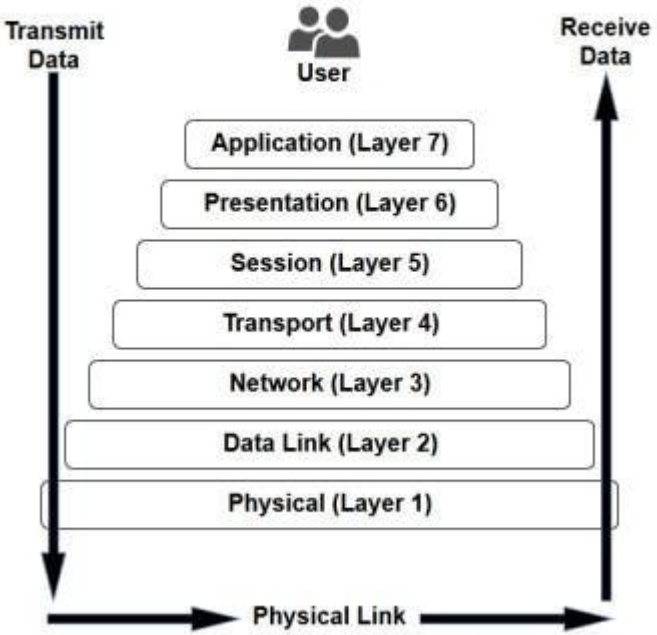
# Networking

# The 7 Layers of OSI



# Cable

- Unshielded Twisted Pair (UTP) / Shielded Twisted Pair (STP)
  - Category 3
    - 10mbs
  - Category 5
    - 100mbs / 1000mbs
  - Category 5e
    - 1gbs
    - 10gbs
  - Category 6
    - more stringent specifications for crosstalk and system noise

# Cat 3 / 5 / 6

- Cables have 8 wires
  - 4 Pair
- Cables are terminated with an RJ-45 Connector, Keystone Jack, or Patch Panel

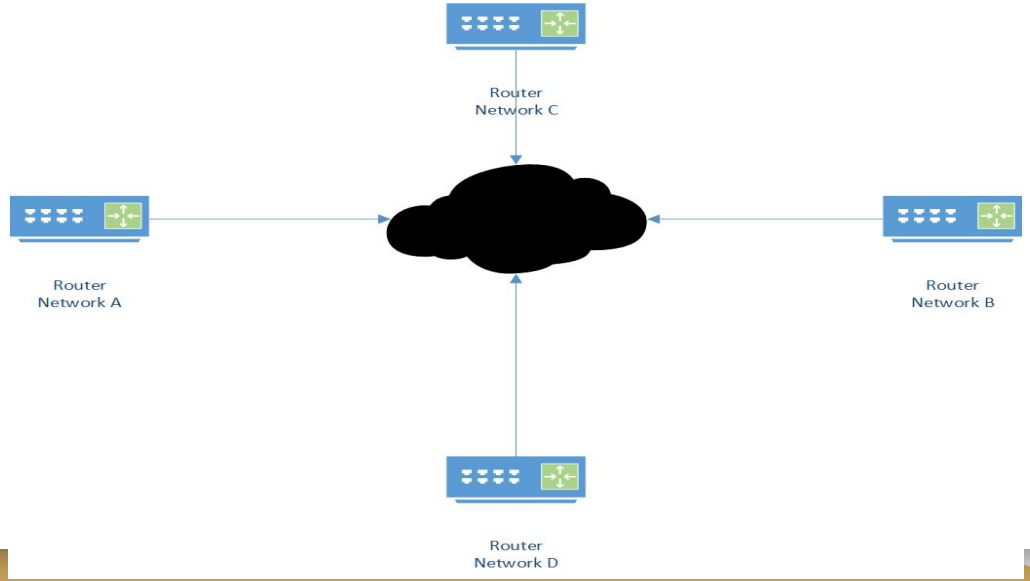
# Fiber Optics

# Network Hardware

- Router
- Switch
- Wireless Access Point
- Firewall

# Router

A router is a device that connects a network to other networks.



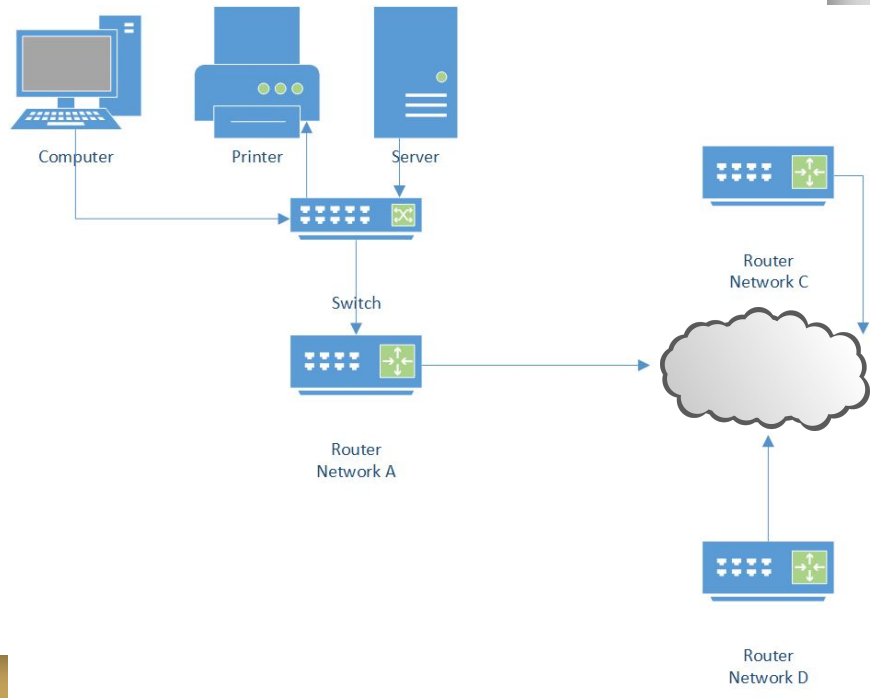
# Switch

A switch connects devices on a network together.

A Switch is a intelligent device that remembers which devices are connected to which port

In an ethernet network all devices are always listening for traffic addressed to them.

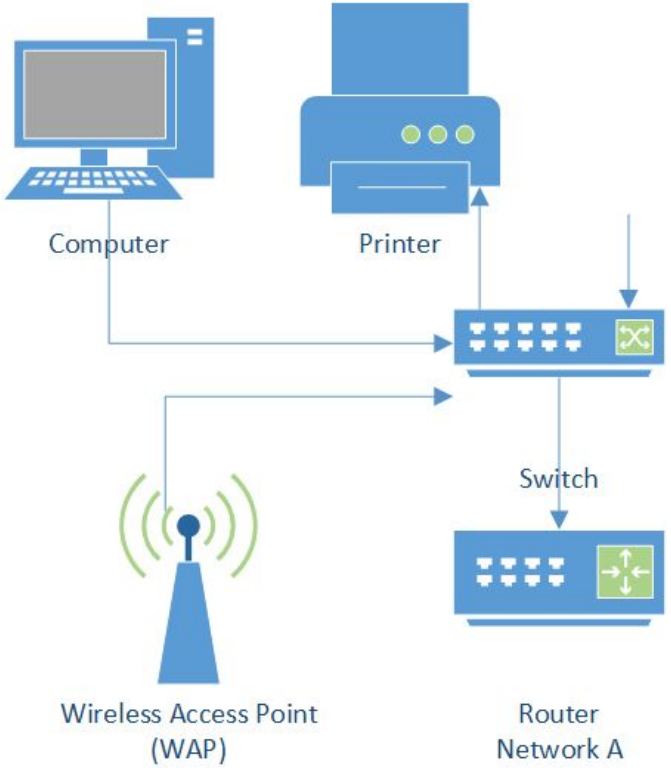
A switch allows traffic to be send only to the ports necessary to get to the proper destination



# Wireless Access Point

A wireless Access Point allows clients to connect to a network wirelessly.

Different standards allow for different speeds.  Common Standards are 802.11 b/g/n, 802.11 a



# 802.11b

- Supports bandwidth up to 11 Mbps, comparable to traditional Ethernet.
- 802.11b uses the *unregulated* radio signaling frequency (2.4 GHz)
- Being unregulated, 802.11b gear can incur interference from microwave ovens, cordless phones, and other appliances using the same 2.4 GHz range. However, by installing 802.11b gear a reasonable distance from other appliances, interference can easily be avoided.

**Pros of 802.11b** - Lowest cost; signal range is good and not easily obstructed

**Cons of 802.11b** - Slowest maximum speed; home appliances may interfere on the unregulated frequency band

# 802.11g

- 802.11g attempts to combine the best of both 802.11a and 802.11b.
- 802.11g supports bandwidth up to 54 Mbps
- uses the 2.4 GHz frequency
- 802.11g is backward compatible with 802.11b, meaning that 802.11g access points will work with 802.11b wireless network adapters and vice versa.

**Pros of 802.11g** - Fast maximum speed; signal range is good and not easily obstructed.
**Cons of 802.11g** - Costs more than 802.11b; appliances may interfere on the unregulated signal frequency.

# 802.11n

- *802.11n* (also sometimes known as "Wireless N") was designed to improve on 802.11g in the amount of bandwidth supported by utilizing multiple wireless signals and antennas.
    - *MIMO*technology.
- specifications providing for up to 300 Mbps of network bandwidth.
- 802.11n also offers somewhat better range over earlier Wi-Fi standards due to its increased signal intensity
- it is backward-compatible with 802.11b/g gear.

**Pros of 802.11n** - Fastest maximum speed and best signal range; more resistant to signal interference from outside sources.

**Cons of 802.11n** - Standard is not yet finalized; costs more than 802.11g; the use of multiple signals may greatly interfere with nearby 802.11b/g based networks.

# 802.11ac

- The newest generation of Wi-Fi signaling in popular use
- 802.11ac utilizes dual-band wireless technology, supporting simultaneous connections on both the 2.4 GHz and 5 GHz Wi-Fi bands.
- 802.11ac offers backward compatibility to 802.11b/g/n and bandwidth rated up to 1300 Mbps on the 5 GHz band plus up to 450 Mbps on 2.4 GHz.

# Firewall

A firewall is a device that protects a network from outside security threats.

- Network Ports (ie 80-http)
- Intrusion Detection
- Intrusion Prevention
- Application Layer Protection