EXPLORATION 1

Chapter 11

Configuring and Testing Your Network

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Upon completion of this chapter, you will be able to:

- Define the role of the Internetwork Operating System (IOS).
- Define the purpose of a configuration file.
- Identify several classes of devices that have the IOS embedded.
- Identify the factors contributing to the set of IOS commands available to a device.
- Identify the IOS modes of operation.
- Identify the basic IOS commands.
- Compare and contrast the basic show commands.

Question

What is Router?

Router is a Computer

CISCO IOS - Cisco Internetwork Operating System

Internetwork Operating System for Cisco networking devices

SECURITY

ADDRESSING

INTERFACES

ROUTING

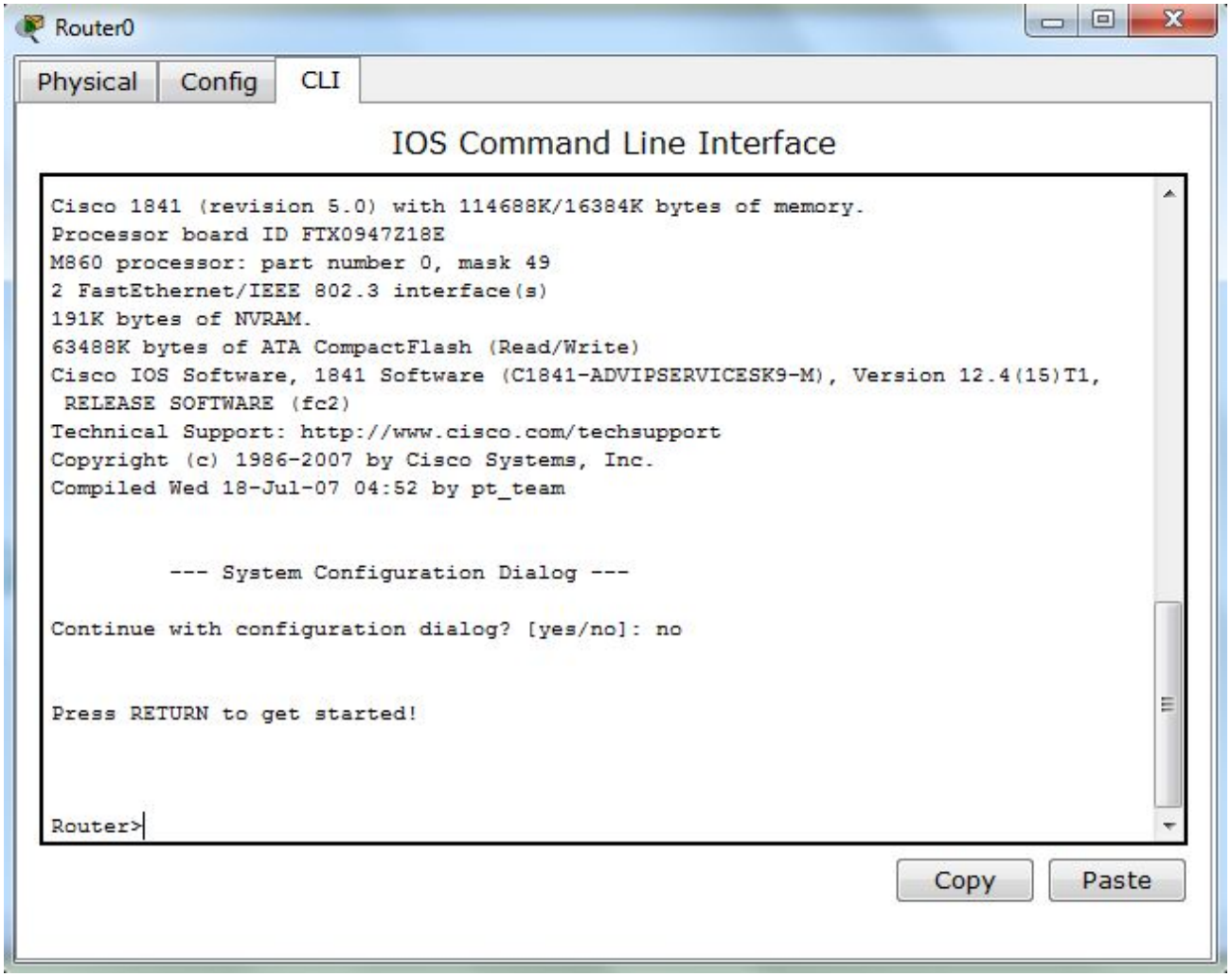
QoS

MANAGING RESOURCES

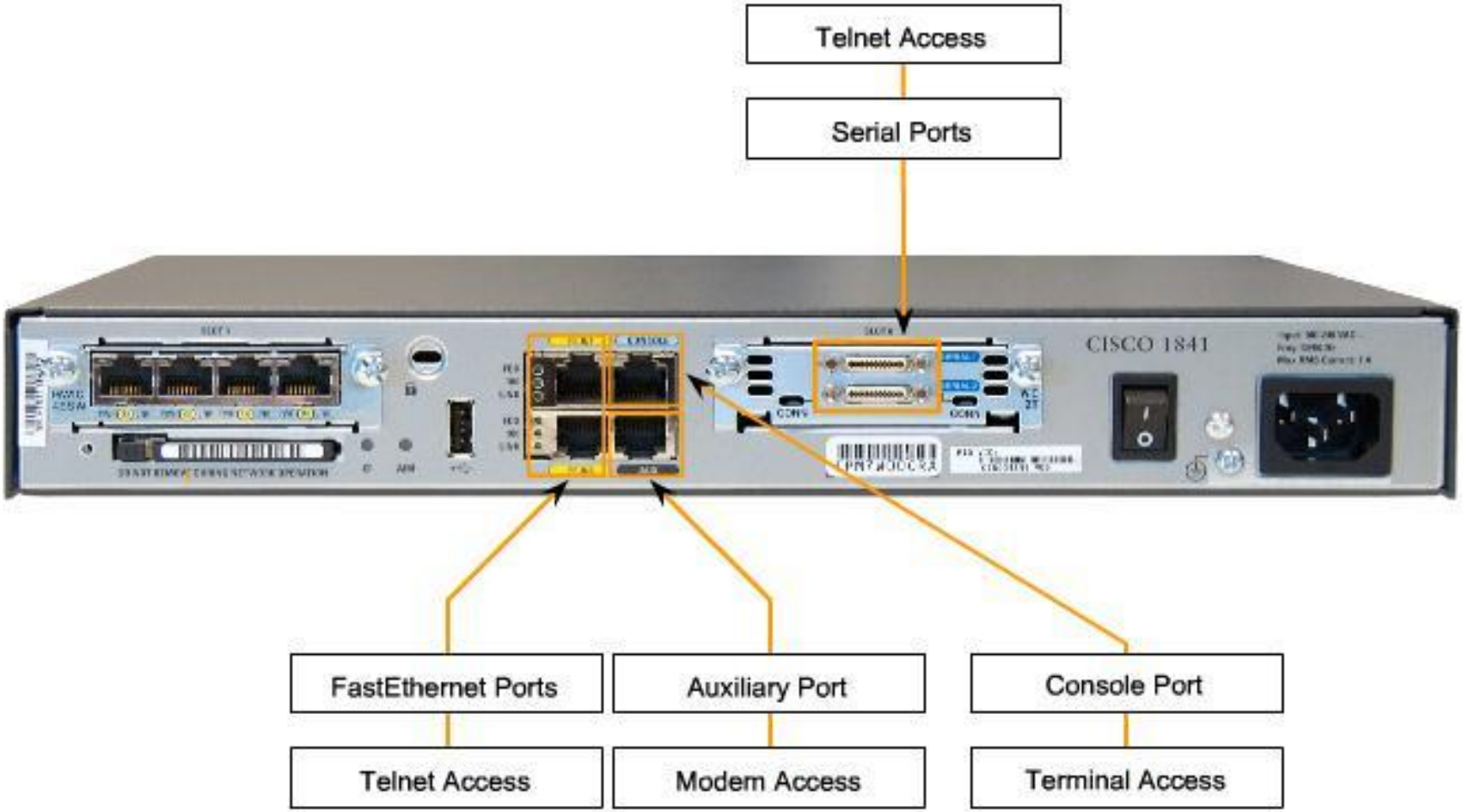
CISCO IOS

- CLI – Command Line Interface
- The IOS file itself is several megabytes in size and is stored in semi-permanent memory area called FLASH.
- In many Routers IOS is copied into RAM and the device is powered on and the IOS runs from RAM.

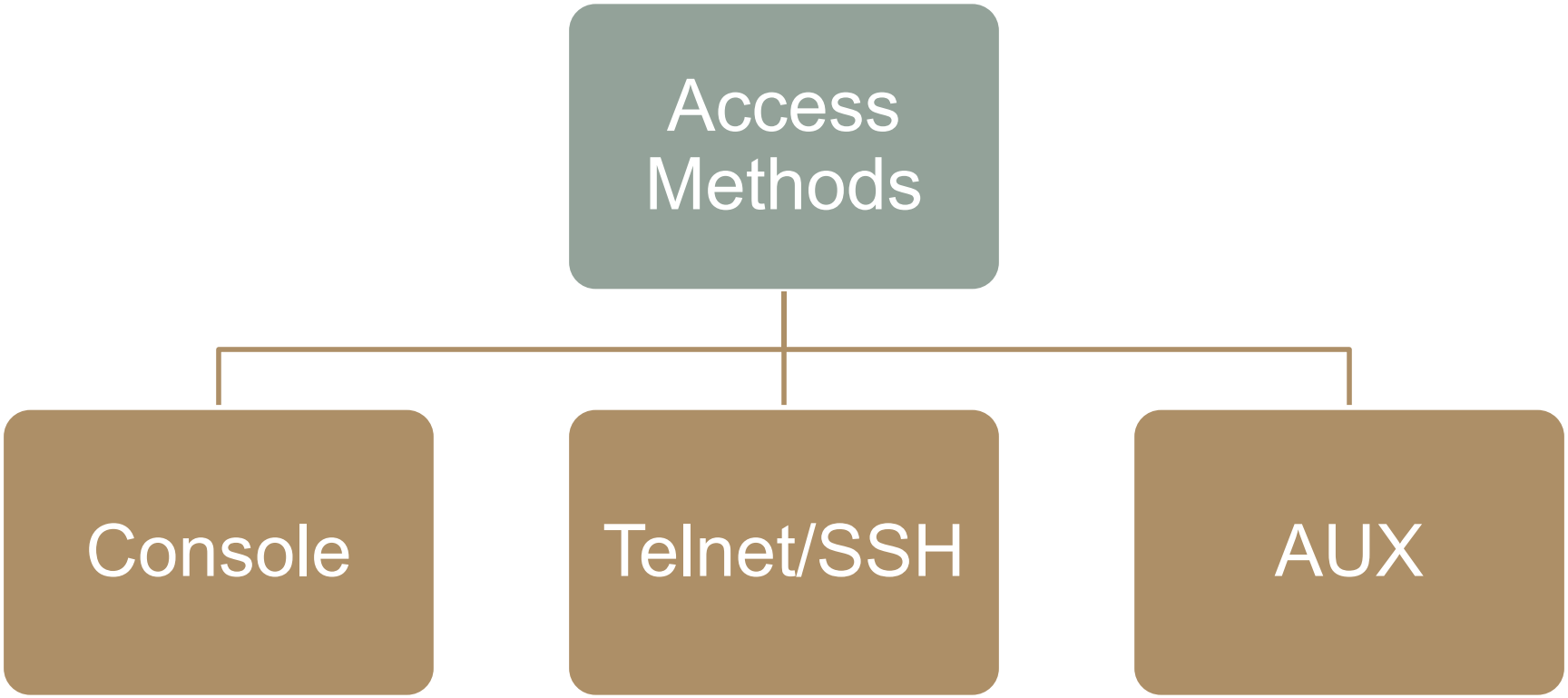
CLI – Command Line Interface



Accessing to Router



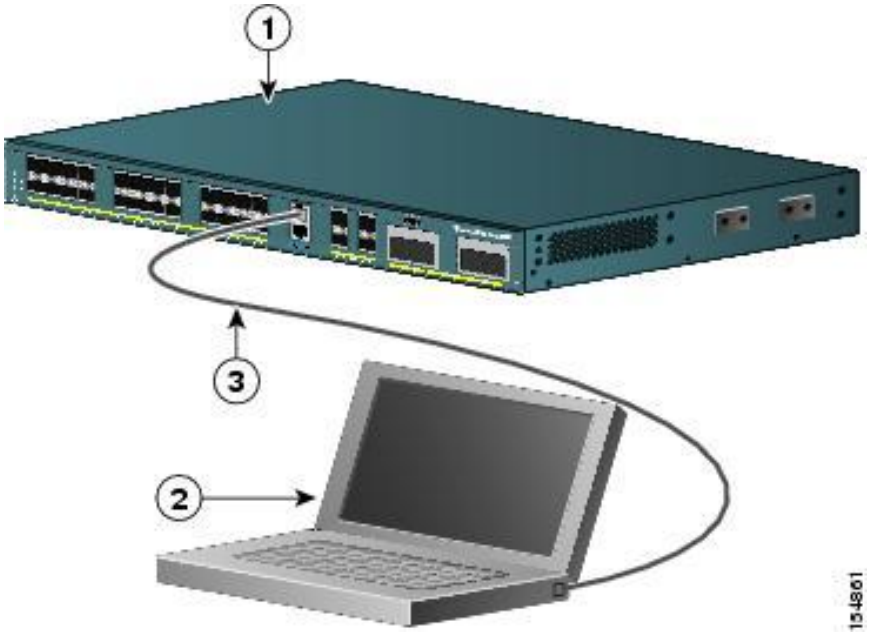
Access Methods



Access with Console

- Also known as CTY line
- Is a management port
- Accessible even if no network services have been configure on the device

Access with Console



Examples of Console use are:

- The initial configuration of the network device
- Disaster recovery procedures and troubleshooting where remote access is not possible
- Password recovery procedures

Access with Telnet

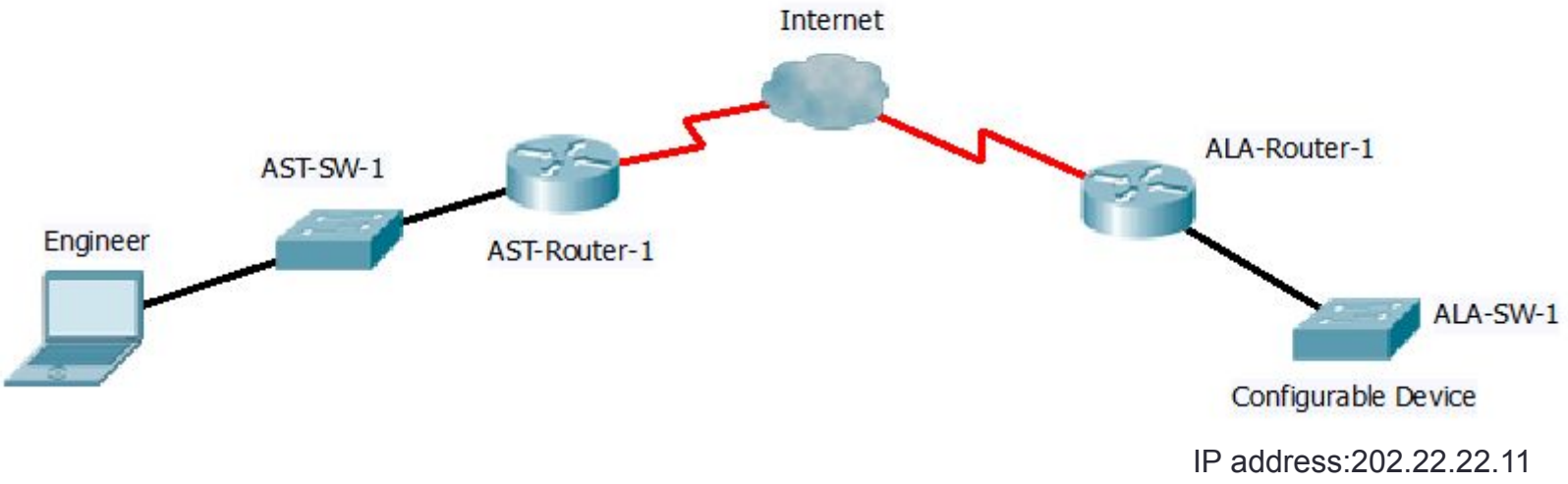
- Method for recovery accessing a CLI session is to telnet to the router
- Telnet sessions require active networking services on the device
- The network device must have at least one active interface configured with a Layer 3 address

Access with SSH (Secure Shell)

- Secure method for remote device access
- Provides stronger password authentication
- Encrypts all communications between the client and the IOS device

Telnet/SSH Configuration

Connection by IP address

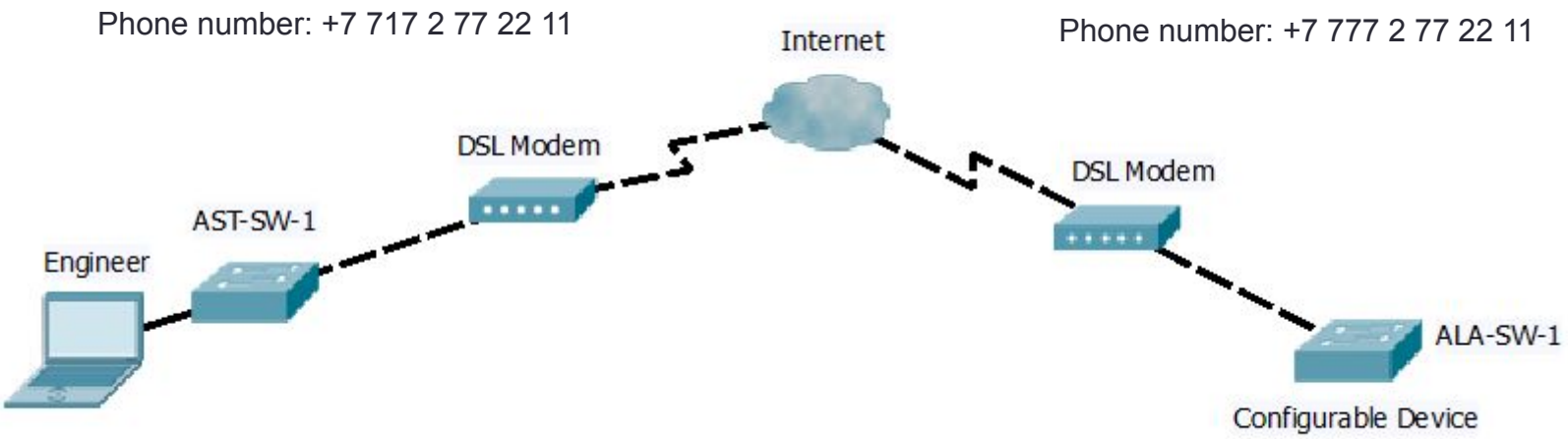


Access with AUX port

- CLI session remotely is via telephone dialup connection using a modem connected to the router's AUX port
- Doesn't require any configured interfaces

Aux Configuration

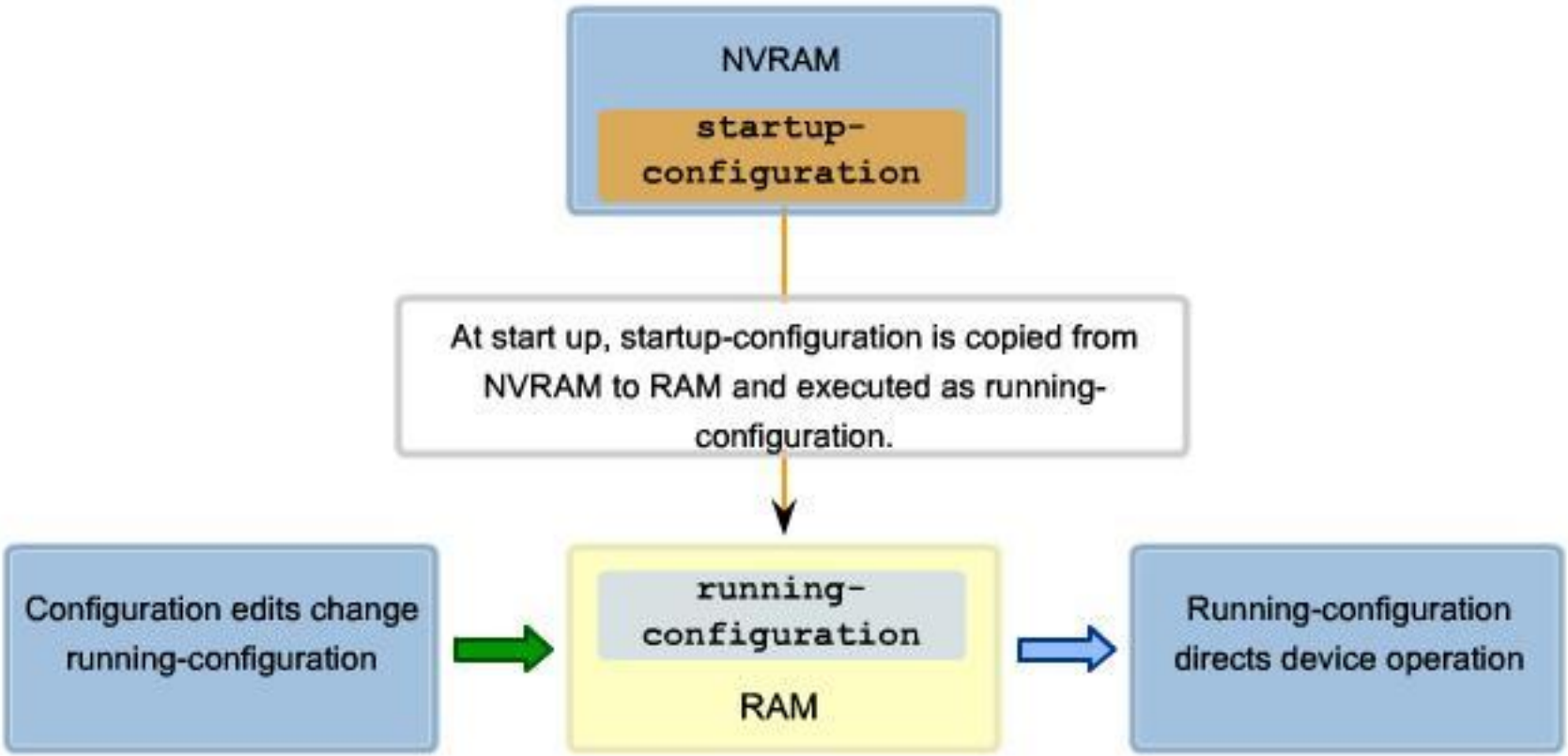
Connection by Subscriber Phone Number



Types of Configuration Files

- Running configuration file
- Startup configuration file

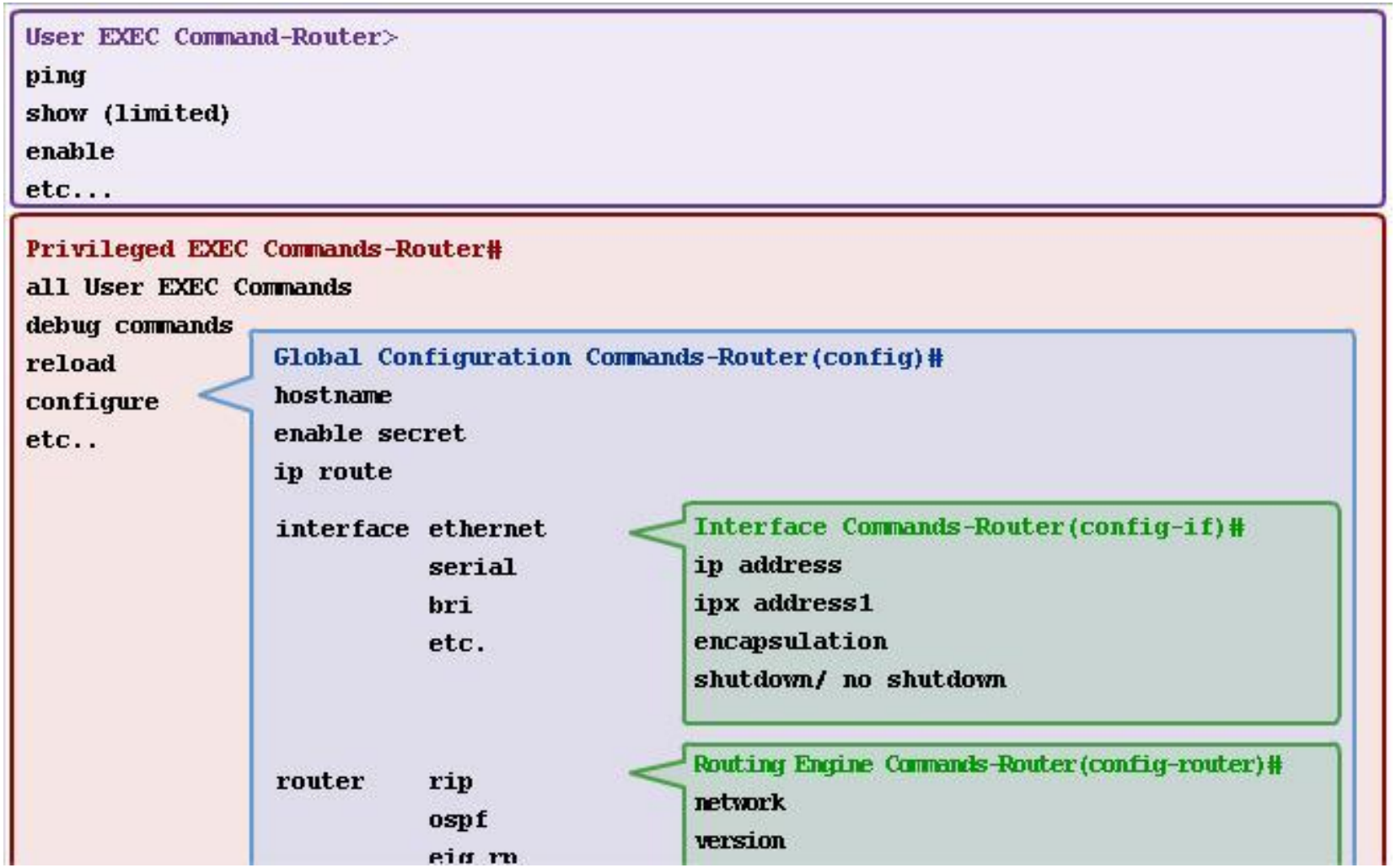
Configuration Files



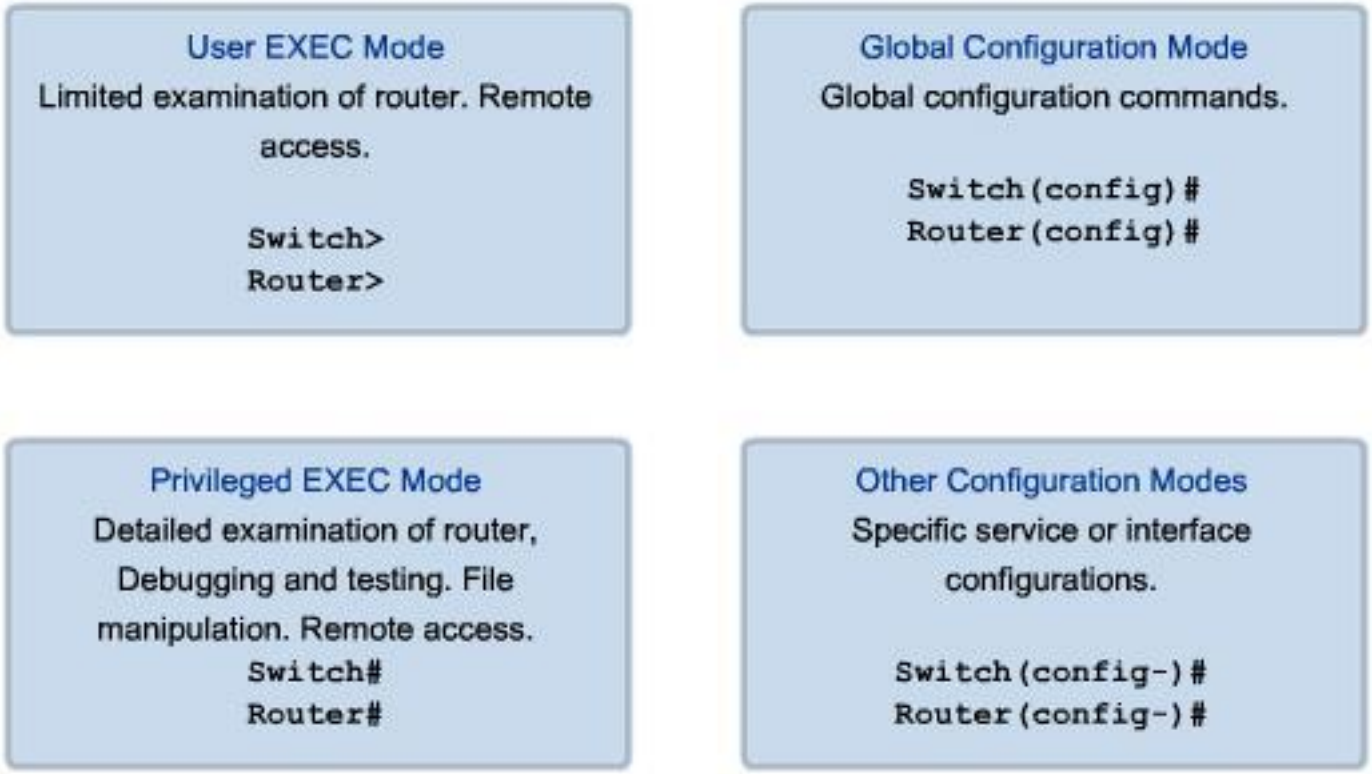
CISCO IOS Modes

- User executive mode
- Privileged executive mode
- Global configuration mode
- Other specific configuration modes

CISCO IOS Modes



CISCO IOS Modes



CISCO IOS Modes

```
Router>ping 192.168.10.5

Router#show running-config

Router(config)#Interface FastEthernet 0/0

Router(config-if)#ip address 192.168.10.1 255.255.255.0
```

The prompt changes to denote the current CLI mode.

```
Switch>ping 192.168.10.9

Switch#show running-config

Switch(config)#Interface FastEthernet 0/0

Switch(config-if)#Description connection to WEST LAN4
```

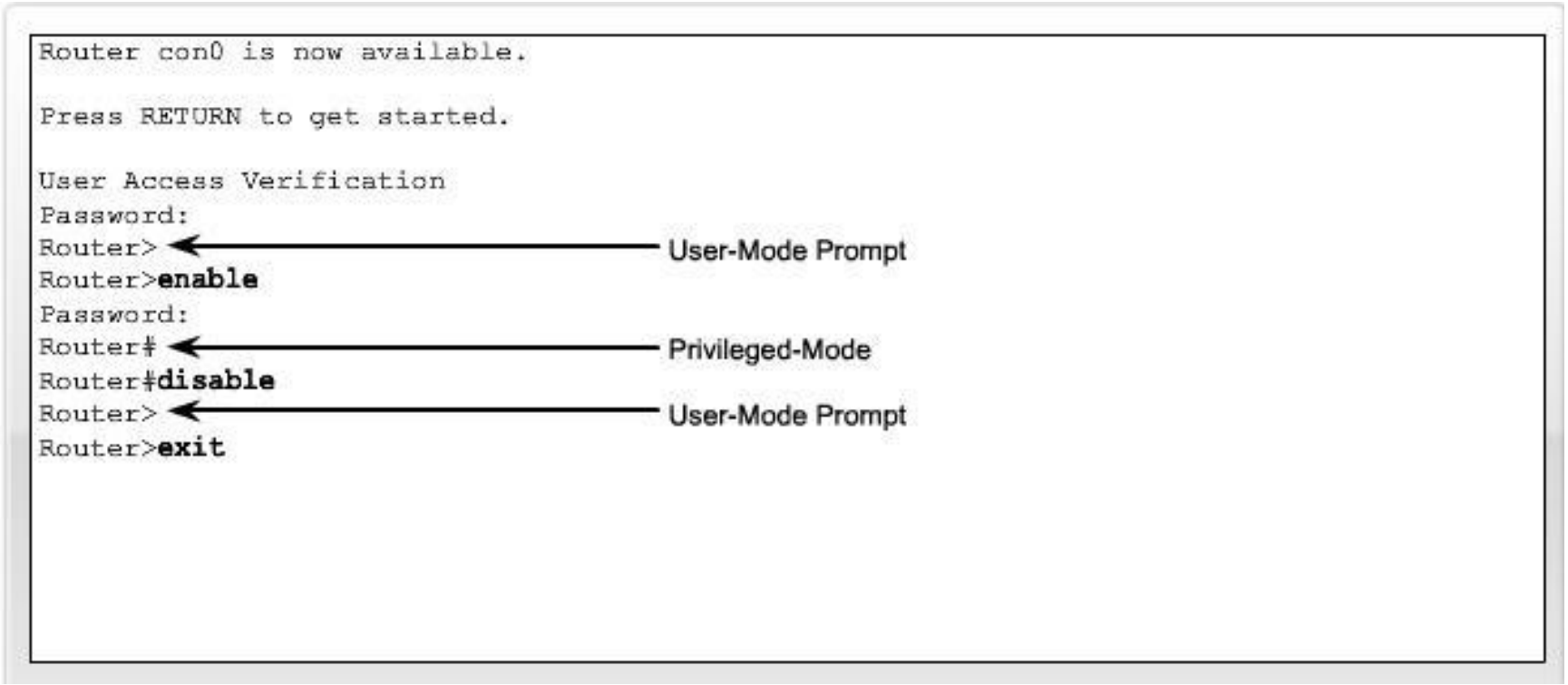
User Executive Mode

- EXEC mode is view-only mode
- Doesn’t allow execution of any commands that might change the configuration of device
- By default, there is no authentication required to access the EXEC mode from the console
- It is good practice to ensure that authentication is configured during the initial configuration

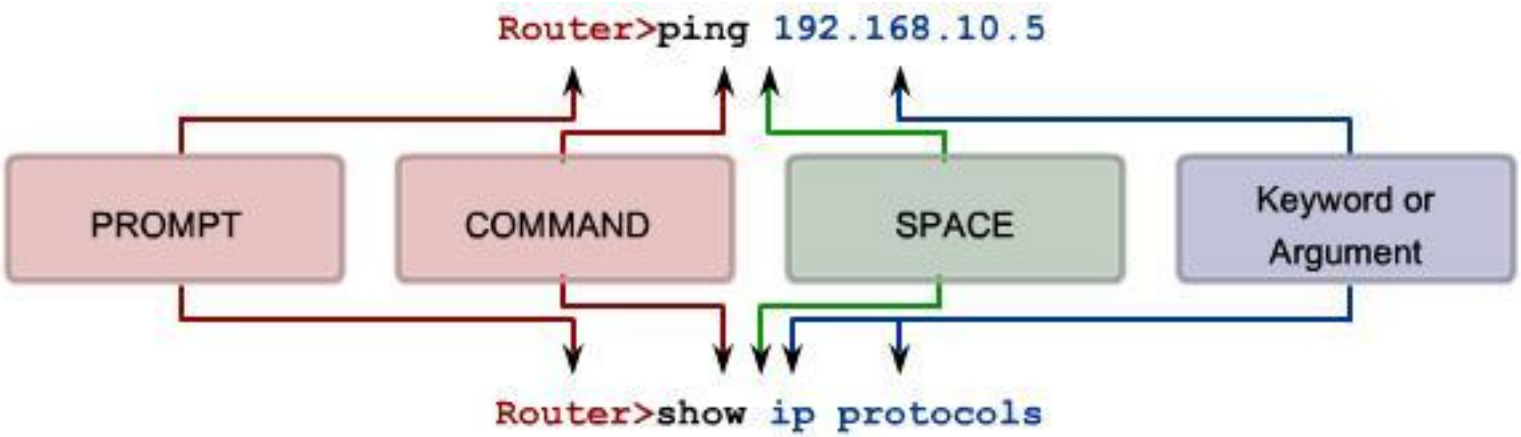
Privileged EXEC Mode

- The execution of configuration and management commands requires that the network administrator use the privileged EXEC mode, or a specific mode further down the hierarchy.

Switching between EXEC and Privileged EXEC modes



Structure of Command



Using CLI Help
Context-Sensitive Help

Example of a sequence of commands using the CLI context sensitive help

```
Cisco#cl?
clear  clock
Cisco#clock ?
  set  Set the time and date
Cisco#clock set
% Incomplete command.
Cisco#clock set ?
  hh:mm:ss  Current Time
Cisco#clock set 19:50:00
% Incomplete command.
```

Command explanations

Incomplete command messages

Invalid input messages

Variable formats

```
Cisco#clock set 19:50:00 ?
  <1-31>  Day of the month
  MONTH   Month of the year
Cisco#clock set 19:50:00 25 6
                            ^
Invalid input detected at '^' marker.
Cisco#clock set 19:50:00 25 June
% Incomplete command.
Cisco#clock set 19:50:00 25 June ?
  <1993-2035>  Year
Cisco#clock set 19:50:00 25 June 2007
Cisco#
```

Command Syntax Check

The IOS returns a help message indicating that required keywords or arguments were left off the end of the command:

```
Switch#>clock set
% Incomplete command.
Switch#clock set 19:50:00
% Incomplete command.
```

The IOS returns a help message to indicate that there were not enough characters entered for the command interpreter to recognize the command.

```
Switch#c
% Ambiguous command:'c'
```

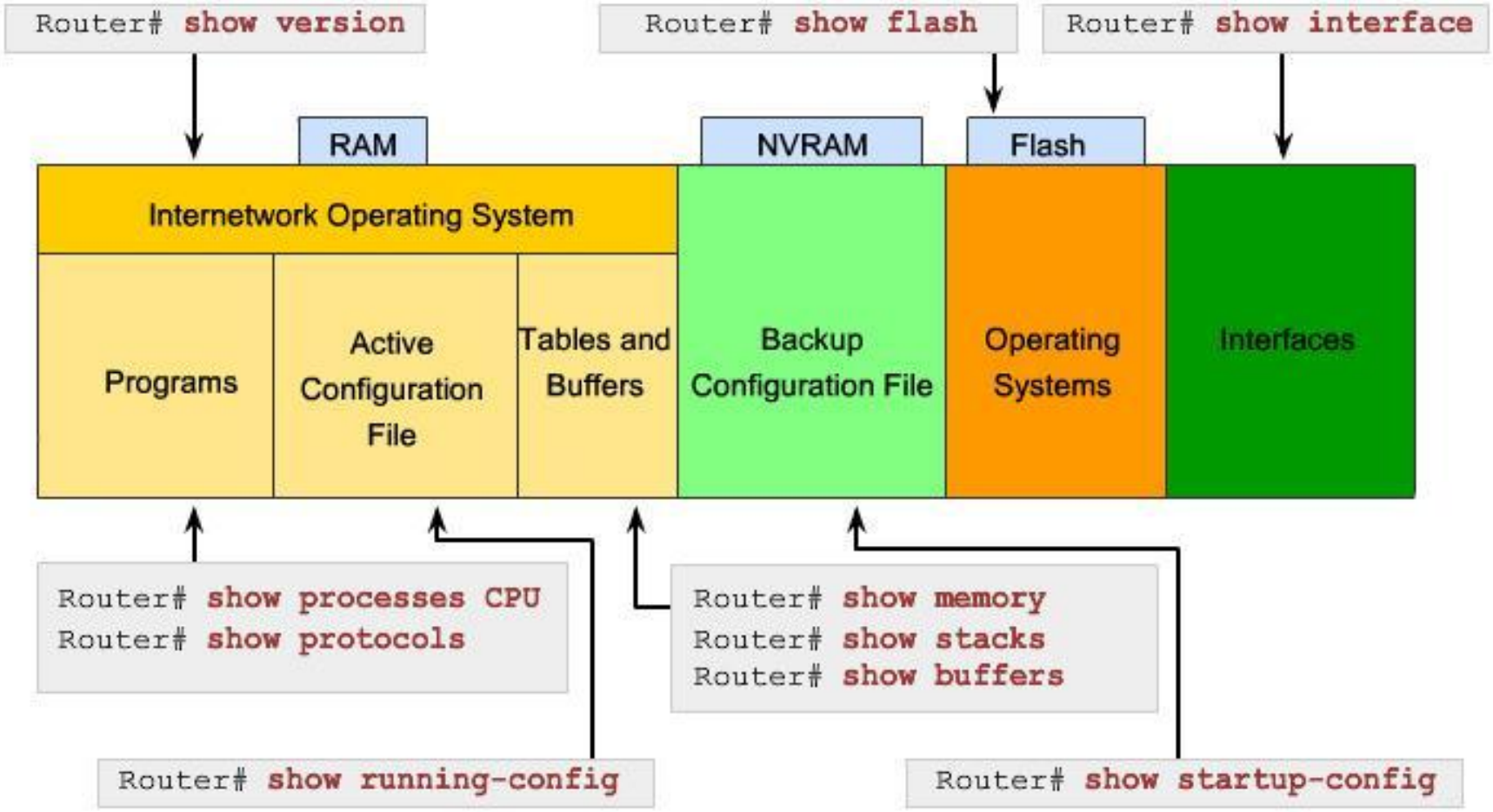
The IOS returns a "^" to indicate where the command interpreter can not decipher the command:

```
Switch#clock set 19:50:00 25 6
                          ^
% Invalid input detected at '^' marker.
```

Hot Keys and Shortcuts

- Tab - Completes the remainder of the command or keyword
- Ctrl-R - Redisplays a line
- Ctrl-Z - Exits configuration mode and returns to the EXEC
- Down Arrow - Allows user to scroll forward through former commands
- Up Arrow - Allows user to scroll backward through former commands
- Ctrl-C - Aborts the current command and exits the configuration mode

Structure of IOS



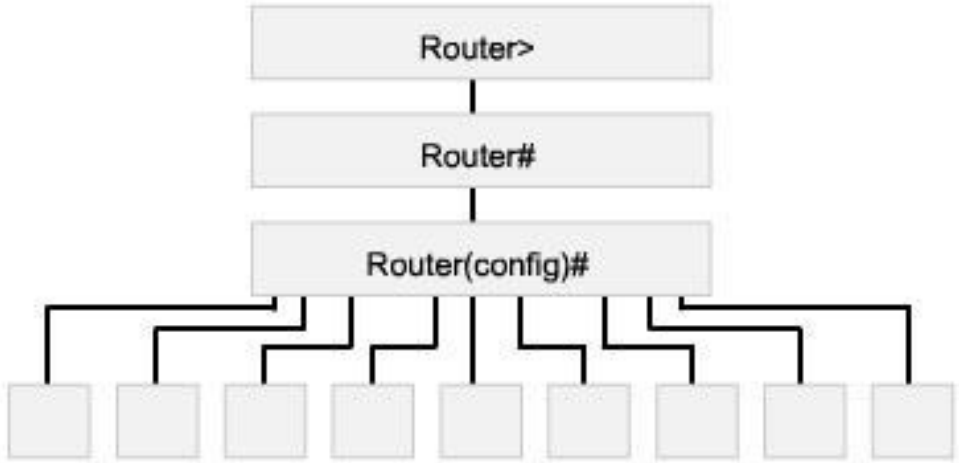
Global Configuration Mode

User EXEC mode

Privileged EXEC mode

Global configuration mode

Specific configuration mode

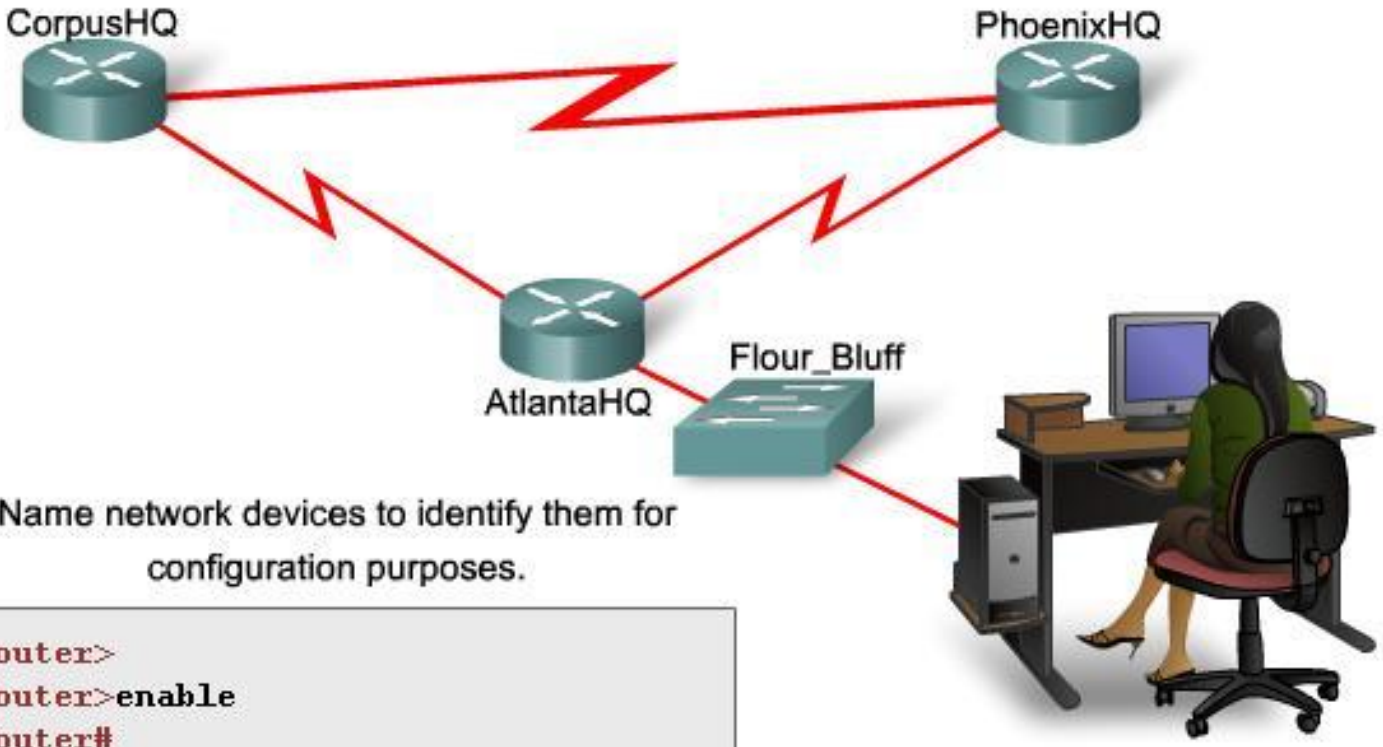


Configuration Mode	Prompt
Interface	Router(config-if)#
Line	Router(config-line)#
Routers	Router(config-router)#

Basic Configurations Using CISCO IOS

- Some guidelines for naming conventions are that names should:
  - Start with a letter
  - Not contain a space
  - End with a letter or digit
  - Have characters of only letters, digits, and dashes
  - Be 63 characters or fewer
- Without name it is difficult to identify devices

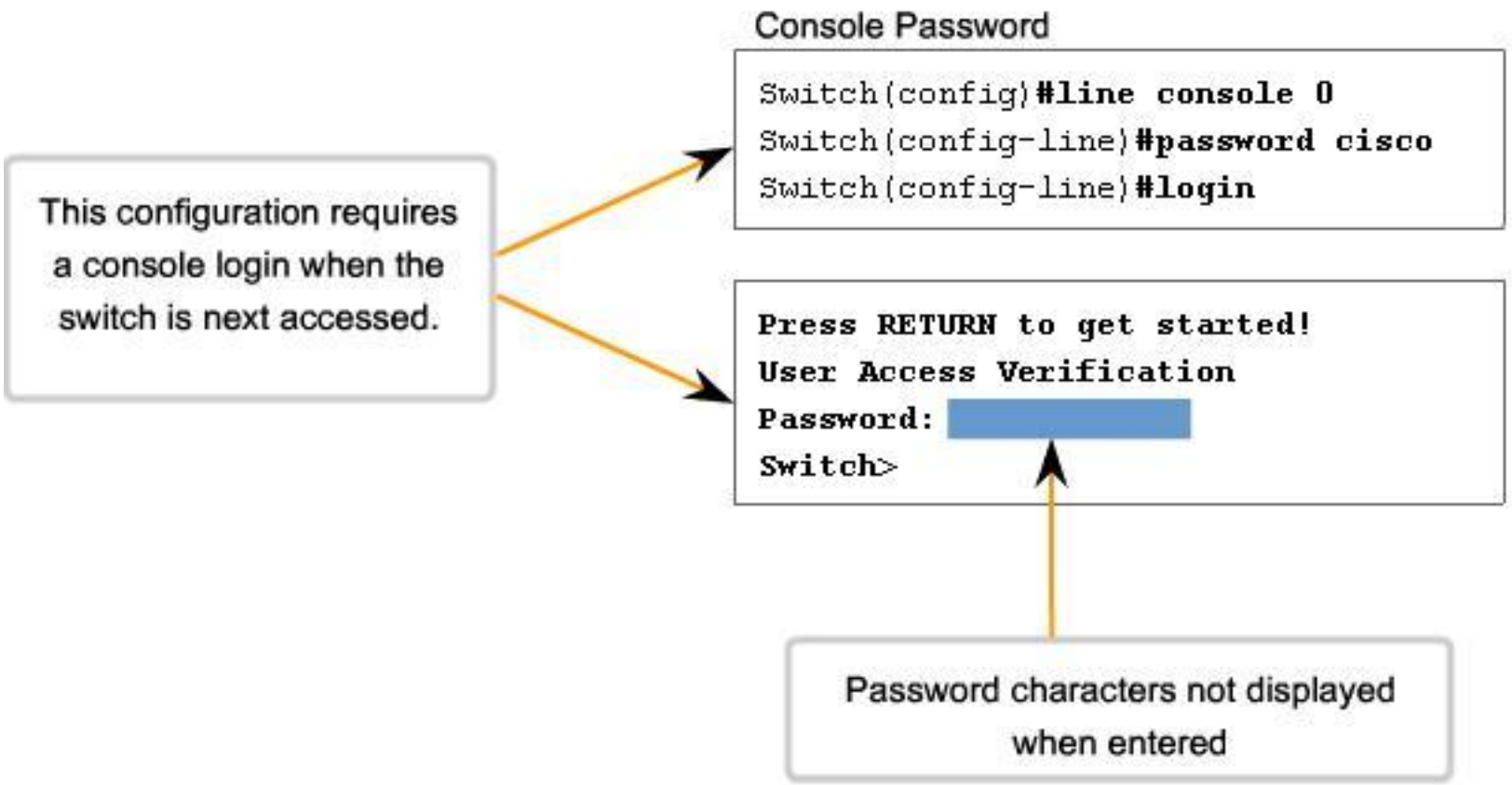
Giving names for devices



Name network devices to identify them for configuration purposes.

```
Router>
Router>enable
Router#
Router#configure terminal
Router(config)#hostname AtlantaHQ
AtlantaHQ(config)#
```

Password for Console



The passwords introduced here are:

- Console password - limits device access using the console connection
- Enable password - limits access to the privileged EXEC mode
- Enable secret password - encrypted, limits access to the privileged EXEC mode
- VTY password - limits device access using Telnet

Consider these key points when choosing passwords:

- Use passwords that are more than 8 characters in length.
- Use a combination of upper and lowercase and/or numeric sequences in passwords.
- Avoid using the same password for all devices.
- Avoid using common words such as password or administrator, because these are easily guessed.

Different types of Passwords

Virtual Terminal Password

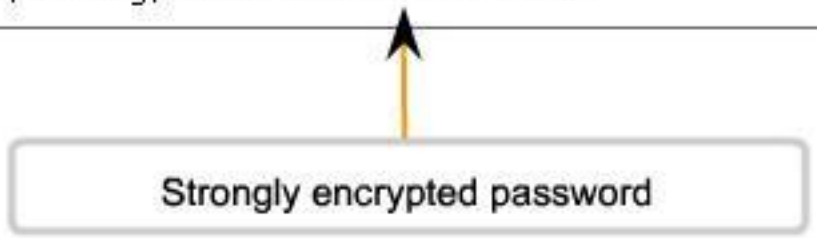
```
Router(config)#line vty 0 4
Router(config-line)#password cisco
Router(config-line)#login
```

Enable Password

```
Router(config)#enable password san fran
```

Enable Secret Password

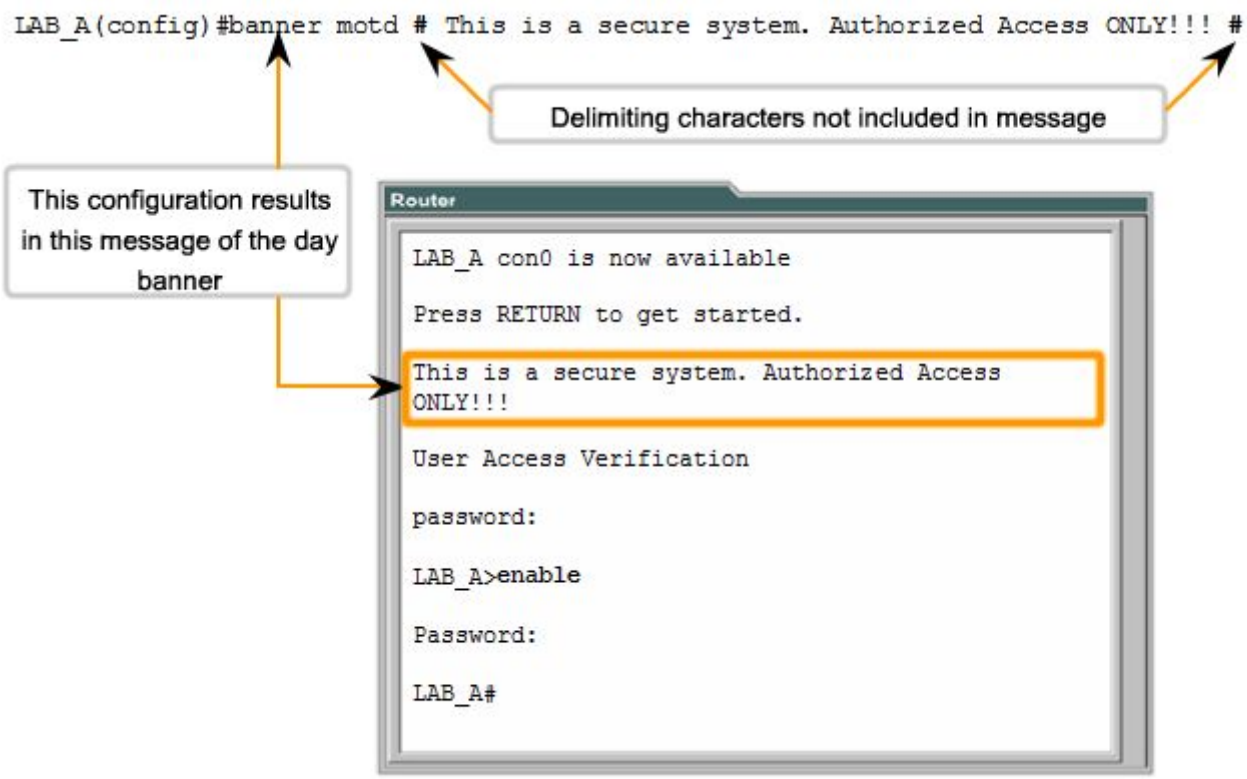
```
Router(config)#enable secret cisco
```



Encryption of Passwords

- service password-encryption

Banner Message



Managing Configuration Files

- router#copy running-config startup-config
- rrase startup-config

Configuring Interfaces

All interfaces are accessed by issuing the **interface** command at the global configuration prompt.

In the following commands, the *type* argument includes serial, ethernet, fastethernet, and others:

```
Router(config)#interface type port
Router(config)#interface type slot/port
Router(config)#interface type slot/subslot/port
```

The following command is used to administratively turn off the interface:

```
Router(config-if)#shutdown
```

The following command is used to turn on an interface that has been shutdown:

```
Router(config-if)#no shutdown
```

The following command is used to quit the current interface configuration mode:

```
Router(config-if)#exit
```

When the configuration is complete, the interface is enabled and interface configuration mode is exited.

Configuration of FastEthernet interface on Router


```
Router(config)#interface FastEthernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Configuration of Serial interface on Router


```
Router(config)#interface Serial 0/0/0
Router(config-if)#ip address 192.168.11.1 255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Interface Description


```
Router(config)#interface FastEthernet 0/0
Router(config-if)#description  Building B Sales LAN
Router(config-if)#exit
```

Description is all text after this space

Interface description used for internal network documentation

```
Router(config)#interface Serial 0/0/0
Router(config-if)#description  To Perth CKT-PT27834365-01
Router(config-if)#exit
```

Description is all text after this space

Q/A