# Introduction to Computer Networks



Reference: Slides by Dr F.Farahmand

# Telecommunications

- Tele (Far) + Communications
- Early telecommunications
  - smoke signals and drums
  - visual telegraphy (or semaphore in 1792)
- Telegraph and telephone
  - Telegraph (1839)
  - Telephone (1876)
- Radio and television
- Telephony
  - Voice and Data



## **Communication Systems**



# **Communication Systems**

- Process describing transfer of information, data, instructions between one or more systems through some media
  - Examples
    - people, computers, cell phones, etc.
    - Computer communication systems
- Signals passing through the communication channel can be **Digital**, or analog
  - Analog signals: continuous electrical waves
  - Digital signals: individual electrical pulses (bits)
- Receivers and transmitters: desktop computers, mainframe computers, etc.
  Communication channel



# **Communications Components**

- Basic components of a communication system
  - Communication technologies
  - Communication devices
  - Communication channels
  - Communication software



# **Communications Model**



<sup>(</sup>b) Example

## **Data Communications Model**



# **Communication Channels**

- A **channel** is a path between two communication devices
- **Channel capacity**: How much data can be passed through the channel (bit/sec)
  - Also called channel bandwidth
  - The smaller the pipe the slower data transfer!
- Consists of one or more transmission media
  - Materials carrying the signal
  - Two types:
    - Physical: wire cable
    - Wireless: Air



# **Physical Transmission Media**







#### Wireless Network



#### Wired Network



#### Hybrid Network



#### **Direct Connect**



### **Powerline Network**



## Basic Equipment: Cards/Cables





## Hubs & Switches





## Routers

 A device that forwards data packets along networks. A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network. Routers are located at gateways, the places where two or more networks connect.



4-Port LAN

Power In

## Most common home network



# Devices, Devices, (what can you use)

PDA, Cell Phones, Notebooks, Printers, Hard drives, cameras, robots

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