Curriculum Development Centers Program

Awardee of The Office of the National Coordinator for Health Information Technology

# Component 9 – Networking and Health Information Exchange

## Unit 2-1
## Network Media and Hardware Communication Devices

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## Unit Objectives

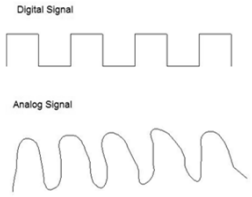
- Select appropriate network media types (such as Ethernet and Wireless) to facilitate networking and data exchange, taking into account access and regulatory requirements
- Select appropriate hardware devices (such as routers, switches, and access points) to facilitate networking and data exchange, taking into account access and regulatory requirements



## Transmission Basics

Information can be transmitted via one of two methods:

- Analog
- Digital



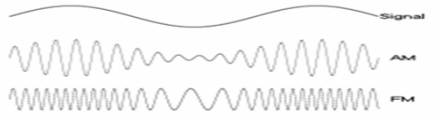
## Transmission Basics

- Amplitude
  - Measure of a signal's strength
- Frequency
  - Number of times a signal's amplitude changes over a period of time



## Data Modulation

- Amplitude modulation (AM)
  - Amplitude of the signal is used to represent bit
- Frequency modulation (FM)
  - Frequency of carrier signal is used to represent bit






## Transmission Direction

- Simplex
  - Signals travel in only one direction
- Half-duplex
  - Signals may travel in both directions but in only one direction at a time
- Full-duplex
  - Signals travel in both directions at the same time
  - Multiplexing

## Transmission Speed

- Bandwidth
  - measures difference between highest and lowest frequencies a media can transmit
- Throughput
  - amount of data the medium transmits during a given period of time
- Both are measured in bits per second (bps)



## Transmission Speed Continued

1 bit per second – bps

1000 bits per second- Kbps

1,000,000 bits per second – Mbps

1,000,000,000 bits per second – Gbps

1,000,000,000,000 bits per second – Tbps

Current technology has transmission speeds measured in Mbps or Gbps.



## Causes of Errors in Data Transmission

- Electromagnetic interference (EMI)
- Radio frequency interference (RFI)
- Attenuation
- Crosstalk
- Latency

## Network Connectivity

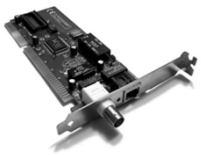
To create a physical network we need:

- Network media
- Way to connect devices to the media
- Connectivity devices



## Network Interface Cards (NICs)

- Node – any device on the network that has an address and can send and/or receive data
- All nodes have a NIC to receive and transmit data over the network media
- Wide variety of NICs available
  - Must match network media
  - Compatible with device hardware





## Wireless NICs