Cisco IOS supports various command modes, among those following modes are the highly tested in CCNA level exam.

- User EXEC Mode
- Privileged EXEC Mode
- Global Configuration Mode
- Interface Configuration Mode
- Sub Interface Configuration Mode
- Setup Mode
- ROM Monitor Mode

We need to execute specific commands to navigate from one mode to another. Following section describe IOS command modes with specific navigation commands in details.

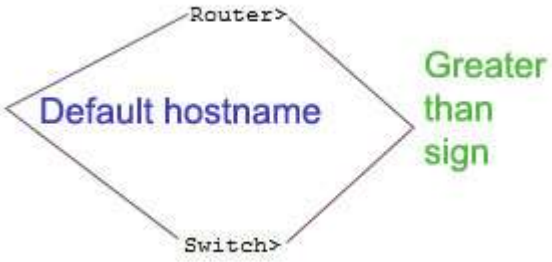
User EXEC Mode

This is the primary mode when you logged in router. On job environment, it is usually password protected. You need a valid username and password to access this mode. You have three chances to enter a valid password, before connection attempt is refused. On LAB environment, you could access this mode directly (unless you have configured it for password).

```
Press RETURN to get started!
          User EXEC Mode

Router>
```

By default, it consists device hostname followed by a greater than sign. For router default hostname is **Router**. For switch default hostname is **Switch**.



Default hostname can be changed from global configuration mode using *hostname* command.

User exec mode is the subset of privileged exec mode. For security purposes, this mode is reserved for tasks that do not change the configuration of router. It has limited commands those allow you to connect to remote devices, change terminal line settings on a temporary basis, perform basic tests and list system information.

Enter? at command prompt to list all available commands on this mode.

```
Router>? ← Enter ? at command prompt
Exec commands: to list all available
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  ping        Send echo messages
  resume      Resume an active network connection
  show        Show running system information
  ssh         Open a secure shell client connection
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
Router>
```

Privileged Exec Mode

Privileged exec mode is the main exec mode. Same as user exec mode on job environment, this mode is also password protected. You have to enter the password to access this mode. In lab environment, it's usually unprotected. You can access this mode by executing `enable` command at user exec mode.

```
Router>
Router>enable
Router#
```

Most commands of this mode are one time commands, like **show** or **clear** commands, which show current configuration status and clear counters on interfaces respectively. You can list all available commands of this mode by entering **?** at command prompt.

This mode has all commands available for exec mode including user exec mode.

Common commands can be entered either from user exec mode or privileged exec mode.

Exec mode commands are not saved across the reboot of device.

Global Configuration Mode

Global configuration mode is the next access level in IOS mode sequence. This mode is used to configure device globally, or to enter in element like interface, protocols specific configuration mode. Use `configure terminal` command at privileged exec mode to access global configuration mode.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
```

Global configuration mode and element specific configuration mode allow you to make change in running configuration. By default running configuration is not stored across the reboot, but you can save running configuration to preserve it across the reboot. To save running configuration use `copy running-config startup-config` from privileged EXEC mode commands.

To return in privileged exec mode from global configuration mode or element specific configuration mode we have three commands.

- Ctrl + Z (Press CTRL key with Z Key)
- exit
- end

`Ctrl+Z` key combination will work in all mode. But it has a drawback, if you pressed `Ctrl+Z` at the end of a command line in which a valid command has been typed, that command will be added in the running configuration file.

exit command only works in global configuration mode.

end command is the safest way to exit from global configuration mode or interface specific mode. It will always take you back in privileged EXEC mode regardless of which configuration mode or configuration sub-mode you are in.

Interface configuration mode

Interface configuration mode is used to configure interface related settings. Many settings are enabled on a per-interface basis like as serial port, Ethernet. Interface configuration commands affect interface related settings, such as enable or disable interface, bandwidth, clock rate etc. To configure or change these setting, you need to enter in interface specific mode. To access interface configuration mode use following command.

```
Router(config)# interface type number
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface serial 0/0/0
Router(config-if)#
```

For example, to configure first serial port on 1841 series router we would use following command

```
Router(config)#interface serial 0/0/0
```

Sub Interface Configuration Mode

If interface supports virtualization, then sub interface mode is used to configure the virtual interface. From sub interface configuration mode you can configure multiple virtual interfaces known as sub interface on a single physical interface. On router usually virtual interfaces are used for wan connection such as Frame Relay. Frame Relay connection supports multiple point-to-point links known as PVC (Permanent virtual circuits). PVC can be combined under the separate sub interfaces those are configured on a single physical interface. Another example of sub interface is VLAN communication, where we create sub interface on physical FastEthernet port for each VLAN. To access sub interface configuration mode run following command from interface configuration mode.

```
Router(config-if)# interface type number
```

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#interface fastethernet 0/0.1
Router(config-subif)#
```

In above example fastethernet 0/0.1 is the virtual interface (sub interface) of physical interface fastethernet 0/0.

Setup Mode

At the end of booting process, router tries to locate running configuration. If it finds the configuration, it would load that. If it fails to find valid configuration, it would initiate the setup mode. In Setup Mode router will ask you questions about the initial settings in a sequence for basic configuration values. Depending on answers provided by you, router will automatically build initial configuration.

```
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
 RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team


         --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.


Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system

Would you like to enter basic management setup? [yes/no]: yes
Configuring global parameters:

  Enter host name [Router]:
```

Router will enter in setup mode only if it does not find the valid configuration.

ROMMON Mode

During the boot process, router loads IOS image in RAM. If it does not find a valid IOS image, it would enter in ROMMON mode. You can manually enter in this mode by interrupting boot sequence during the startup. This mode is used for diagnostic purpose. By default router does not enter in this mode unless it completely fail to locate the IOS image. To manually enter in this mode, execute reload command from privileged exec mode and then press `CTRL + C` key combination during the first 60 seconds of startup.

```
Router>enable
Router#reload
Proceed with reload? [confirm]y
System Bootstrap, Version 12.3(8r)T8, RELEASE SOF
TWARE (fc1)
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.

Self decompressing the image :
#########
monitor: command "boot" aborted due to user interrupt
rommon 1 >
```

Cisco IOS mode summary

Mode	Purpose	Prompt	Command to enter	Command to exit

Mode	Purpose	Prompt	Command to enter	Command to exit
User EXEC	Allow you to connect with remote devices, perform basic tests, temporary change terminal setting and list system information	Router >	Default mode after booting. Login with password, if configured.	Use **exit** command
Privileged EXEC	Allow you to set operating parameters. It also includes high level testing and list commands like show, copy and debug.	Router #	Use **enable** command from user exec mode	Use **exit** command
Global Configuration	Contain commands those affect the entire system	Router(config)#	Use `configure terminal` command from privileged exec mode	Use **exit** command
Interface Configuration	Contain commands those modify the operation of an interface	Router(config-if)#	Use **interface *type number*** command from global configuration mode	Use **exit** command to return in global configuration mode
Sub-Interface Configuration	Configure or modify the virtual interface created from physical interface	Router(config-subif)	Use **interface *type sub interface*** number command from global configuration mode or interface configure mode	Use **exit** to return in previous mode. Use **end** command to return in privileged exec mode.
Setup	Used by router to create initial configuration, if running configuration is not present	Parameter[Parameter value]:	Router will automatically insert in this mode if running configuration is not present	Press **CTRL+C** to abort. Type **Yes** to save configuration, or **No** to exit without saving when asked in the end of setup.
ROMMON	If router automatically enter in this mode, then it indicates that it fails to locate a valid IOS image. Manual entrance in this mode Allow you to perform low-level diagnostics.	ROMMON>	Enter **reload** command from privileged exec mode. Press **CTRL + C** key combination during the first 60 seconds of booting process	Use **exit** command.

- IOS commands are not case sensitive; you can enter them in uppercase, lowercase or even in mixed case.
- Password is case sensitive. Make sure you type it in correct case.
- In any mode, you can obtain a list of commands available on that mode by entering a question mark (`?`).
- Standard order of accessing mode is
- User Exec mode => Privileged Exec mode => Global Configuration mode => Interface Configuration mode => Sub Interface Configuration mode
- Router will enter in setup mode only if it fails to load a valid running configuration.
- Router will enter in ROMMON mode only if it fails to load a valid IOS image file.
- You can manually enter in ROMMON mode for diagnostics purpose.