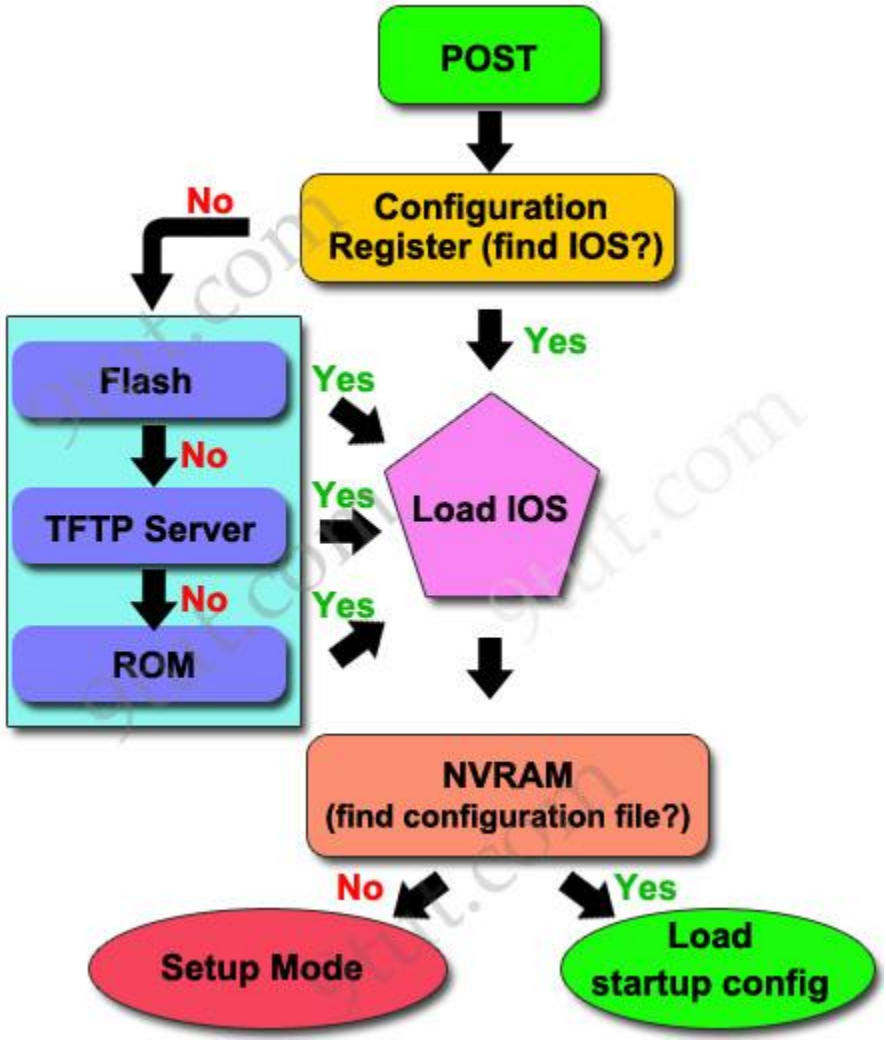
Different Types of Router Memory

- **ROM** - Power-on Self Test (POST) diagnostics.
- **Flash Memory -** Contains the full Operating System Image, Flash memory retains content when router is powered down or restarted.
- **RAM -** Very fast memory, used to hold running Cisco IOS Operating System, Provides temporary memory for the router configuration file of the router whiles the router is powered on.
- **NVRAM** - Used to store the Startup Configuration File. This is the configuration file that IOS reads when the router boots up.

Communicate with a Router using Console, Auxiliary, Telnet, SSH, HTTP and HTTPS

- **Connection by using Console Port**
  By connecting the routers console port to a workstation through a console cable.
- **Connection by using Auxiliary Port (AUX Port)**
  By using a remote computer through a modem that calls another modem connected to the router with a cable using the Auxiliary Port on the router. Auxiliary Port (AUX Port) allows a direct, non-network connection to the router, from a remote location.
- **Connection by using protocols like telnet, SSH, HTTP or HTTPS**

Cisco Router Boot Sequence, Cisco Router POST (Power on Self Test)



Cisco IOS Command Lines Modes

- User mode (User EXEC mode)
    - Router>
- Privileged mode (Privileged EXEC Mode)
    - Router#
- Global Configuration mode
    - Router(config)#
- Interface mode (Router physical interface configuration mode)
    - Router(config-if)#
- Subinterface mode (Router sub-interface configuration mode)
    - Router(config-subif)#
- Line mode (Router line configuration mode - console, vty etc.)
    - Router(config-line)#
- Router configuration mode (Routing protocols configuration mode.)
    - Router(config-router)#

Cisco Router Start-up Configuration file, Running Configuration file Commands

- Router1# copy running-config startup-config
- Router1# copy running-config tftp

Basic Cisco Router Configuration Commands

To configure a name for router, use hostname command from Global Configuration mode.

```
Router>enable

Router#configure terminal

Router(config)#hostname Router1

Router1(config)#exit

Router1#
```

- How to Configure a MOTD Banner for Router.

```
Router1>enable

Router1#configure terminal

Router1(config)#banner motd #Welcome to Router1#

Router1(config)#exit

Router1#
```

- How to enable DNS lookup

```
Router1>enable

Router1#configure terminal

Router1(config)#ip name-server 192.168.100.10

Router1(config)#exit

Router1#
```

- How to turn off the automatic name resolution

```
Router1>enable
```

Router1#configure terminal

Router1(config)#no ip domain-lookup

Router1(config)#exit

Router1#

- How to assign a Local Name to an IP address

  Router1>enable

  Router1#configure terminal

  Router1(config)#ip host PC001 192.168.100.122

  Router1(config)#exit

  Router1#

- How to Turn on synchronous logging

  Router1>enable

  Router1#configure terminal

  Router1(config)#line console 0

  Router1(config-line)#logging synchronous

  Router1(config-line)#exit

  Router1(config)#exit

  Router1#

- How to configure an inactivity time-out for automatic log-off

  Router1>enable

  Router1#configure terminal

Router1(config)#line console 0

Router1(config-line)#exec-timeout 3 0

Router1(config-line)#exit

Router1(config)#exit

Router1#

Configure passwords to secure Cisco Router

- How to password protect Console Port

  Router>enable

  Router#configure terminal

  Router(config)# line console 0

  Router(config-line)# password CISCO

  Router(config-line)# login

  Router(config-line#Ctrl-Z

  Router#

- How to password protect Auxilary (AUX Port) Port

  Router#config t

  Router(config)#line aux 0

  Router(config-line)#password cisco

  Router(config-line)#login

  Router(config-line)# Ctrl-Z

  Router#

- How to password protect VTY Ports (Telnet Ports)

```
Router#config t

Router(config)#line vty 0 4

Router(config-line)#password cisco

Router(config-line)#login

Router(config-line)# Ctrl-Z

Router#
```

- How to password protect Privileged Mode

```
Router#config t

Router(config)#enable password cisco

Router(config-line)# Ctrl-Z

Router#

Router#config t

Router(config)#enable secret cisco

Router(config-line)# Ctrl-Z

Router#
```

Configure IP address to Router

- There are two ways to configure an IP Address on the Router's Interface
    - Configure an IP Address to Fast Ethernet Interface - fa<port_number>
    - Configure an IP Address to Serial Interface - se<port_number>

```
Router1>enable

Router1#configure terminal
```

Router1(config)#interface se/fa ip_address default_subnet_mask

Router1(config-if)#no shutdown

Router1(config-line)#exit

Router1(config)#exit

Router1#

Saving, Erasing, and Verifying Configuration

Cisco device store commands information into two configuration files:

Running & Startup

- Running configuration - Save the data from RAM to NVRAM
    - Router1#copy running-config startup-config or copy run start
    - You can view all files by typing show running-config in privileged mode
- Startup configuration tells us how much NVRAM is being used to store the startup-config file. It is the best way to verify the configuration that will be used for the next time, whenever the router is reloaded.
    - Router1#copy running-config startup-config or copy run start
- Erasing the Configuration
    - You can erase the startup-config file by using the erase startup-config command.If you want to reload the router after using the erase startup-config command, then use reloads command.
    - Router1#reload
- Verifying Configuration
    - Verifying with the ping Command
    - Verifying with the traceroute Command
    - Verifying with the show interface Command
    - Verifying with the show ip interface Command
    - Using the show ip interface brief command
    - Verifying with the show protocols Commands
    - Using the show controllers Command

Cisco Router Show Commands

Cisco IOS Show Command	Description
Router1#show interfaces	Displays statistics for all interfaces
Router1#show interface fa0/0	Displays statistics of fa0/0 interface.
	You may use other interface also.
Router1#show ip interface brief	Displays a summary of all IPv4 interfaces, including
	status and IPv4 address assigned in router "Router1"
Router1#show ipv6 interface brief	Displays a summary of all IPv6 interfaces, including
	status and IPv6 address assigned in router "Router1"
Router1#show controllers serial 1/0	Displays statistics for interface hardware serial 1/0.
	Statistics display if the clock rate is set and
	if the cable is DCE, DTE, or not attached
Router1#show clock	Displays the system clock of the router "Router1".
Router1#show hosts	Displays the configured hostnames and their
	corresponding IP addresses of the router "Router1"
Router1#show users	Displays all users connected to the router "Router1"
Router1#show history	Displays history of Cisco IOS commands used
Router1#show flash	Displays info about Flash memory
Router1#show version	Displays info about loaded Cisco IOS software
Router1#show arp	Displays the ARP table of the router "Router1".
	ARP table is the table which contains the
	Resolved IPv4 address to MAC address mappings.
Router1#show protocols	Displays status of configured Layer 3 protocols
Router1#show startup-config	Displays configuration saved in NVRAM
Router1#show running-config	Displays configuration currently running in RAM
Router1#show ip route	Displays the IPv4 routing table of the router "Router1"
Router1#show ipv6 route	Displays the IPv6 routing table of the router "Router1"

Cisco IOS Shortcut Keys

Key Combination	Purpose
CTRL-A	Cursor moves to the "Beginning" of the Line.
CTRL-E	Cursor moves to the “End” of the line
CTRL-B	Cursor moves back "Back One Character". (or Left Arrow)
CTRL-F	Cursor moves forward "Back One Character". (or Right Arrow)
ESCAPE-B	Cursor moves "Backward to the Beginning of the Next Word".
ESCAPE-F	Cursor moves "Forward to the Beginning of the Next Word".
CTRL-U	Erases the line completely
CTRL-W	Erases the word the cursor is under
CTRL-Z	Move from Configuration mode back to Privilege EXEC mode
CTRL-D	Delete