Cisco IOS Basics

The following are some key points that summarize the IOS basics:

Types of Memory: There are different types of memory on a Cisco device:

·**ROM**: The Read-Only Memory (ROM) on a Cisco device is like the ROM on a computer in the sense that it stores the POST and the boot loader program. The boot loader program is responsible for locating the IOS.

·**Flash**: The flash memory is used to store the Cisco IOS.

·**RAM**: RAM is used to store things like the routing table on a router, or the MAC address table on a switch. It is also used to store the running-config. RAM is also known as volatile RAM

·**NVRAM**: Non-volatile RAM (NVRAM) is used to store the startup-config, which is copied to the running-config on bootup after the IOS is loaded.

·**POST**: The first thing that occurs when a Cisco device boots up is the POST routine, which is responsible for performing a self diagnostic to verify everything is functioning on the router or switch.

·**Locate IOS**: After the POST, The configuration register is checked to find from where the ios have to be loaded.If IOS in flash memory it will be loaded into RAM.If IOS is not present in the flash it will check TFTP server or ROM

·**Startup-config applied**: After the IOS is loaded into memory, the bootloader program then locates the startup-config and applies it to the device.If there is no start-up config,the router goes to intial setup mode.

Configuration Modes: When making changes to the Cisco device, there are a number of different configuration modes, and each change is made in a specific configuration mode. The following summarizes the major configuration modes:

·User Exec: When you connect to a Cisco device, the default configuration mode is user exec mode. With user exec mode, you can view the settings on the device but not make any changes. You know you are in user exec mode because the IOS prompt displays a ">".

·Privilage mode : In order to make changes to the device, you must navigate to privilage mode.Privilage mode displays with a "#" in the prompt.You can control access to privilage mode using password.

·Global Config: Global configuration mode is where you go to make global changes to the router, such as the hostname. To navigate to global configuration mode from privilage mode, you have to type **config terminal**, where you will be placed at the "(config)#" prompt.

·Sub Prompts: You can navigate to a number of different sub prompts from global configuration, such as the interface prompts to modify settings on a specific interface and the line prompts to modify the different ports on the device.

Network services

DHCP: The DHCP service is responsible for assigning IP addresses to hosts on the network. When a client boots up, it sends a DHCP discover message, which is a broadcast message designed to locate a DHCP server. The DHCP server responds with a DHCP Offer, offering the client an IP address. The client then responds with a DHCP request message asking for the address before the server responds with a DHCP ACK to acknowledge that the address has been allocated to that client.Once an IP address is leased to the client,client will keep and contact DHCP server periodically to review it.If a conflict occurred,the IP address is removed from the pool and administrator must resolve the conflict

DNS: The DNS service is responsible for converting the Fully Qualified Domain Name, (FQDN) such as www.gleneclarke.com to an IP address.

NAT: Network Address Translation is responsible for converting the internal address to a public address that is used to access the Internet. NAT offers the benefit of being able to purchase only one public IP address and have a number

of clients on the network use that one IP address for Internet access. NAT also offers the security benefit that the internal addresses are not used on the Internet — helping to keep the internal addresses unknown to the outside world. There are two types of NAT

Ø*Static NAT:* Static NAT is the mapping of one internal address to one public address. With static NAT, you will need multiple public addresses to allow internal clients to access the Internet.

Ø*NAT overloading:* A more popular form of NAT, NAT overloading is the concept that all internal address get translated to the one public address on the NAT device.

·**Web services:**

POP3/IMAP4: POP3 and IMAP4 are the Internet protocols for receiving email over the Internet.

SMTP: SMTP is the Internet protocol for sending email over the Internet. SMTP servers are also known as *email servers*.

HTTP: HTTP servers are also known as *Web servers* and are used to host Web sites. HTTP is a protocol that is used to send the Web page from the Web server to the Web client.

FTP: FTP is an Internet protocol used to transfer files over the Internet. The files are hosted on FTP servers, which are then downloaded to any clients on the Internet.

Cabling

Rollover cable: A rollover cable is also known as a *console cable* and gets the name *rollover* because the order of the wires from one end of the cable to the other are totally reversed, or rolled over. The rollover/console cable is used to connect a computer to the console port or auxiliary port of the router for administration purposes.

·**Back-to-back serial cable:** The back-to-back serial cable is used to connect two Cisco routers directly together over a serial link. A back-to-back serial link will have one router act as the DCE device with the clock rate set and the other router act as the DTE device.

·**Straight-through cable:** A straight-through cable is used to connect dissimilar devices together. Scenarios that use straight-through cables are computer-to-switch and switch-to-router.

·**Crossover cable:** A crossover cable has wires 1 and 2 switch positions with wires 3 and 6 on one end and is used to connect similar devices together. Scenarios that use crossover cables are computer-to-computer, switch-to-switch, and computer-to-router (they are both hosts).

·**Coaxial cable:** A network cable type used in old Ethernet environments, such as 10Base2 and 10Base5. Coaxial cable is seen in high-speed Internet connections with cable companies today.

·**Fiber optic cable:** A unique cable type that has a glass core which carries pulses of light as opposed to copper cable carrying electrical signals (coax and twisted pair cabling)