Computer Networking Devices

Seven Different Networking Components

What is a network device?

- Components used to connect computers as well as other electrical devices together in order to share resources such as printers and fax machines.

Devices used in Networking

- The different devices or components used in networking include:
- Hubs
- Switches
- Routers
- Network bridges
- Gateways
- Firewalls
- Wireless AP (Access Points)

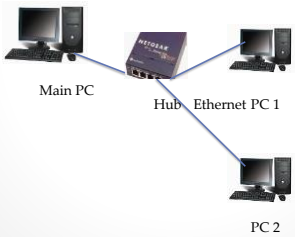
What is a Hub?

- A small rectangular box that joins computers together through ports on the back of the hub.
- Picture of a 4 – Port Ethernet Hub (below)

How does a Hub work?

- A hub receives data packets and passes on all the Information it receives to all the other computers connected to the hub.
- Information is also sent to the computer that sent the information!
- **Example**: if computer 1 wants to communicate with computer 3, the data will be sent to all the computers on the network since hubs do not know the destination of the information it receives.

Diagram of a hub network



Additional Information about Hubs

- Most hubs contain 4 ports some have 5 or more ports.
- Hubs can be used for a smaller network such as a home network or a small office network.
- Hubs are not that expensive.
- Hubs may not be the best option for sophisticated or complex networks.

What is a Switch?

- Switches look similar to hubs in that they are rectangular in shape. Manageable switches are usually a little bigger than unmanageable switches. A switch also has ports on the back.

How does a Switch work?

- Switches work about the same way as hubs. Unlike hubs, switches can identify the destination of a packet.
- Switches send information only to the computer that is suppose to receive the information.
- Switches can also send and retrieve information at the same time which makes sending information faster to retrieve than hubs.

Diagram of a Switch Network

Additional Information about Switches

- Switches are a better option than hubs for larger networks or home networks with 4 or more connected computers.
- Switches price more depending on if the switch is manageable or unmanageable, usually unmanageable switches are less in price versus managed switches.

What is a Router?

- A specialized computer programmed to interface between different networks.

How does a Router work?

- A router receives data from the user.
- Looks for the remote address of the other computer making routing decisions along the way
- Forwards the user data out to a different interface that is closer to the remote computer

Diagram of a Router

Additional Information about Routers

- Routers make sure data sent over the Internet goes where it needs to go and not where it is not needed.
- Acts like a traffic controller, working to cut down congestion throughout the network and keeps everything flowing smoothly along the best path.
- Routers are the only type of equipment that looks at every single packet passing by on the network.
- Home network router including wireless routers

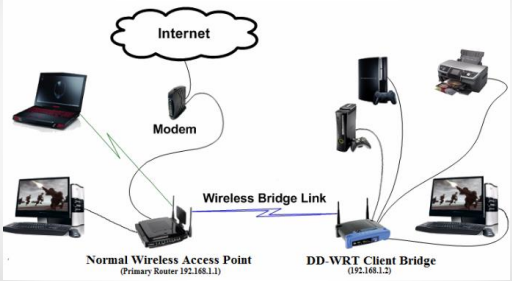
What is a Bridge?

- A hardware device used to create a connection between two separate computer networks or to divide one network into two.
- Filters data traffic at a network boundary and reduces the amount of traffic on a LAN dividing it into two segmer

How does a Bridge work?

- Each bridge consist of a MAC address and operates at layer 2 of the OSI model
- When a packet is received on the bridge ports the forwarding table including the MAC address is automatically updated to map the source MAC address to the network port from which the packet originated
- The gateway then process the received packet according to the packet's type.

Diagram of a Bridge



Additional Information about Bridges

- A bridge examines each message on a LAN and passes the ones known to be within the same LAN.
- Computer addresses have no relationship to location in a bridging network.
- A bridge is sometimes referred to as a brouter.
- Wireless network bridges cost depending on the type of bridge purchased.

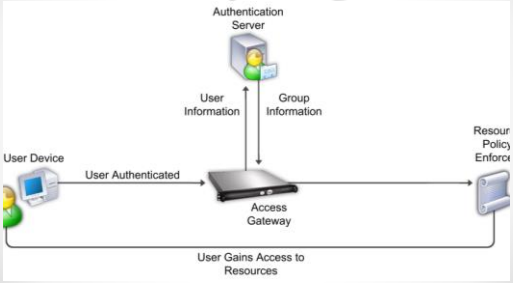
What is a Gateway?

- A communication device that provides a remote network with connectivity to the host network.

How a Gateway Works

- The gateway node acts like a proxy server and firewall
- The gateway uses forwarding tables to determine where packet are to be sent

Gateway Diagram



Additional Information about Gateways

- On the Internet a node or stopping point can be a gateway.
- The computers controlling traffic within a network are gateway nodes.
- A gateway is also associated with a router.

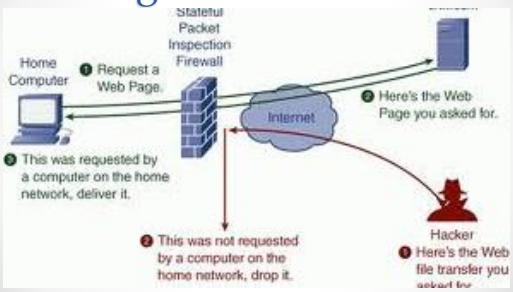
What is a Firewall?

- Hardware or software device that protects a computer network from unauthorized access.

How a Firewall works

- Firewalls filters the information coming through the Internet connection into a user private network.
- To control traffic in and out of the network firewalls one or more of the three methods are used including:
- Packet filtering
- Proxy service
- Stateful inspection

Diagram of Firewall



Additional Information about Firewalls

- Most home network routers have built in firewall.
- The term "firewall" originated from firefighting, where a firewall is a barrier established to prevent the spread of a fire.
- A firewall works with the proxy server making request on behalf of workstation users.
- There are a number of features firewalls can include from logging and reporting to setting alarms of an attack.
- Costs for host based firewalls usually costs less. Some may costs more depending on different things such as features included or if its an enterprise based system.

What is a Wireless Access Point?

- A small hardware device featuring built-in network adapter, antenna, and radio signals.
- Configured nodes on a WLAN.

How a Wireless Access Point works?

- Operates using radio frequency technology
- Broadcast wireless signals computers can detect and use
- A wireless network adapter is implemented while using a wireless access point, most computers today already have network adapters built into the computer.

Diagram of Wireless Access Point

Additional Information about Access Points

- The access point usually connects to the router
- A hotspot is a application wireless users can connect to the Internet.
- Aps are used throughout a home network, usually through only one AP.
- Wireless access points can cost anywhere from $30 and up depending on the type purchased.