
Introduction to networks and protocols

Dr. John Sum

Institute of Electronic Commerce
National Chung Hsing University

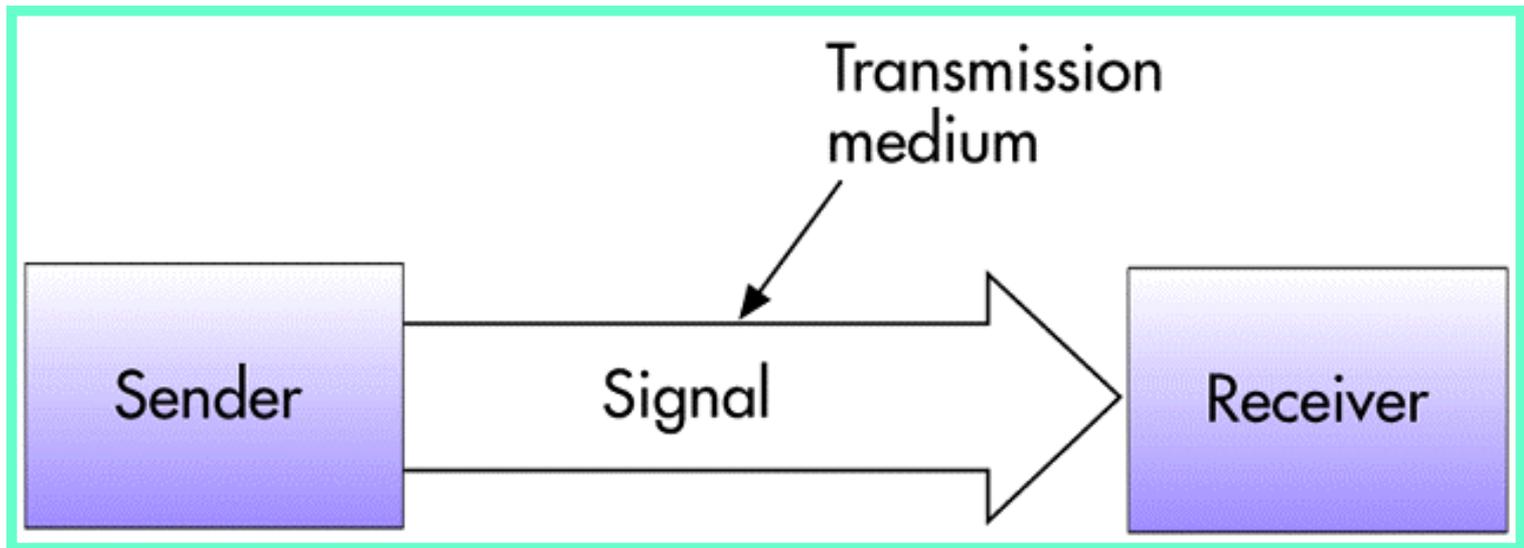
Extended by *Ass. Prof. J. Y. Tigli*
University of Nice Sophia Antipolis

Communication

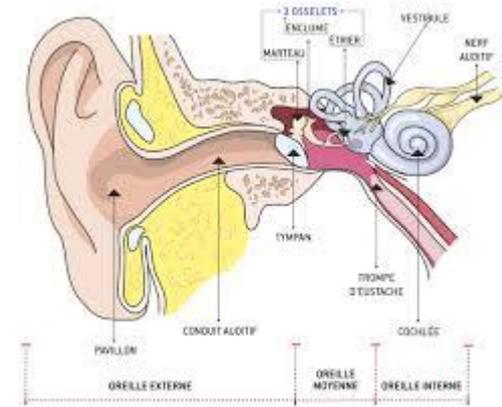
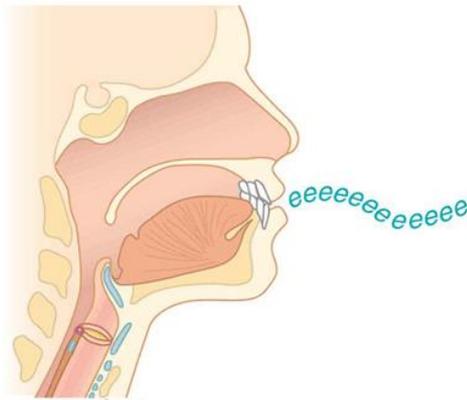
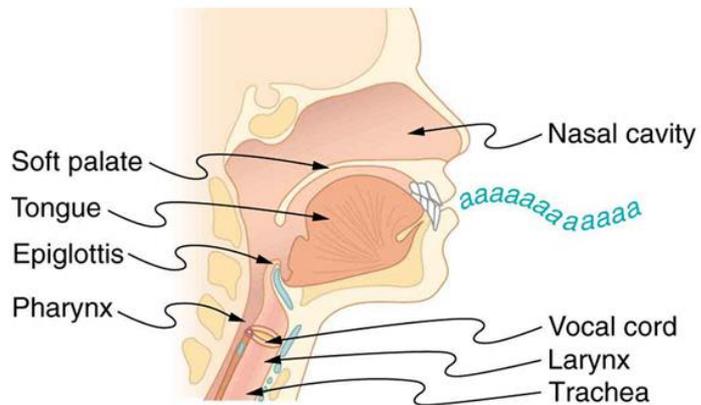
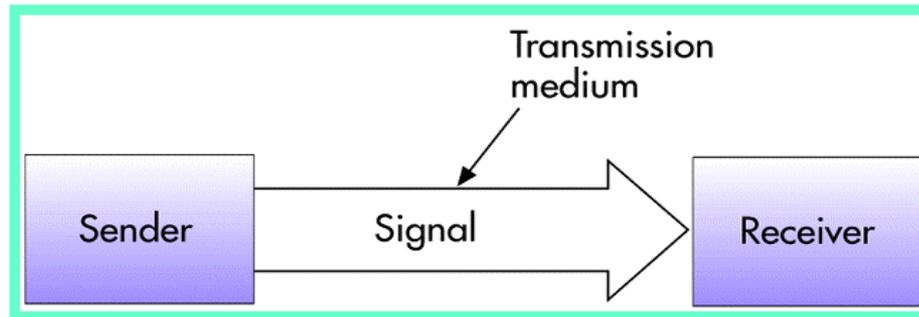
First step for all ... even for humans communications

Communications

- Communications
 - The message (data and information) is communicated via the signal. The transmission medium “carries” the signal.

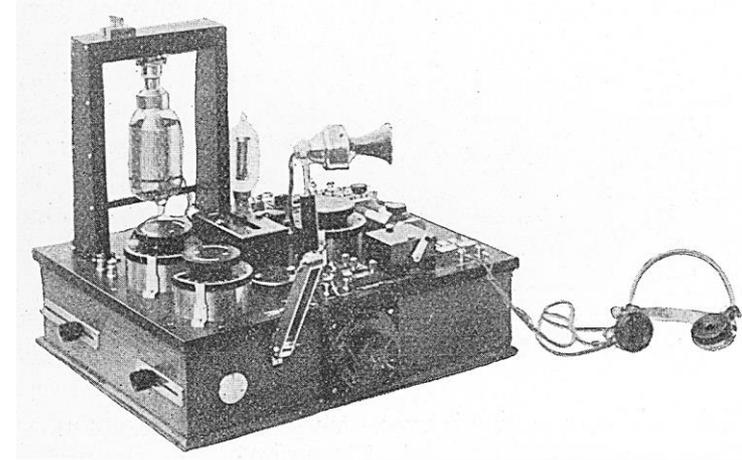
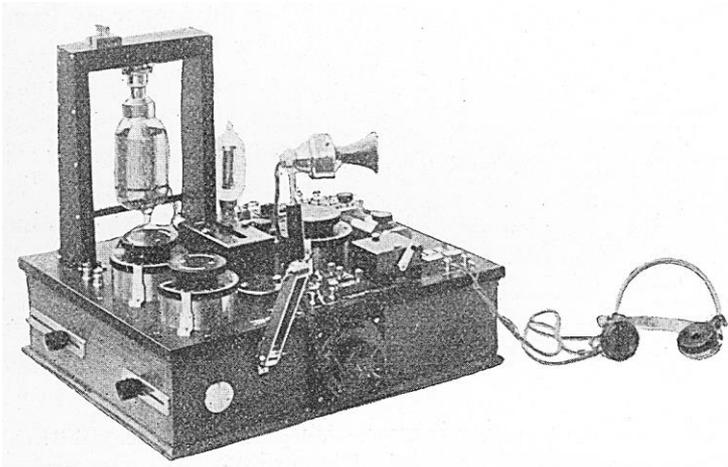
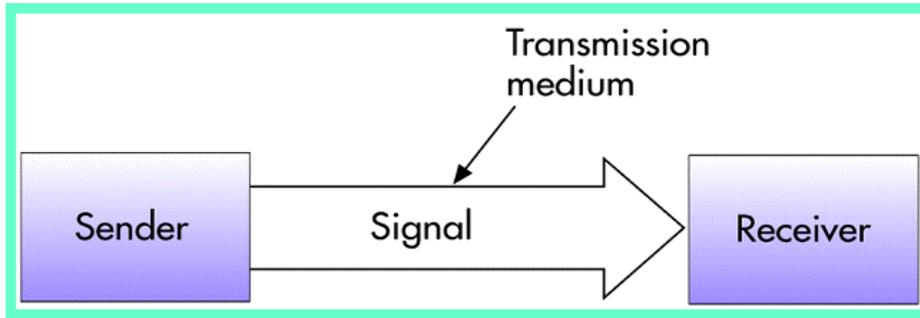


Do you have some examples ?



- Digital or Analog signal ?

Do you have some examples ?



- Digital or Analog signal ?

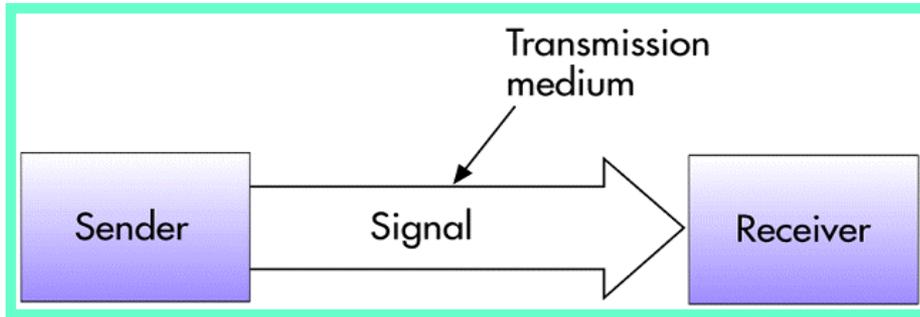
So telecommunications are ...

- Telecommunications
 - The electronic transmission of signals for communications, including such means as:
 - Telephone
 - Radio
 - Television

Telecommunication medium

Anything that carries an electronic signal and interfaces between a sending device and a receiving device.

Do you have some examples ?

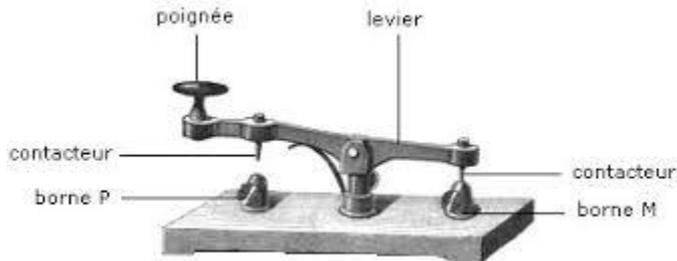


Code morse international

1. Un tiret est égal à trois points.
2. L'espace entre deux éléments d'une même lettre est égal à un point
3. L'espace entre deux lettres est égal à trois points.
4. L'espace entre deux mots est égal à sept points.

A	• —	U	• • —
B	— • • •	V	• • • —
C	— • • —	W	• — • —
D	— • • •	X	— • • •
E	•	Y	— • — —
F	• • — •	Z	— — • •
G	— • • •		
H	• • • •		
I	• •		
J	• — — —		
K	— • — —		
L	• • • •		
M	— —		
N	— •		
O	— — —		
P	• — • •		
Q	— • • —		
R	• — • •		
S	• • •		
T	—		
		1	• — — — —
		2	• • — — —
		3	• • • — —
		4	• • • • —
		5	• • • • •
		6	— • • • •
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First
Protocol

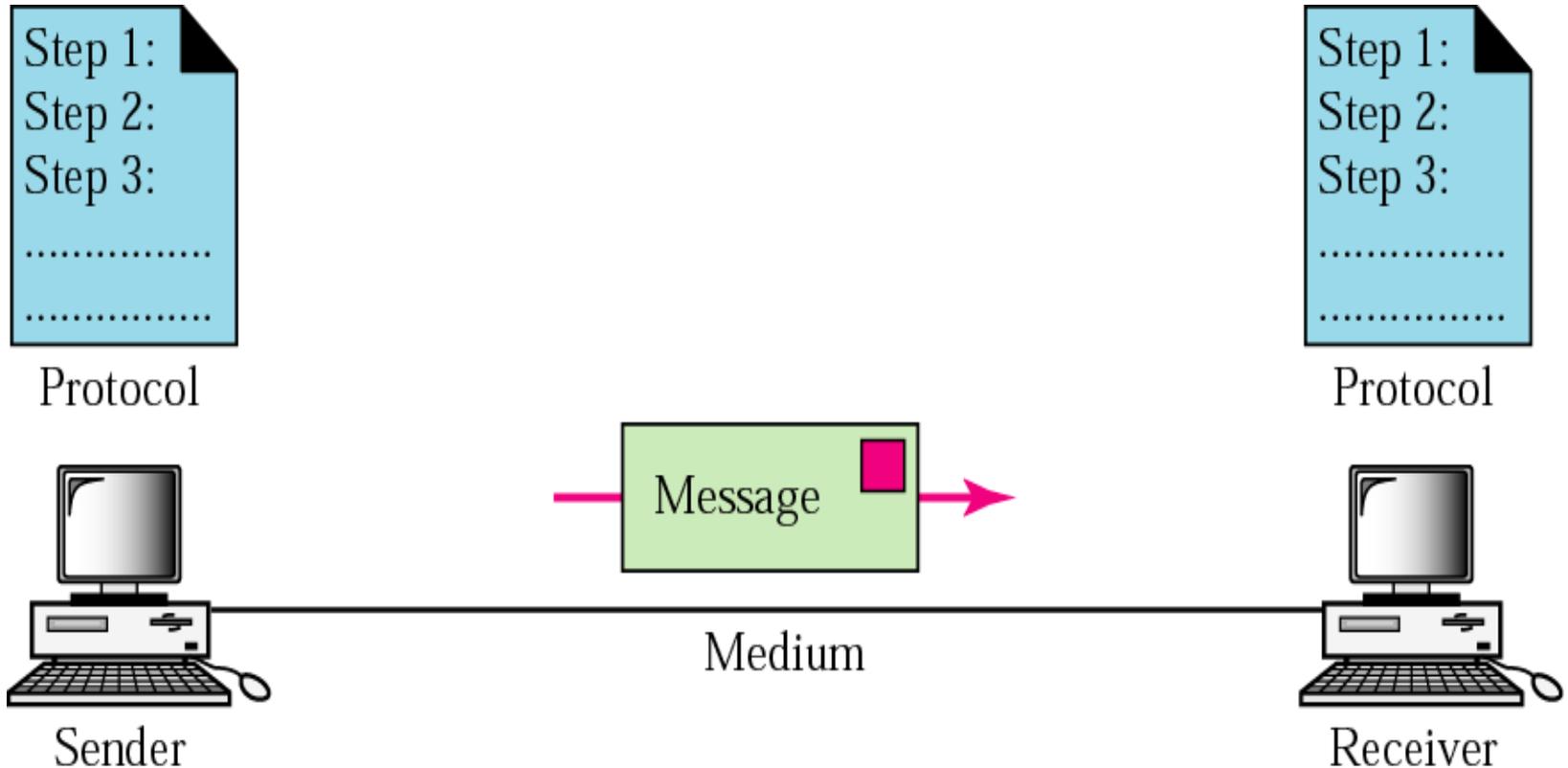


- Digital or Analog signal ?
- Why ?

Data Communications

- Data communications
 - A specialized subset of telecommunications that refers to the electronic collection, processing, and distribution of data -- typically between computer system hardware devices.
-

Data Communications



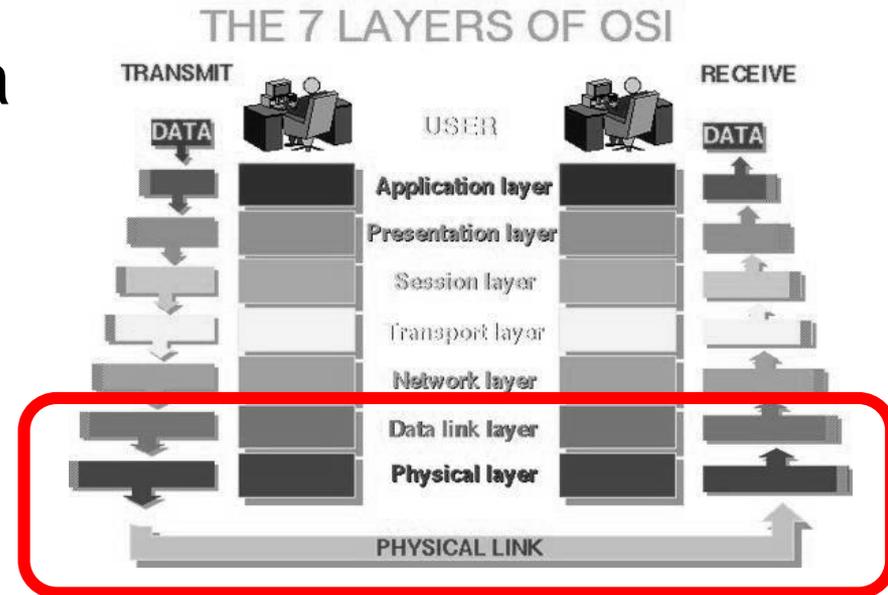
Computer Network

■ Computer Network

- ❑ The communications media, devices, and software needed to connect two or more computer systems and/or devices. (one to one or many)
 - ❑ Used to share hardware, programs, and databases across the organization.
 - ❑ Fosters teamwork, innovative ideas, and new business strategies.
-

Basic Ideas (From OSI/ISO Model)

- Protocols are organized by layers to transmit data to one entity (often computers of connected objects) to one or many others
- Telecommunication is based on physical layer
- Data Communication is based on data layer

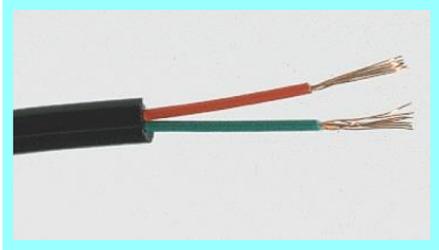


Open Systems Interconnection Model

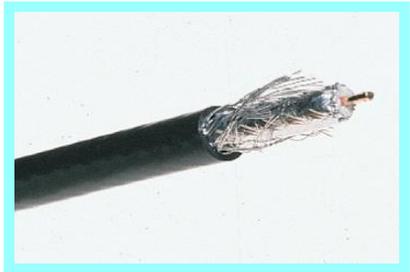
https://en.wikipedia.org/wiki/OSI_model

conceptual model that characterizes and standardizes the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology

Physical Layer and Types of Telecommunication Media



- Twisted Pair Wire Cable
 - Insulated pairs of wires historically used in telephone service and to connect computer devices.



- Coaxial Cable
 - Consists of an inner conductor wire surrounded by insulation, called the dielectric. The dielectric is surrounded by a conductive shield, which is surrounded by a non-conductive jacket. Coaxial cable has better data transmission rate than twisted pair.
- For what kind of network technologies ?

Types of Telecommunication Media

- Fiber-optic Cable
 - Many extremely thin strands of glass or plastic bound together in a sheathing which transmits signals with light beams. Can be used for voice, data, and video.



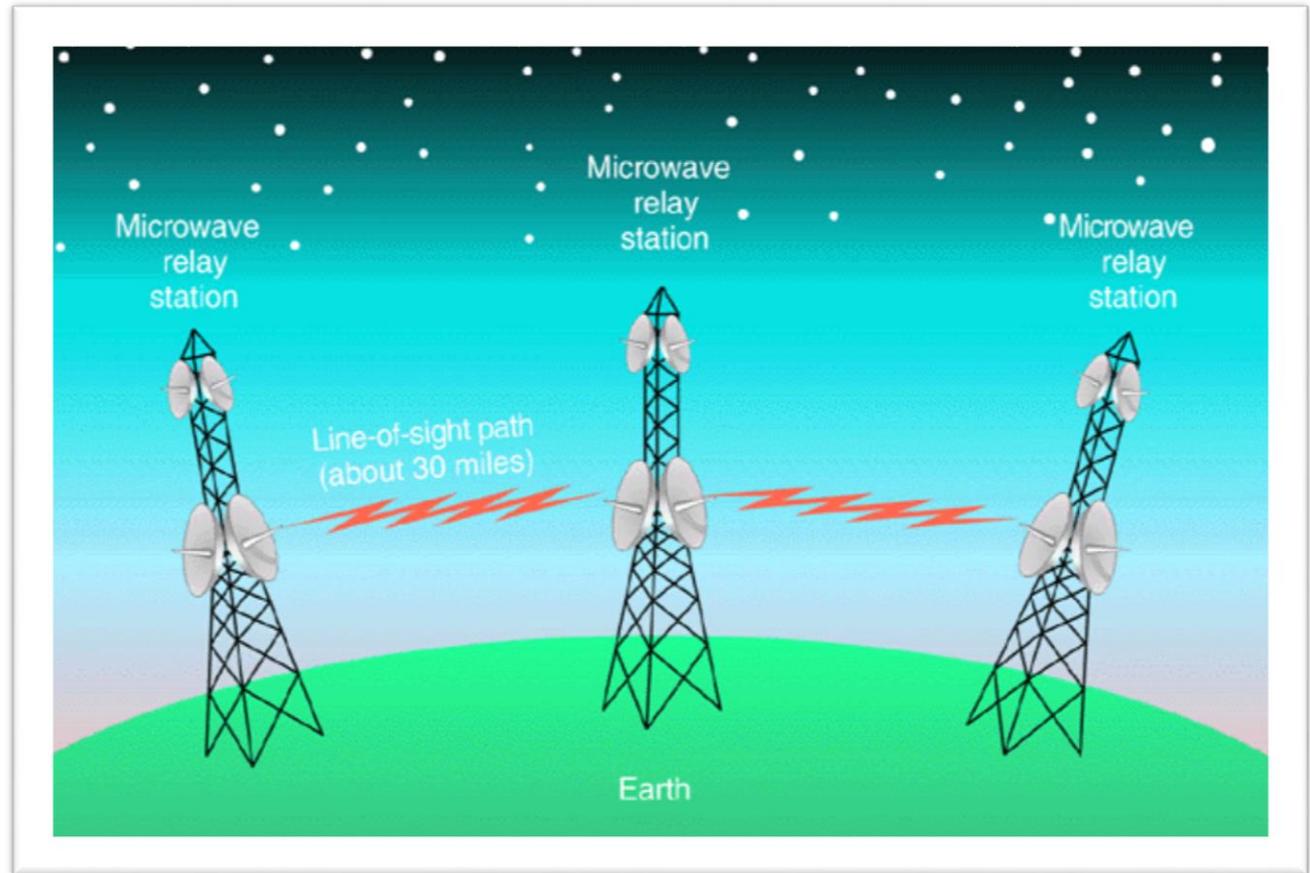
Types of Telecommunication Media

Microwave Communications

Line-of-sight devices which must be placed in relatively high locations.

Microwave Usage

Information is converted to a microwave signal, sent through the air to a receiver, and recovered.

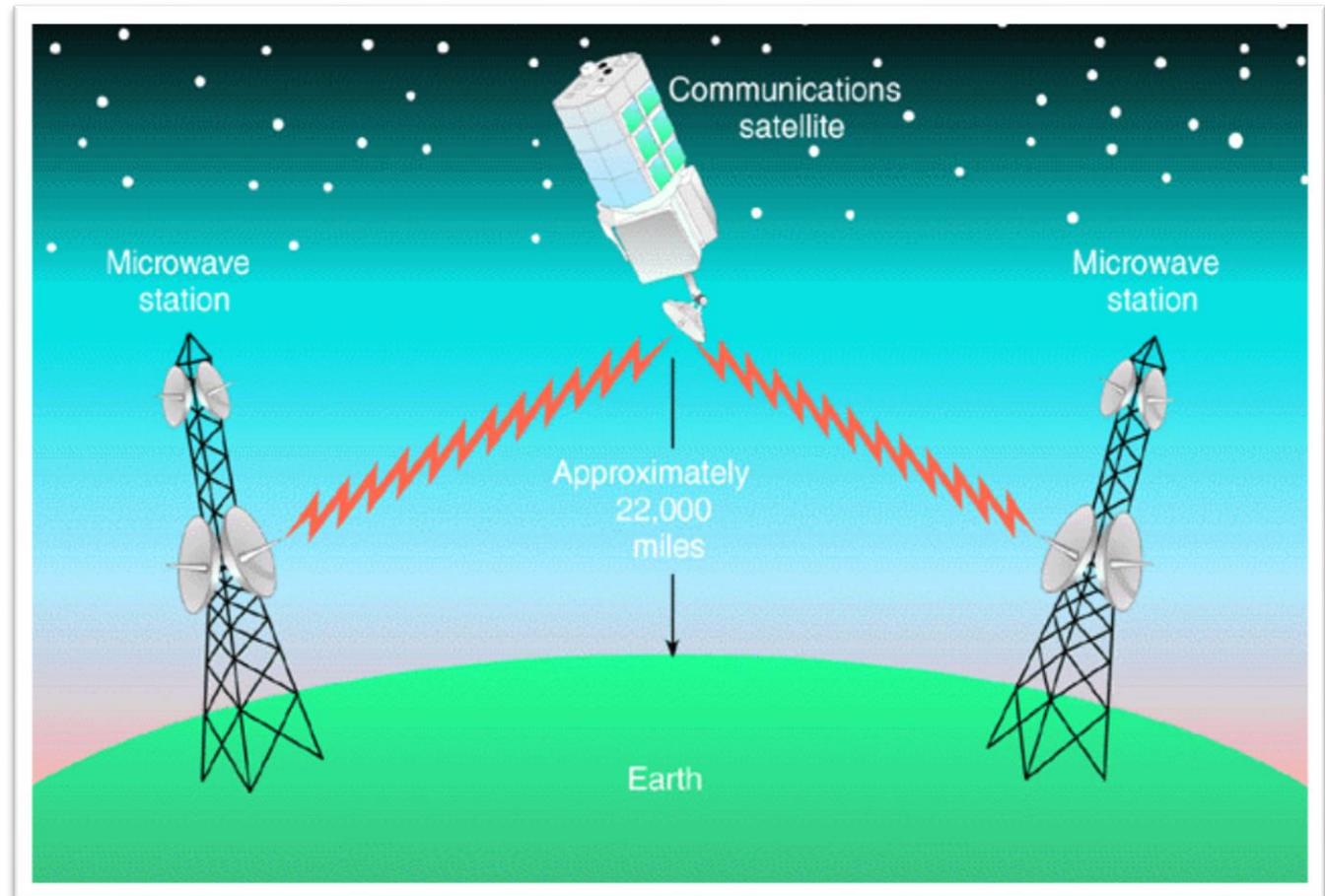


Types of Telecommunication Media

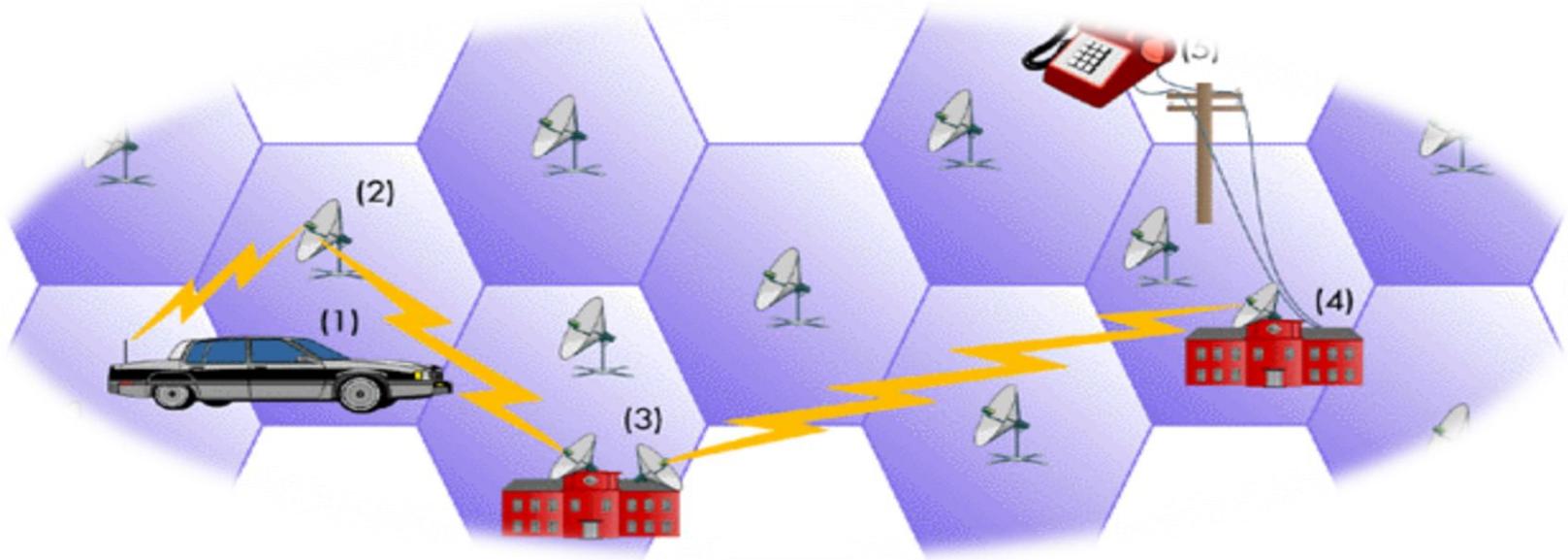
Satellite

Transmission

Communications satellites are relay stations that receive signals from one earth station and rebroadcast them to another.



Types of Telecommunication Media



Cellular Transmission

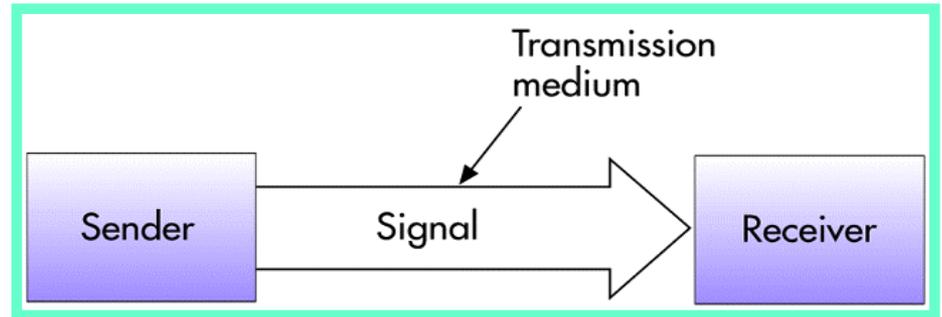
Signals from cells are transmitted to a receiver and integrated into the regular network.

Types of Telecommunication Media

- Infrared Transmission
 - Involves sending signals through the air via light waves.
 - Requires line-of-sight and short distances (a few hundred yards)
 - Used to connect various computing devices such as handheld computers
-

Do you have more examples ?

First Step toward Technical Specification Sheet for Network Technologies deployment

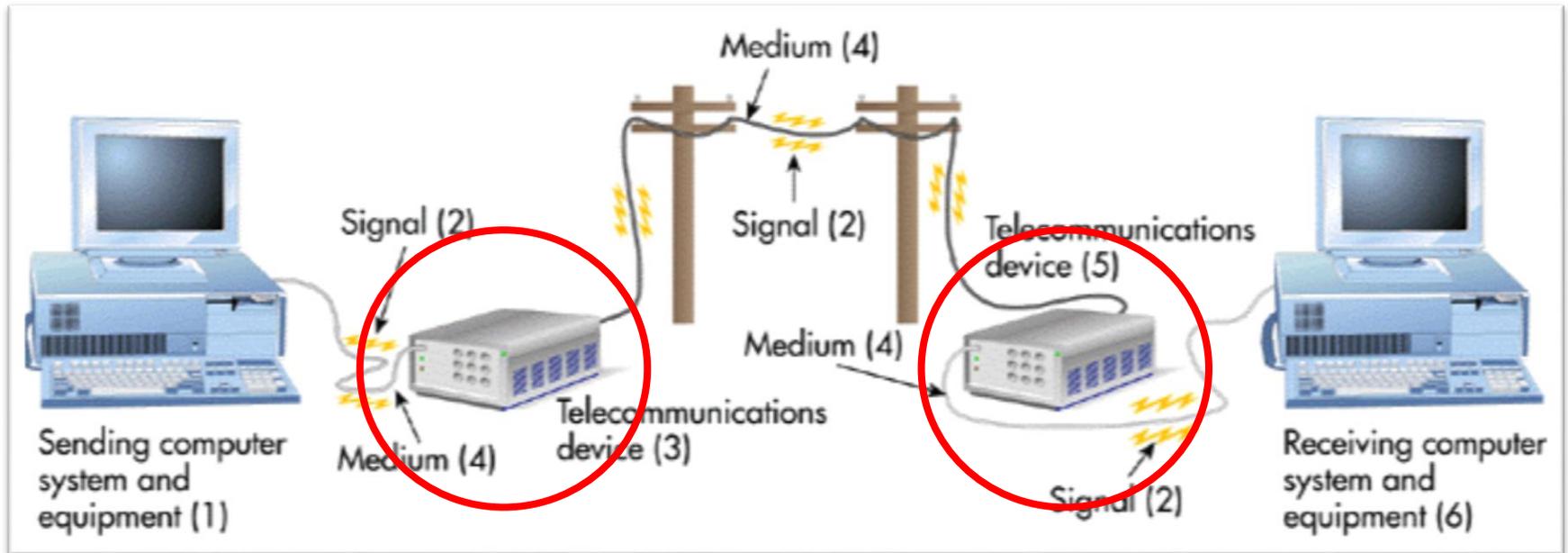


- What is the Network Technology ?
- **What kind of Medium ?**
- Limitations for communication area in a building (that's the first step of your job with networks !) ?

Telecommunication Devices

- Analog Signal
 - E.G. Electricity current
 - Digital Signal
 - A signal represented by bits
 - Modems
 - Devices that translate data from digital to analog and analog to digital
-

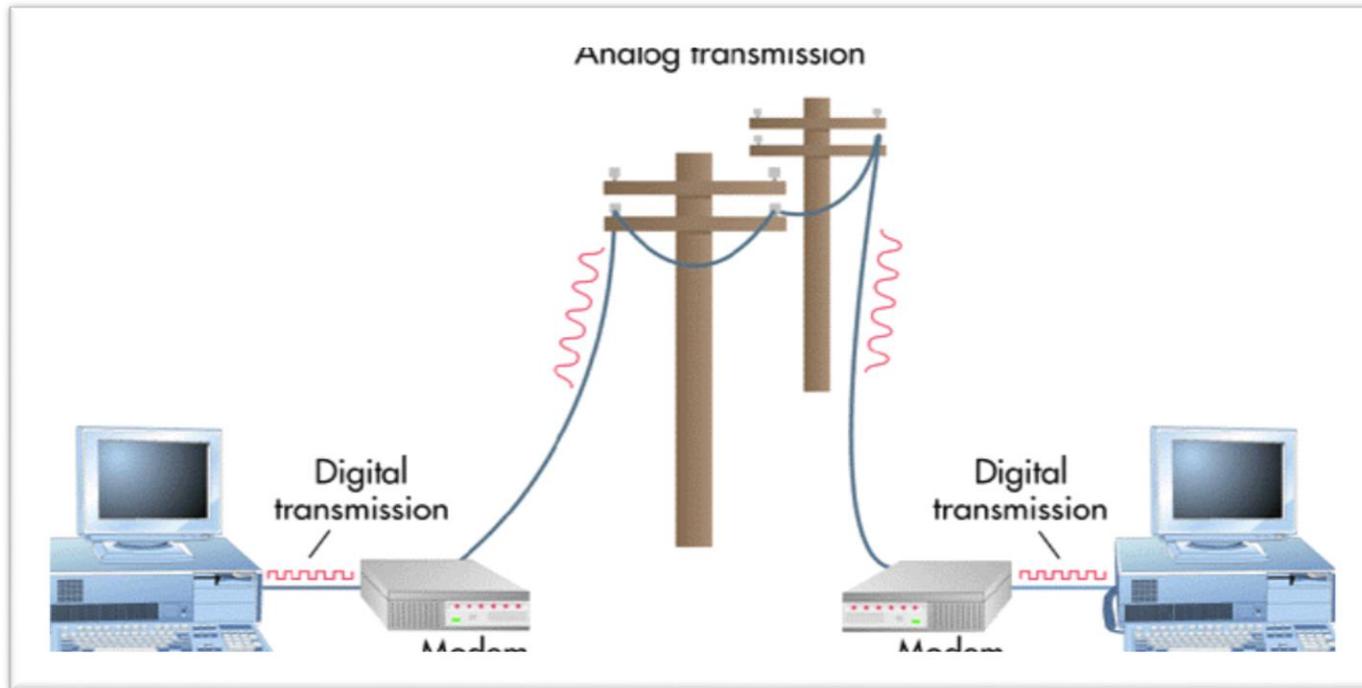
Telecommunications System



Telecommunication Devices

Relay signals between computer systems and transmission media.

Device: Modem

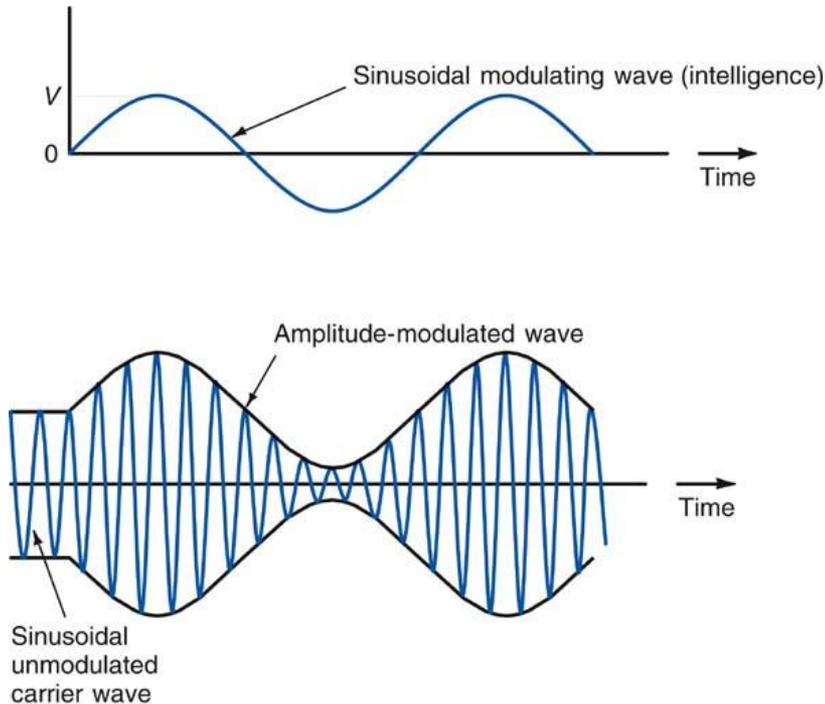


Modem

Modulates a **digital signal into an analog signal** for transmission via analog medium, then demodulates the signal into digital for receiving.

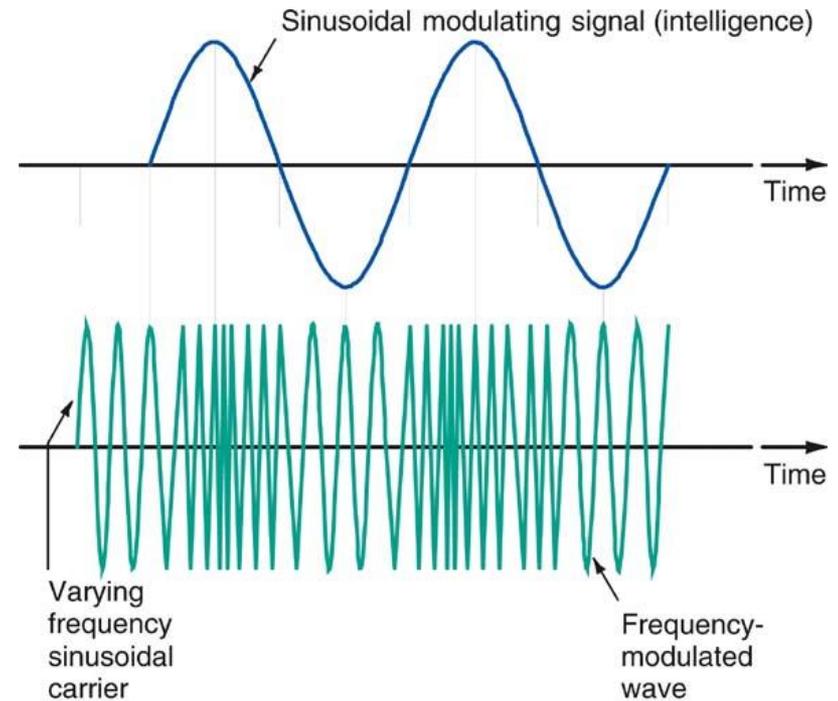
Example of Type Modulation Techniques

Amplitude modulation.



(a)

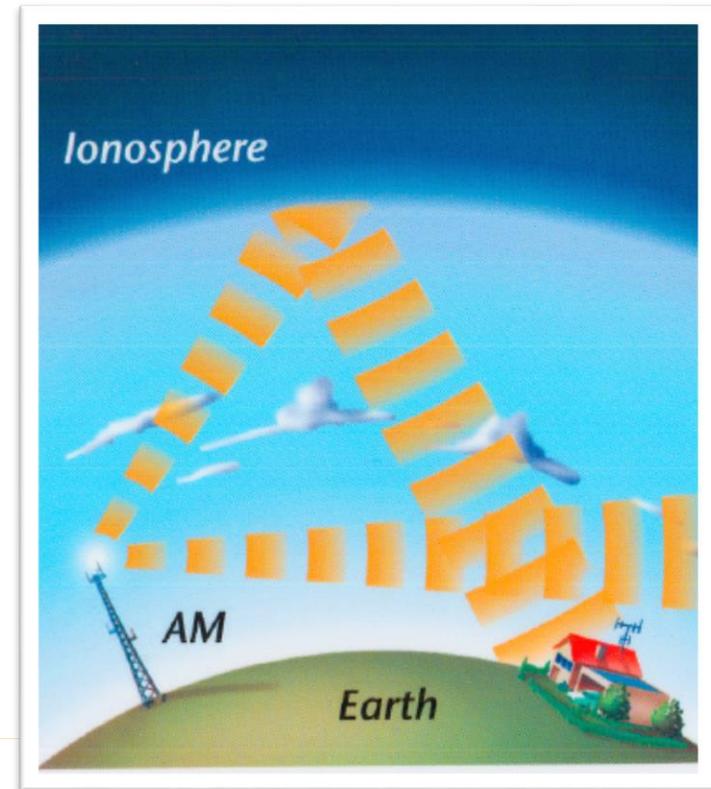
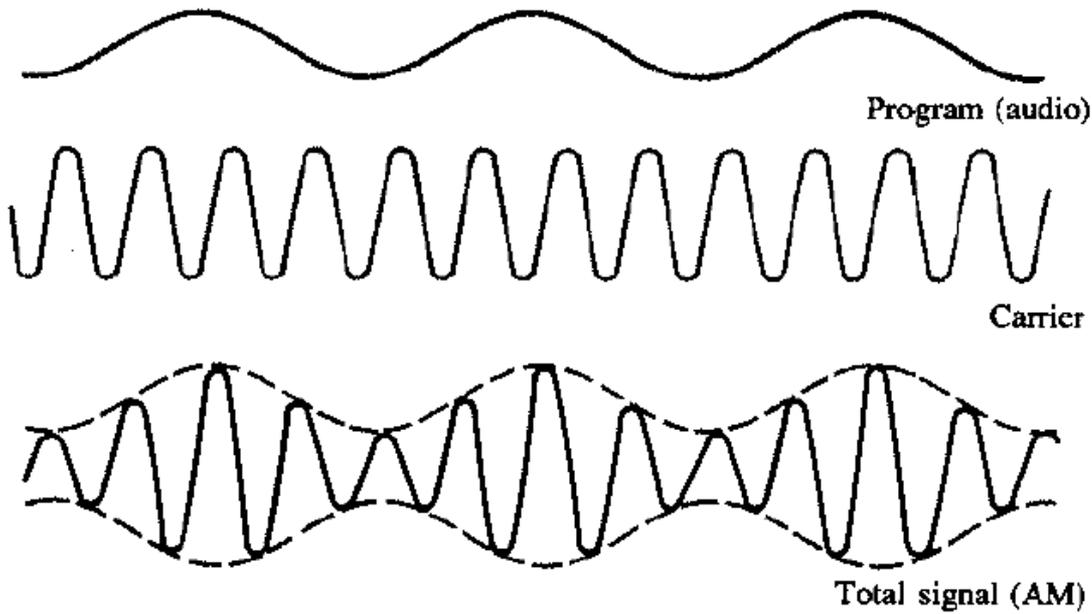
Frequency modulation



(b)

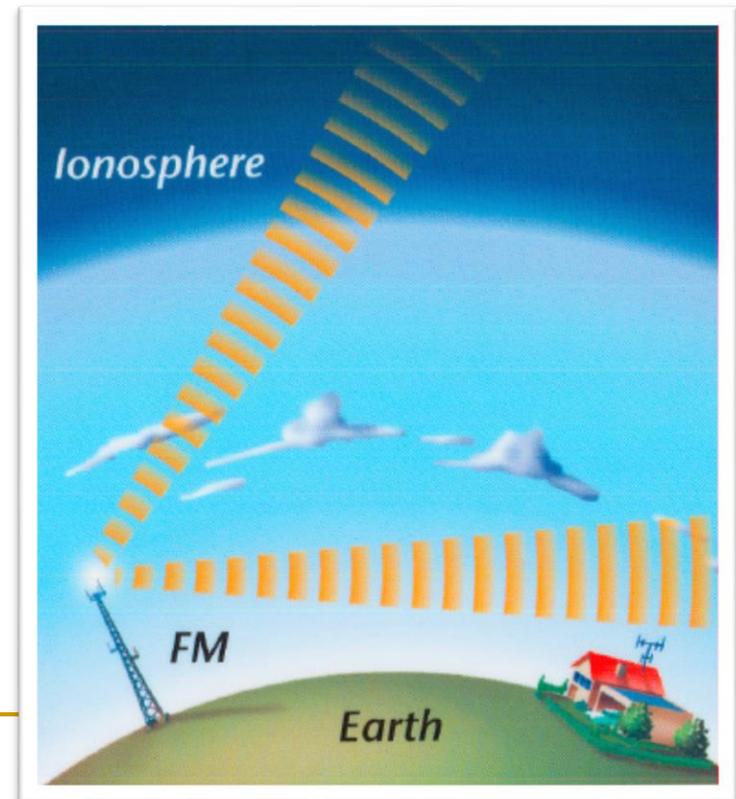
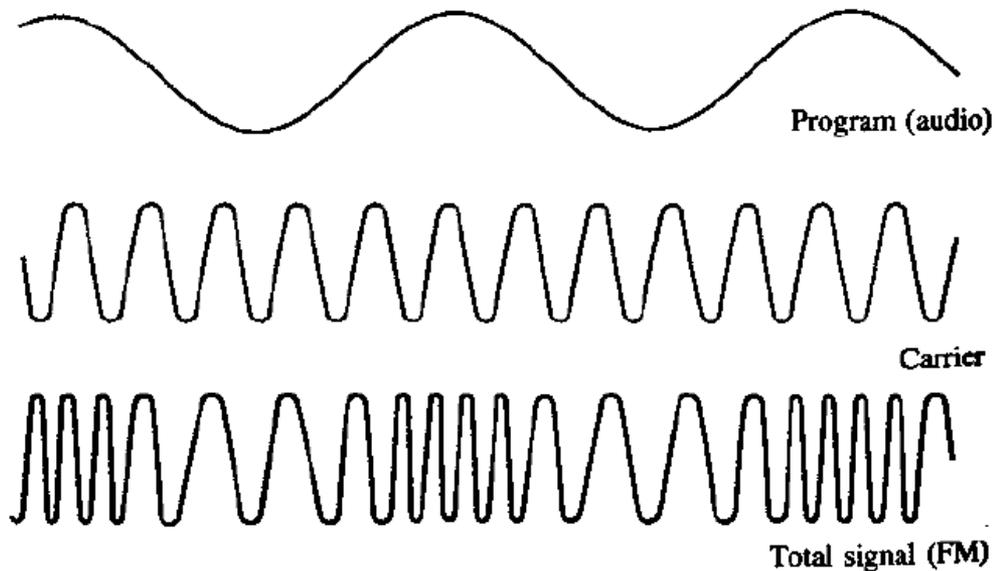
Ex. Amplitude modulation (AM)

- waves bounce off ionosphere that is how you can pick up stations from different cities.
- (535kHz-1605kHz = vibrate at 535 to 1605 thousand times/second)

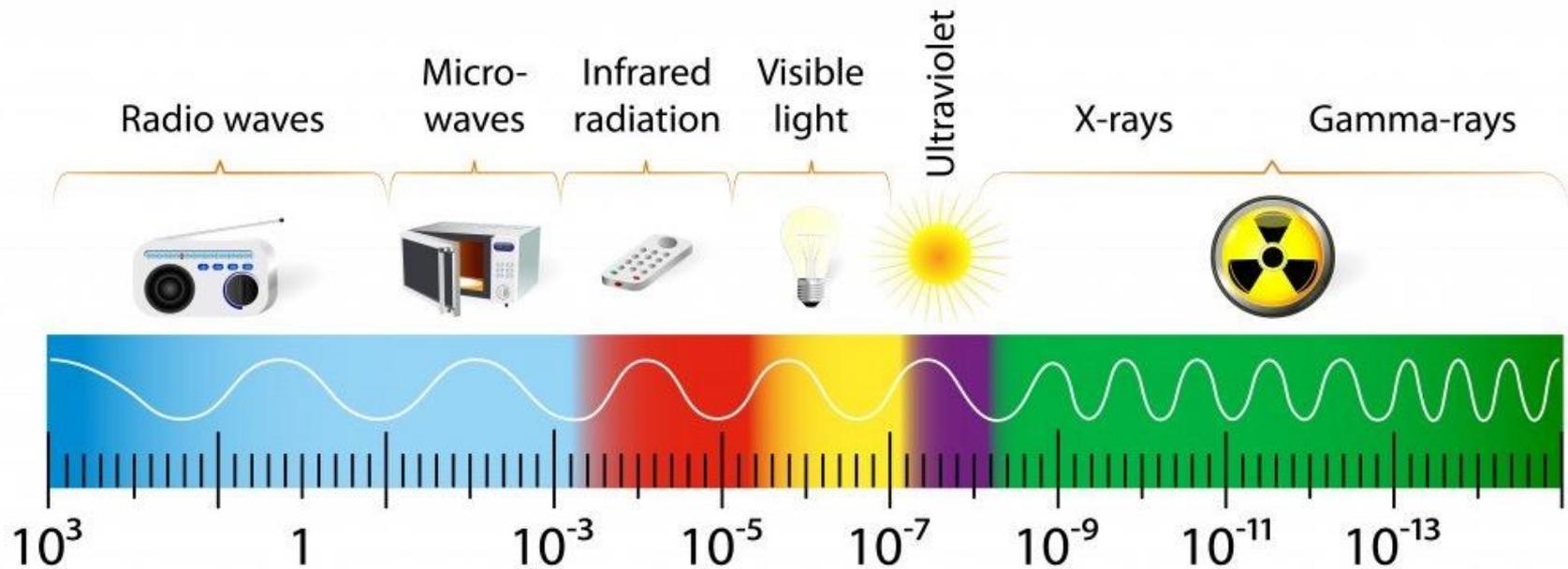


Ex. Frequency modulation (FM)

- waves travel in a straight line & through the ionosphere—you lose reception when you travel out of range.
- (88MHz-108MHz = vibrate at 88million to 108million times/second)

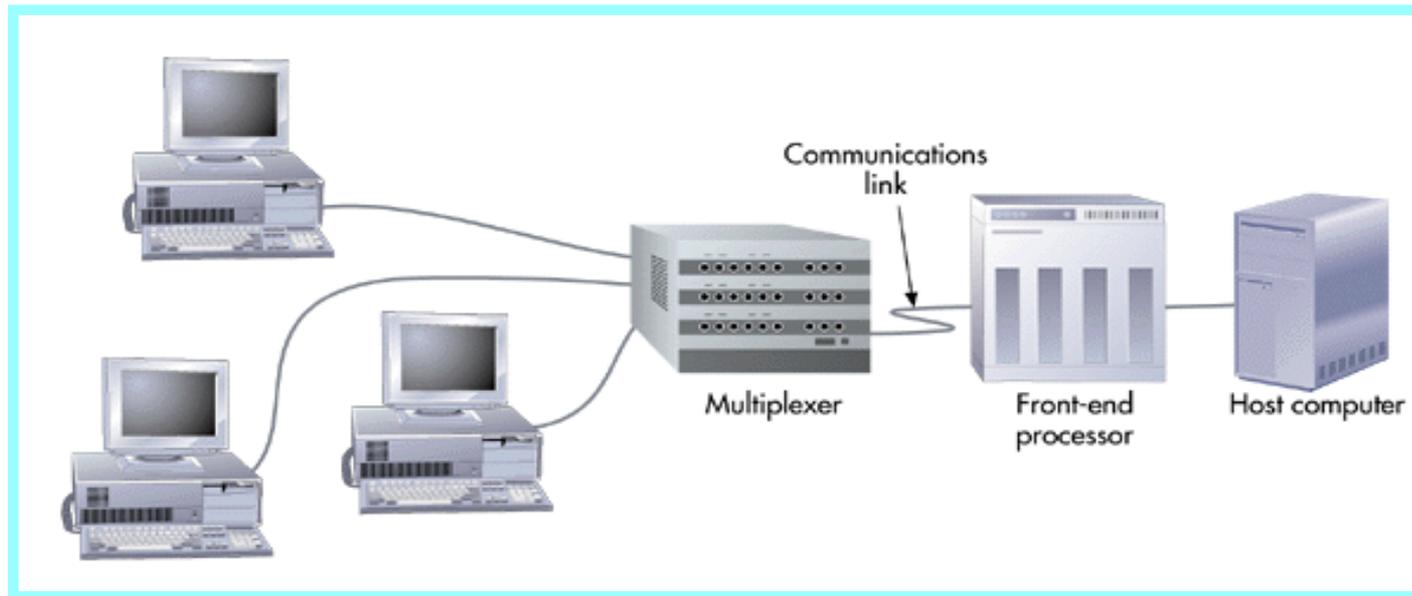


Medium Electromagnetic Spectrum



- Frequencies are more or less well-carried according to the medium type (that's key !)
- Give some examples of couples Frequencies / Network Technologies ?

Device: Multiplexer



Multiplexer

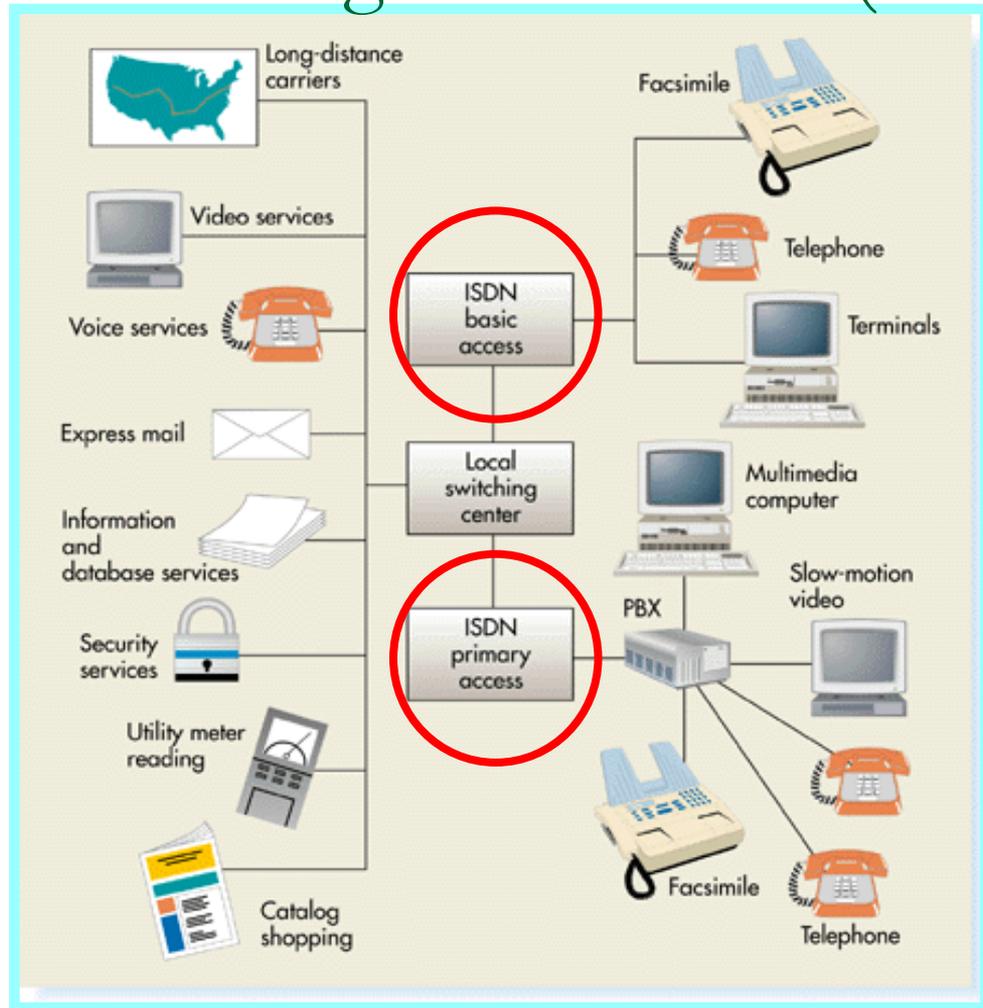
Allows **several telecommunications signals to be transmitted over a single communications medium at the same time.**

Classical Use Case :

Media: Integrated Services Digital Network (ISDN)

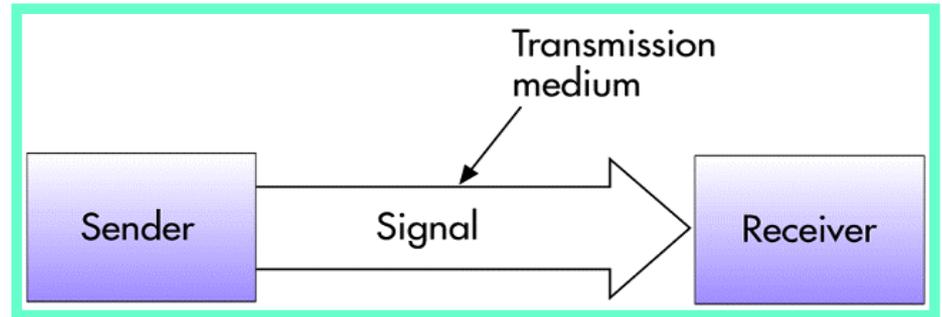
ISDN

Technology that uses existing common-carrier lines to simultaneously transmit voice, video, and image data in digital form.



Do you have more examples ?

First Step toward Technical Specification Sheet for Network Technologies deployment



- What is the Network Technology ?
- What kind of Medium ?
- Limitations for communication area in a building (that's the first step of your job with networks !) ?
- What kind of signal ?
- What kind of Modulation Demodulation ?

Really ! That's your job in buildings !

- Concept Draw Office
 - <http://www.conceptdraw.com/How-To-Guide/house-electrical-plan>
 - Install it and Test it !
 - Do you know the different equipments you must know to make a network plan of your building ?
-