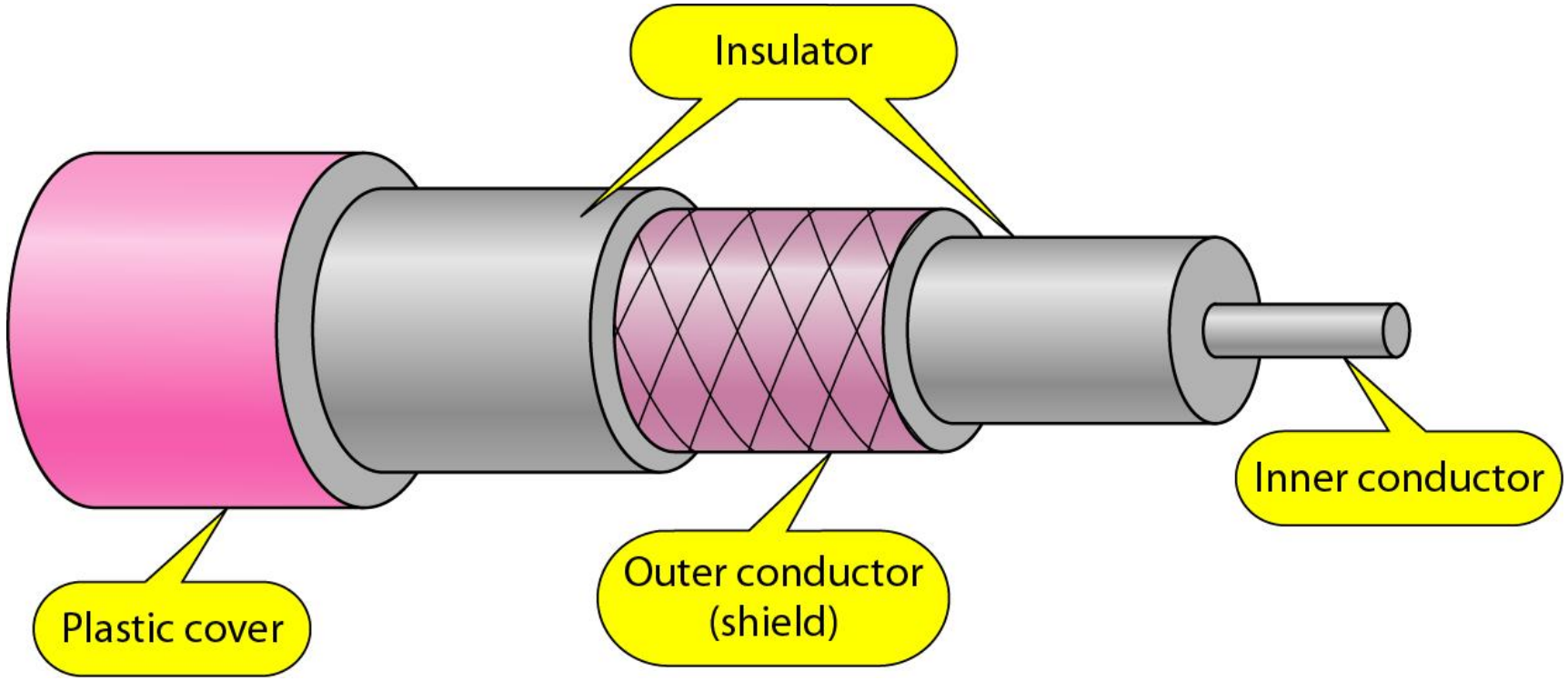
Topics discussed in this section:

Twisted-Pair Cable
Coaxial Cable
Fiber-Optic Cable

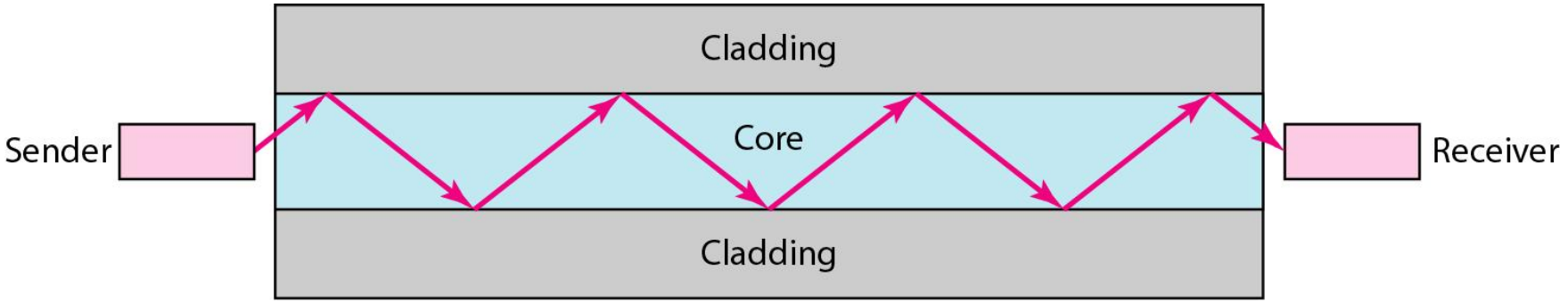
1-1) Twisted-pair cable



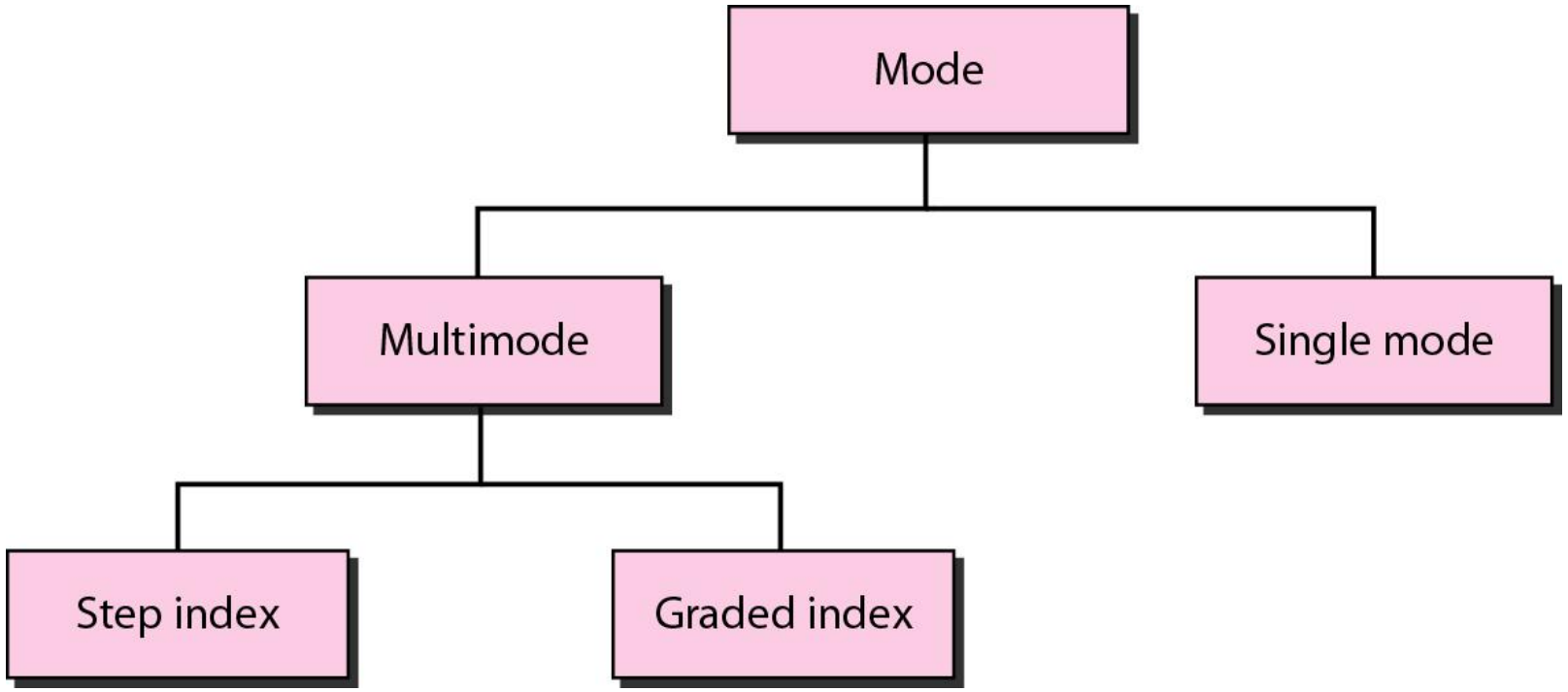
1-2) Coaxial cable



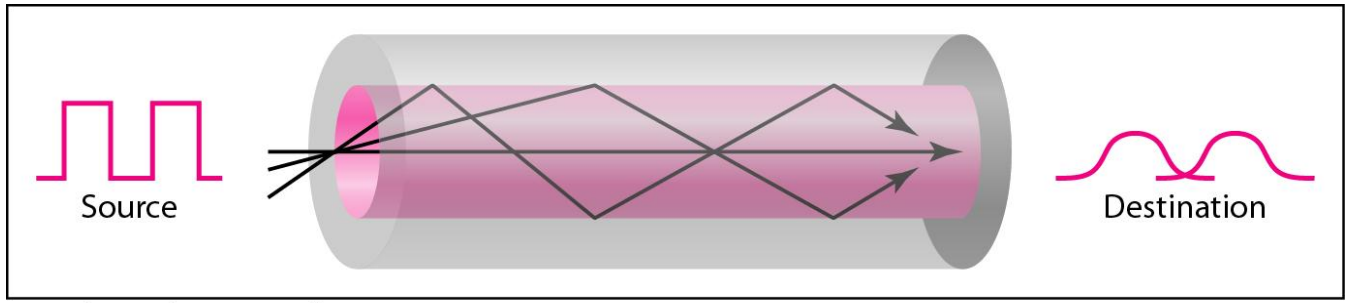
1-3) Optical fiber



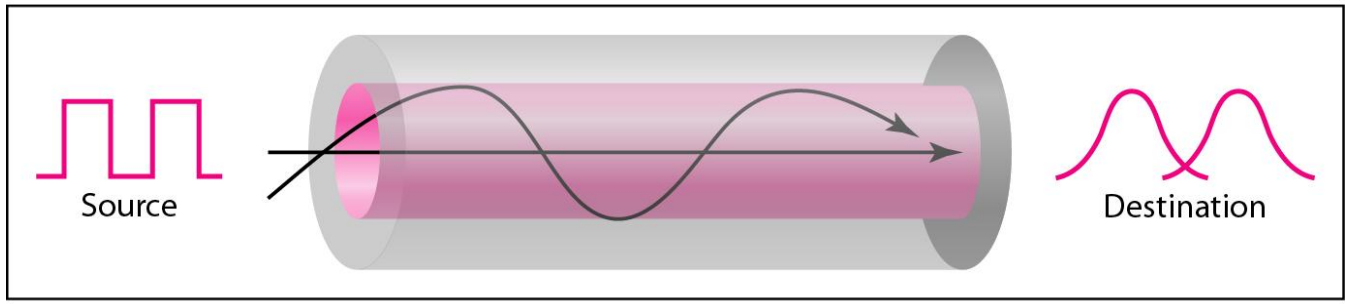
1-3) Optical Fiber Propagation modes (Cont.)



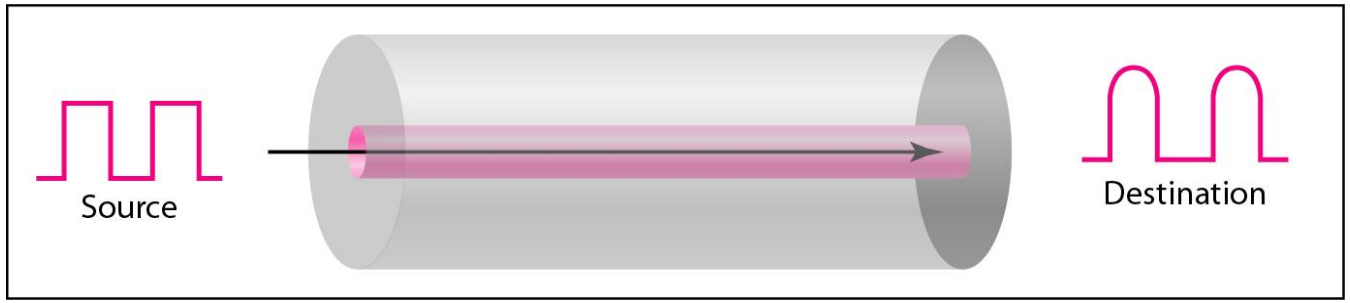
1-3) Optical Fiber Modes (Cont.)



a. Multimode, step index



b. Multimode, graded index



c. Single mode

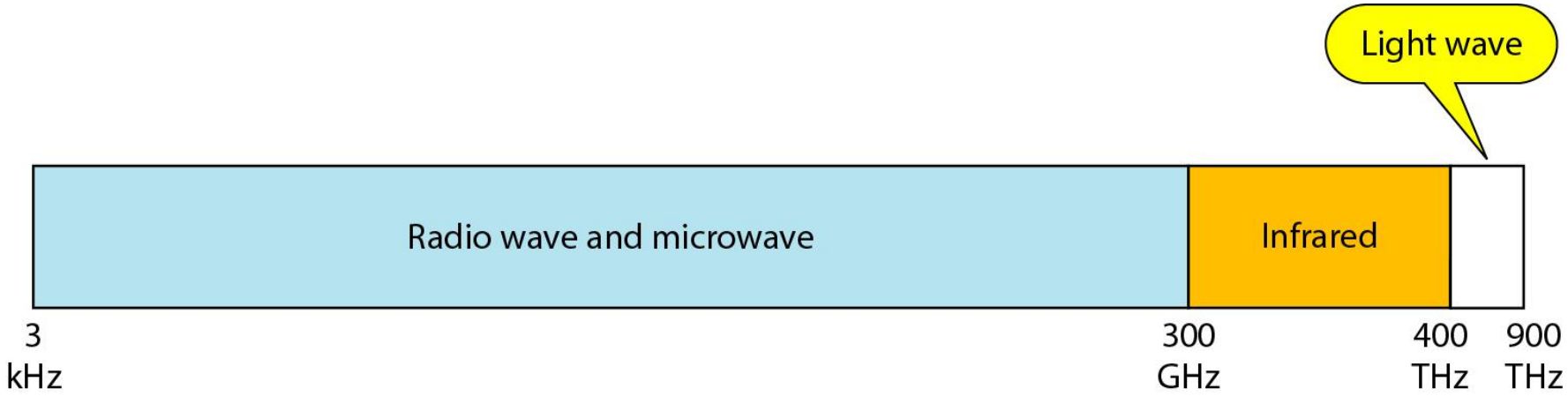
2) UNGUIDED MEDIA: WIRELESS

Unguided media transport electromagnetic waves without using a physical conductor. This type of communication is often referred to as wireless communication.

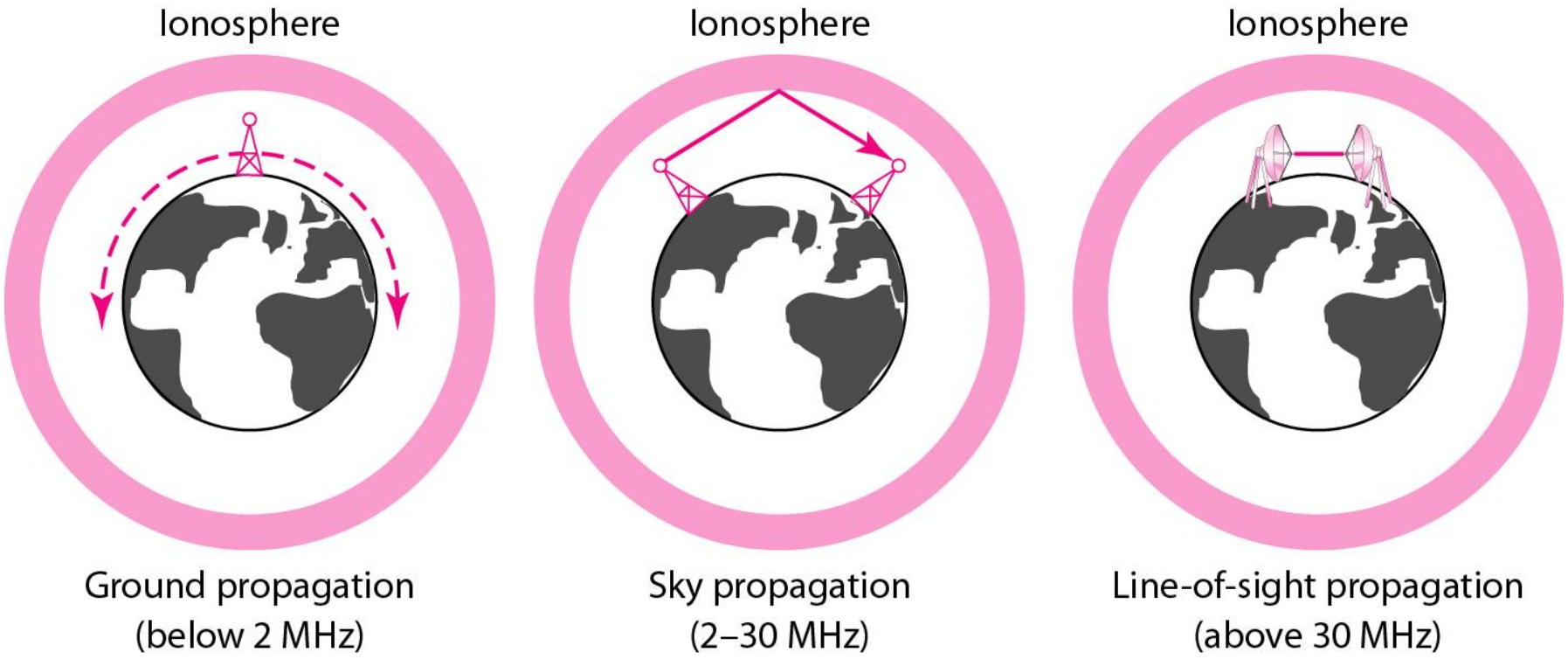
Topics discussed in this section:

Radio Waves
Microwaves
Infrared

2-1) Electromagnetic spectrum for wireless communication



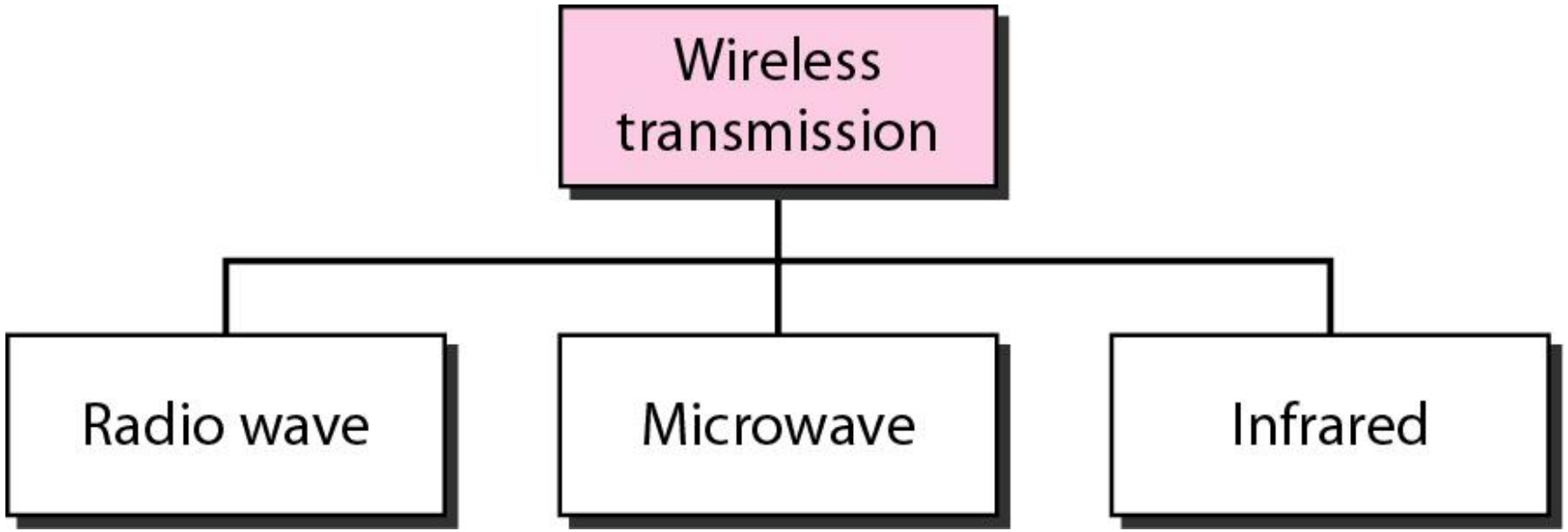
2-1) Propagation methods (Cont.)



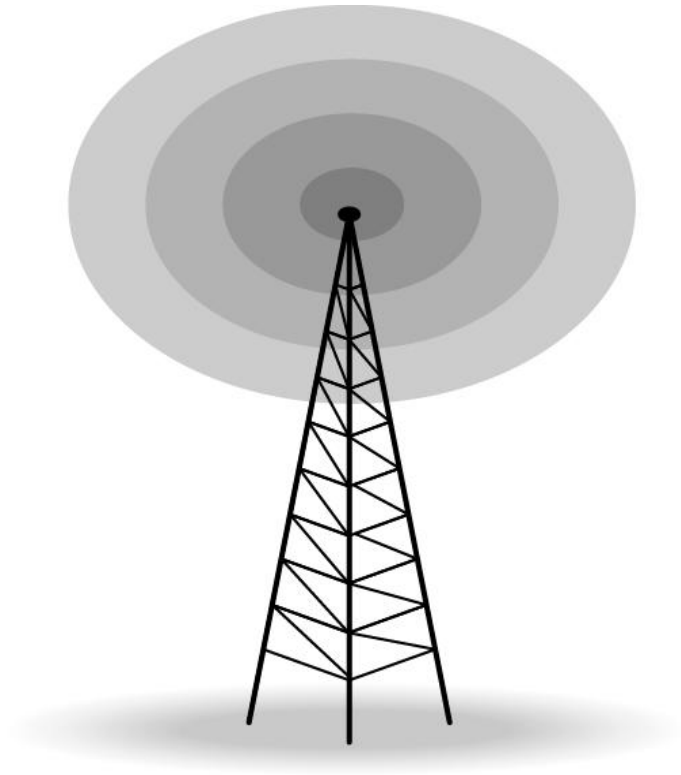
2-1) Bands (Cont.)

Band	*Range*	*Propagation*	*Application*
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

2-2) Wireless transmission waves



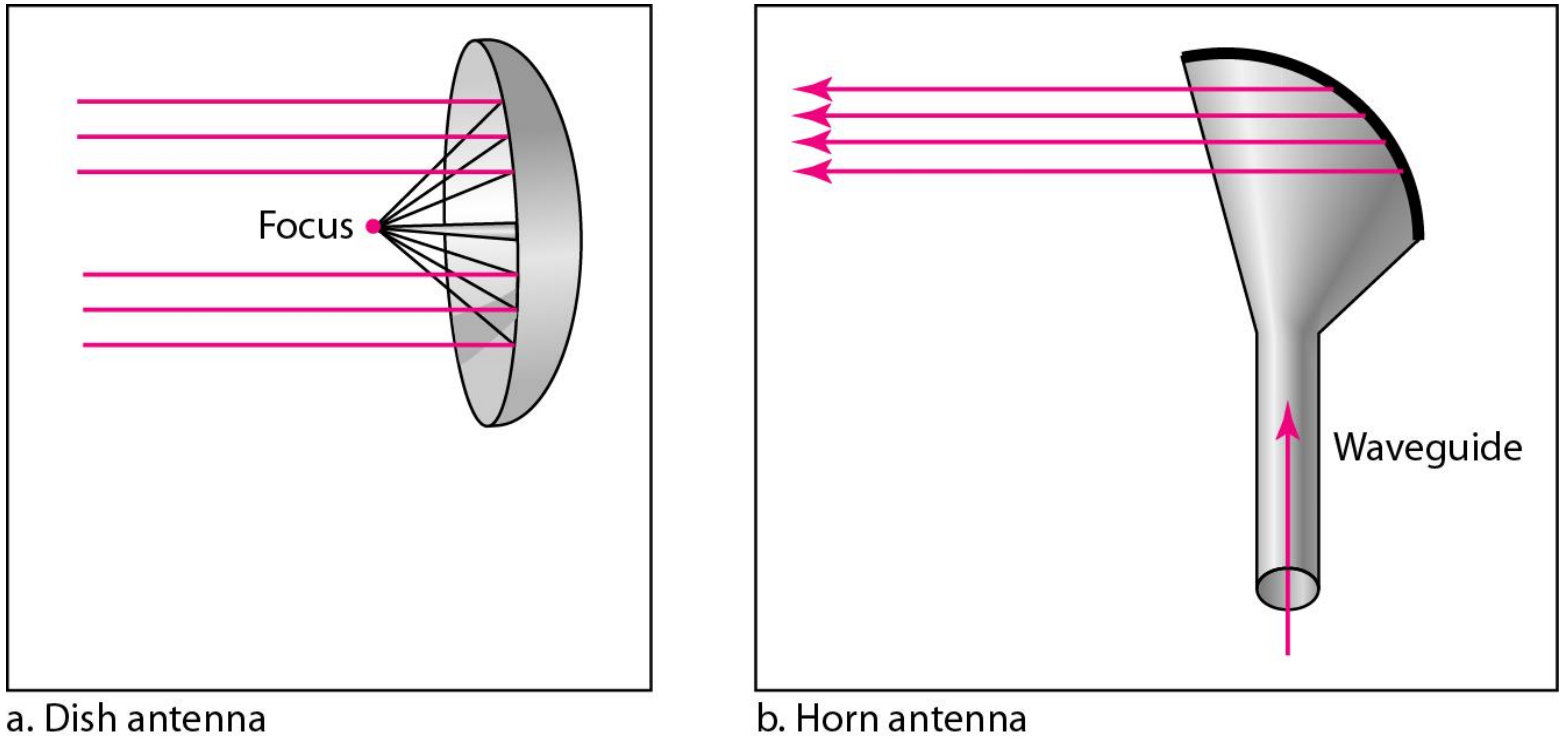
Omnidirectional antenna



Note

Radio waves are used for multicast communications, such as radio and television, and paging systems.

Figure 7.21 *Unidirectional antennas*



a. Dish antenna

b. Horn antenna

Note

Microwaves are used for unicast communication such as cellular telephones, satellite networks,
and wireless LANs.

Note

Infrared signals can be used for short-range communication in a closed area using line-of-sight propagation.