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.