

# Computers Are Your Future

## Chapter 3

### Wired & Wireless Communication

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### What You Will Learn . . .

- The definition of bandwidth
- The bandwidth needs of a typical user
- How modems change digital signals into analog
- Transmission media and methods
- Limitations of public switched telephone network (PTSN) for sending and receiving data

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### What You Will Learn . . .

- Multiplexing and digital telephony and their impact on line usage
- Various wired and wireless applications

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## Moving Data:

- Communications – sending and receiving messages
- Communications channels – paths through which messages are passed

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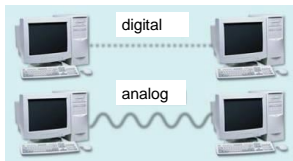
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## Moving Data

- Signals can be:
  - Analog – data is in continuous waveforms
  - Digital – data is in discontinuous pulses (0's & 1's)



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## Bandwidth

Bandwidth – the amount of data that can be transmitted through a given communications channel per second

- Analog measured in cycles per second (Hz)
- Digital measured in bits per second (bps)

Broadband – any transmission medium that transports high volumes of data at high speeds



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## Modems

### Modems

- Transmit data over telephone lines
- **Modulation** – converts digital to analog (from computer to the telephone line)
- **Demodulation** – converts analog to digital (from the phone line to the computer)



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## Wireless Transmission Media

**Wireless transmission media** refers to the methods of carrying data through the air or space using infrared, radio, or microwave signals.



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## Wireless Transmission Media: Infrared

**Infrared** is a wireless transmission medium that carries data via light beams.

- Most TV/DVD remotes use infrared
- Transmitter and receiver must be in line of sight.
- An IrDa port is needed to use infrared with a computer.

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## Wireless Transmission Media: Radio

**Radio** is a wireless transmission medium that carries data via radio frequency signals.

- Wireless home networks
- Radio signals can be long range or short range
- Radio signals are susceptible to noise



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## Wireless Transmission Media: Bluetooth

**Short-range radio transmission technology**

- Devices identify each other by identification number.
- A line of site is not required.
- Common with cell phone headsets.



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## Wireless Transmission Media: Microwaves

**Microwaves** are high-frequency radio waves

- Much of long-distance telephone service is carried by microwaves.
- Microwaves travel in a straight line.
- Microwave relay stations are built about 30 miles apart.



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## Wireless Transmission Media: Satellites

**Satellites** are microwave relay stations orbiting the earth. They receive signals from earth-based stations and transmit signals back to earth.

- They are positioned in **geosynchronous orbits**.



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## Wired Transmission Media: Twisted Pair

- **Twisted Pair** – two insulated wires twisted around each other – used for telephone wires



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## Wired Transmission Media: Coaxial Cable

**Coaxial Cable** – center copper wire surrounded by insulation, surrounding a layer of braided wire

Common for cable television.



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## Wired Transmission Media: Fiber Optic

**Fiber-optic cable**  
– thin strands of  
glass that carry  
data by  
light pulses



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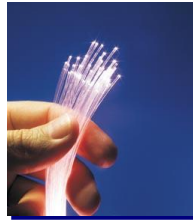
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## Multiplexing

**Multiplexing** technology  
enables simultaneous  
multi-use of transmission  
lines.

- Copper wire allows up to 24 simultaneous calls per wire.
- Fiber-optic cable permits up to 43,384 calls per strand.



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## Last-Mile Technologies

The “last mile” refers to the phone lines that connect homes and businesses to the local loop.

- The inability of users to access the high-speed fiber-optic cable creates a bottleneck of data called the **last-mile problem**.



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## Cellular Telephones

**Cellular telephones** enable calls to be placed through wirelessly

**Cells** are limited geographic transmission areas.

A **mobile telephone switching office (MTSO)** monitors the signal strength of cellular phones.



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## Web-Enabled Devices

- A **Web-enabled device** is any device that can display and respond to HTML or XML.
- PDAs, cell phones, and tablet PCs are Web-enabled devices.



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## Wired and Wireless Applications

**Internet telephone** – VoIP (or Voice over Internet Protocol) lets you make phone calls using your high speed Internet connection instead of a phone line.

For more information check out the article on [PC World](#).

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## Facsimile (Fax) Transmission



- Fax transmission is the means of sending an image of a document over telephone lines.

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## Satellite Radio, GPS

**Satellite radio** - broadcasts are transmitted through a satellite

**GPS** – global positioning systems

- 27 earth orbiting satellites
- Used in navigation systems



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