Networking Equipment

- **Hub**: A hub, at the most basic level, is a **"dumb" device that operates at the Physical layer of the OSI model**. A hub forwards **all signals it receives to all connected network devices**. Think of a hub as a "drunk" – when he speaks, he speaks to all around him, even if he really only means to speak with one person.

- **Switch**: Because the hub is something of a "drunk," it can be an inefficient (think about the excess traffic created) and unsecure device. Imagine if you wish to send sensitive credit card information over the network – do you really want every node to receive your electronic signal? To alleviate this, the switch was developed. A switch **operates at the Data Link layer of the OSI model**. It uses the MAC sub-layer to **forward the relevant frames of information only to the intended recipient**. Messages can still be broadcast, but this is only an option and not the normal condition. Unlike the "drunken" hub, the switch can speak softly to one person at a time or announce to the crowd. The Network+ exam tends to test you on this **difference between a hub and switch**, so keep it fresh in your mind.

- **Bridge**: A *bridge* also operates at the Data Link layer (aka Layer 2) and is used to **connect two (similar or dissimilar) physical network segments together**, forming a larger inter-network. It can forward packets or reject them based on their destination (MAC) address. Note: The connected network segments must have same network ID.

- **Router**: The *router* operates at the Network layer of the OSI Model and is used to **forward packets across network segments to reach a certain destination address**. Do not be confused between a router and a bridge – a bridge simply forwards packets or frames based on their destination address from one connected network segment to another. A router **can determine where a packet should be sent to**

given its final destination (IP address). Usually, routers forward packets to other routers, but sometimes routers also forward to other pieces of network equipment. A router is usually used to connect a home computer to an "always-on" Internet connection through the home network. To appreciate what a router really does, run tracert to your favorite website and see how many steps (hops) are involved in getting from your computer to the web server in question.

- **Gateway**: A *gateway* is any device that serves to **interface with other networks using dissimilar protocols** . For example, a gateway might interface between a home network and the Internet or between a NetBIOS network and an IPX/SPX network. A gateway operates in any of the seven OSI layers.

- **WAP**: A *Wireless Access Point* is a device that **allows wireless devices to access and to communicate with the network**. It acts as a **bridge between the wired, traditional network and other wireless devices.** Alternatively, it can act as a bridge between wireless devices and another, linked WAP. It typically operates in the Network layer of the OSI model as a sort of router/bridge/switch combination. Note that most WAP devices direct traffic by MAC address, making them switched.

- **NIC**: A *Network Interface Card* is a device that allows **a node to connect to the network, typically in the form of a computer "card"** *(PCI/ISA)*, but also in the form of an external (think USB) device. It can either be wired and connect to a traditional, wired network, or wireless, and connect to a WAP.