

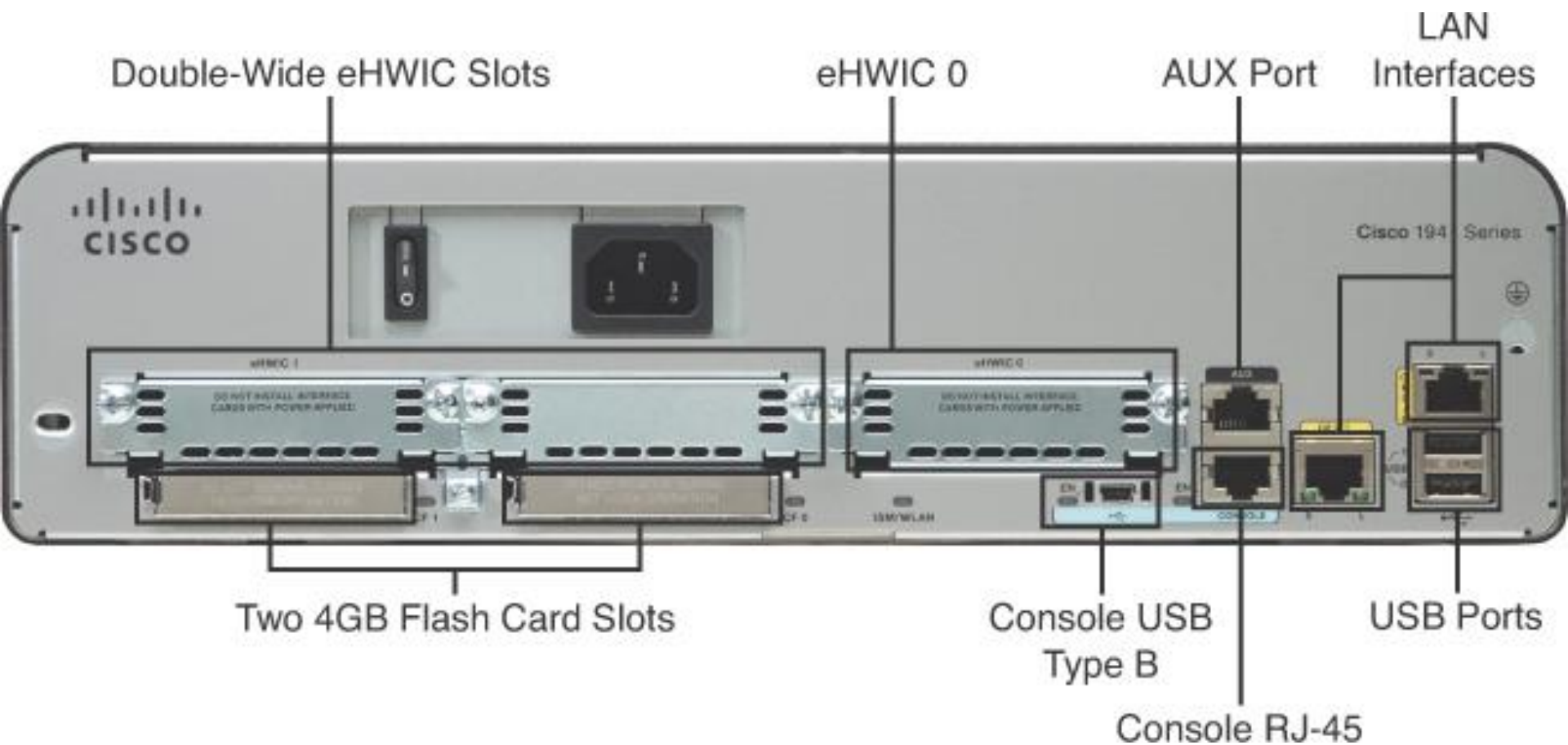


Basic config Router

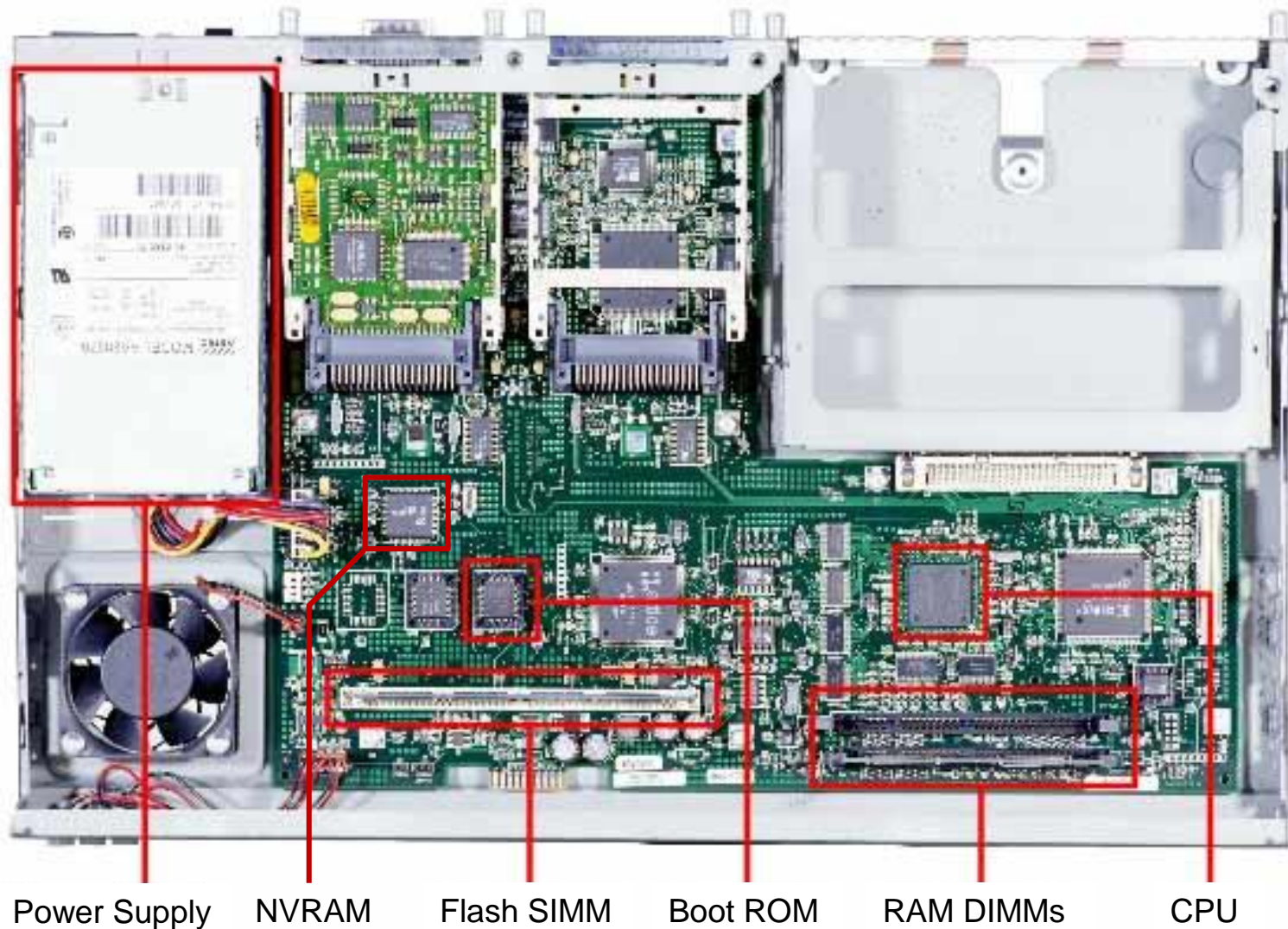
Router Example



Router Example (cont.)



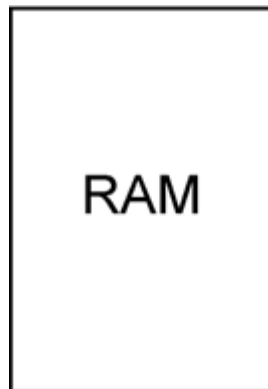
Router Internal Components



Router Internal Components (cont.)

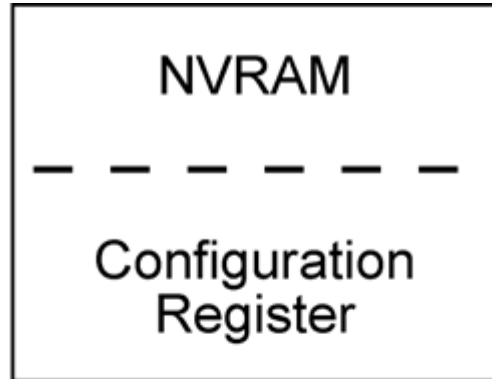
(**R**andom **A**ccess **M**emory)

Stores routing table &
running configuration
RAM contents lost when
power is off



NVRAM

Configuration
Register

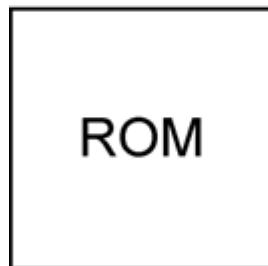


(**N**on-volatile **R**AM)

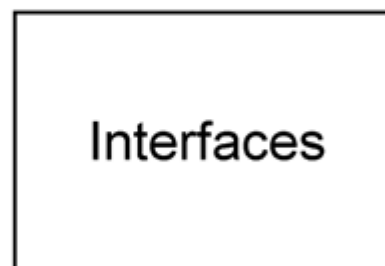
Stores startup configuration
The NVRAM is not erased
when the router is reloaded
or even switched off

(**R**ead **O**nly **M**emory)

Holds diagnostic software
used when router is power
up & stores the bootstrap
program

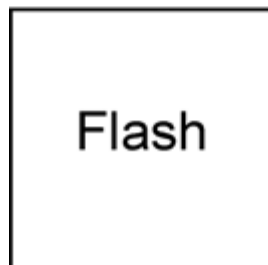


Interfaces

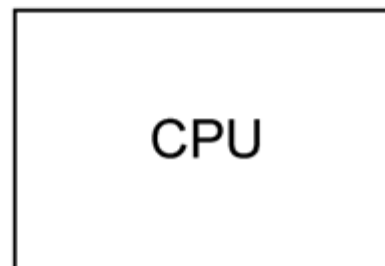


Physical Interfaces that are
used to connect network

Contains the operating
system (Cisco IOS)

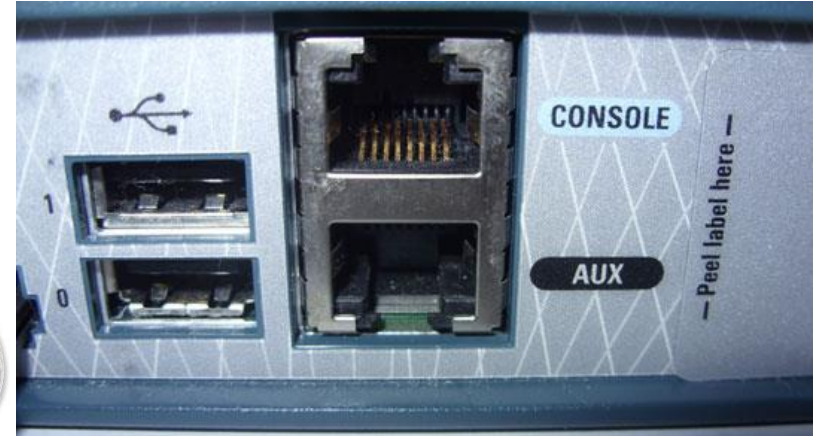
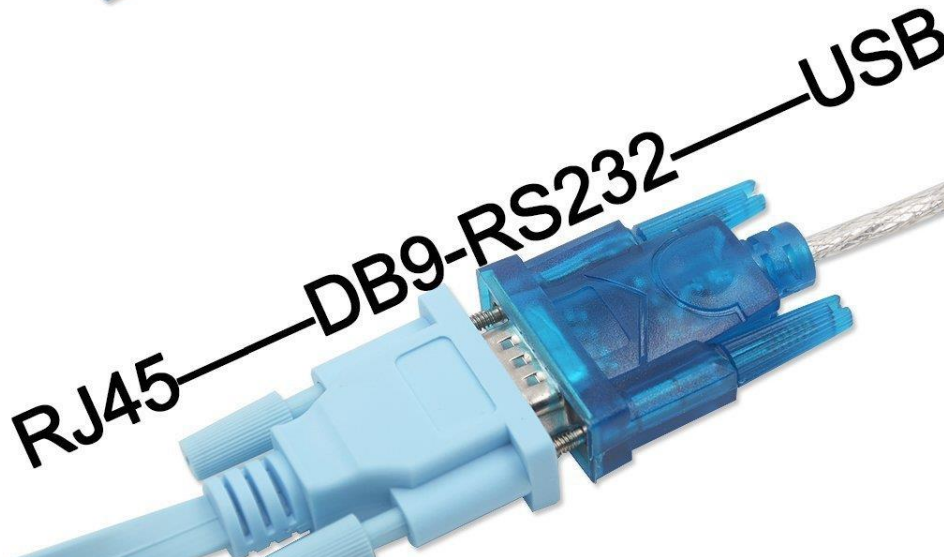
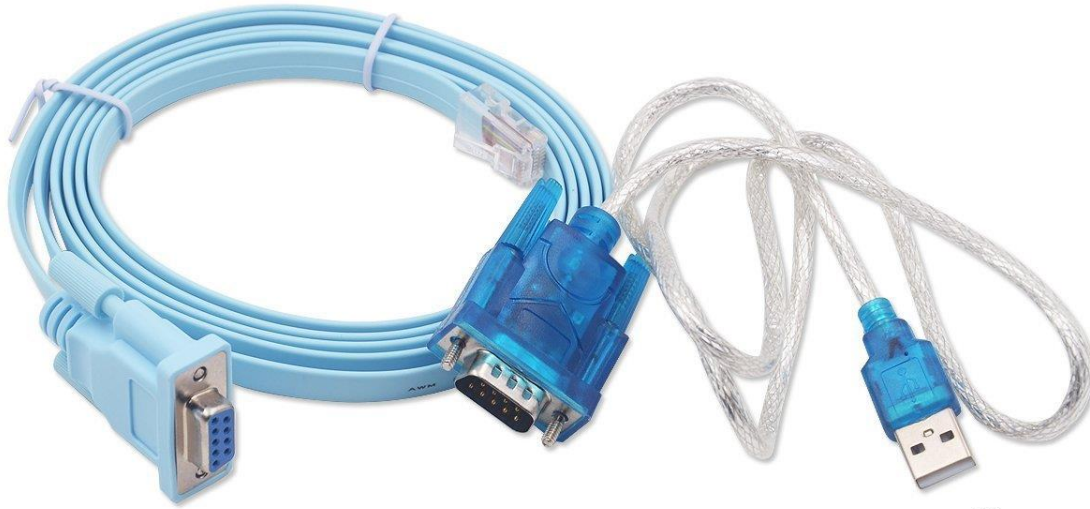


CPU

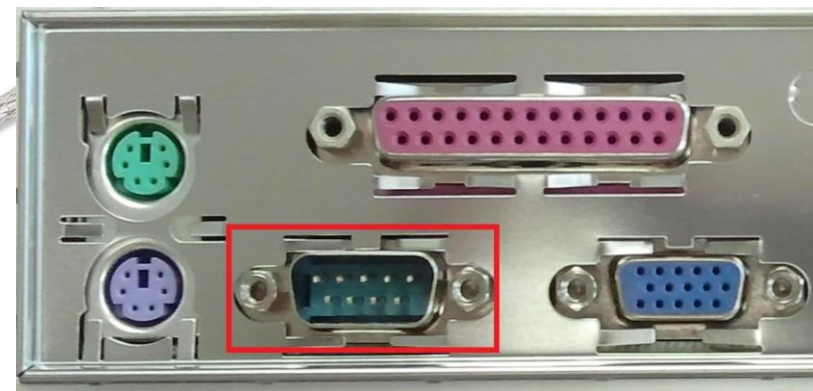


Executes operating system
instructions

Connect Console Cable



Router

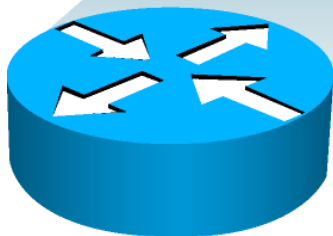


PC

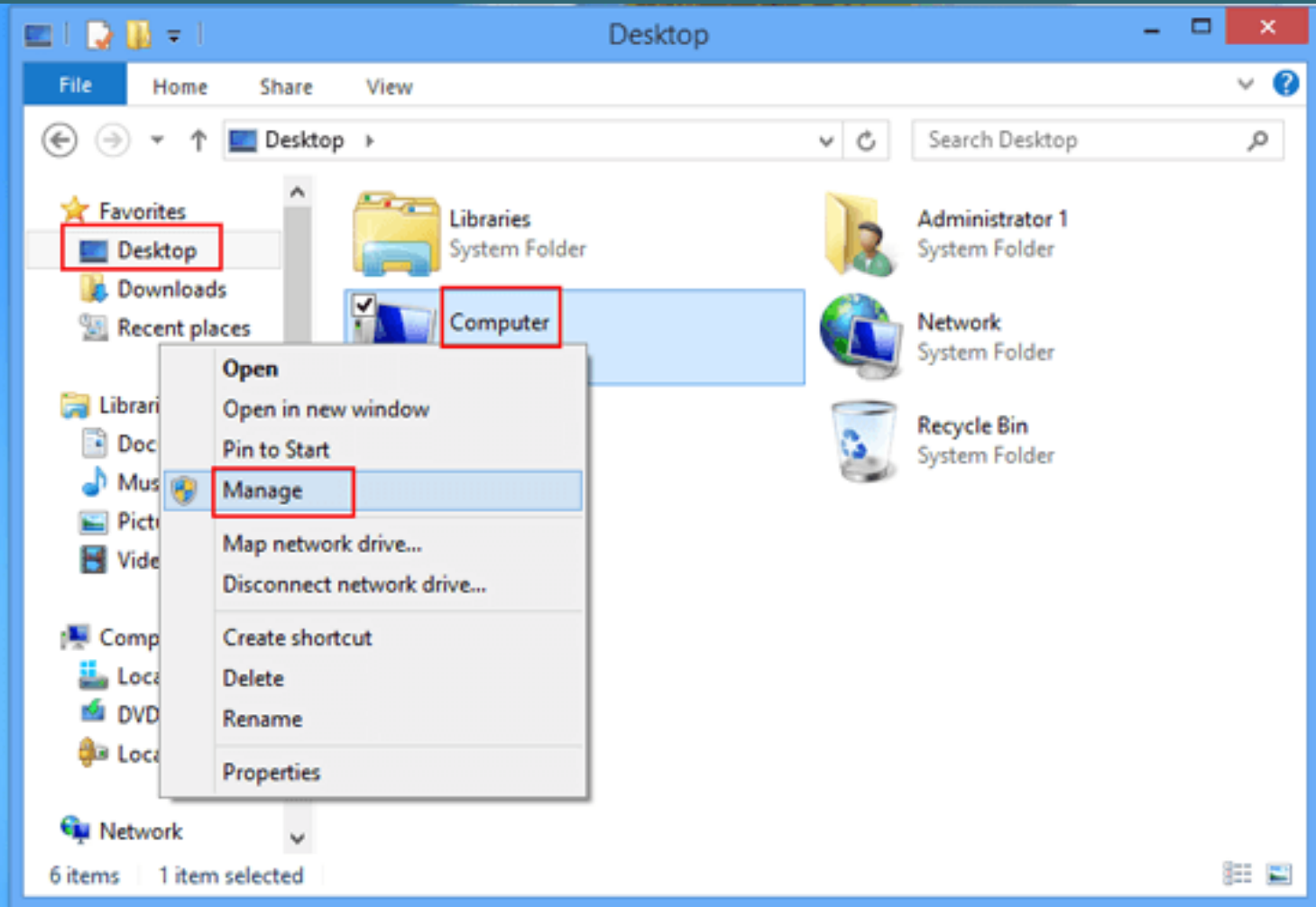
Initial Startup of the Cisco Router

- System startup routines initiate router software
- Router falls back to startup alternatives if needed

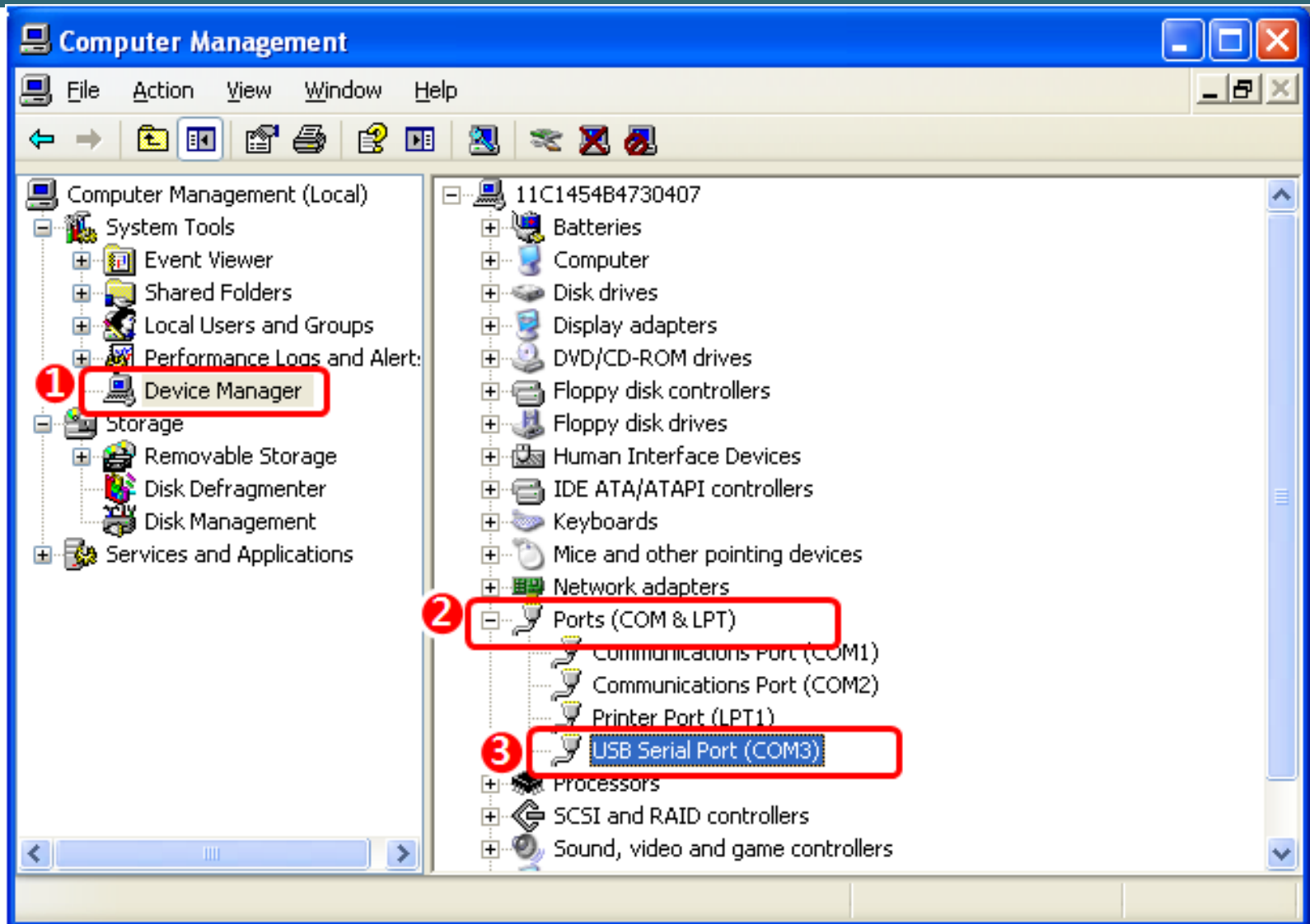
1. Before you start the router, verify the power, cabling, and console connection.
2. Push the power switch to “on.”
3. Observe the boot sequence:
 - Cisco IOS Software output text appears on the console.




Verify COM port



Verify COM port (cont.)



PuTTY Example

 PuTTY Configuration ✕

Category:

- Session
 - Logging
- Terminal
 - Keyboard
 - Bell
 - Features
- Window
 - Appearance
 - Behaviour
 - Translation
 - Selection
 - Colours
- Connection
 - Data
 - Proxy
 - Telnet
 - Rlogin
 - SSH
 - Serial

Basic options for your PuTTY session

Specify the destination you want to connect to

Serial line: Speed:

Connection type:

☐ Raw ☐ Telnet ☐ Rlogin ☐ SSH ☒ Serial

Load, save or delete a stored session

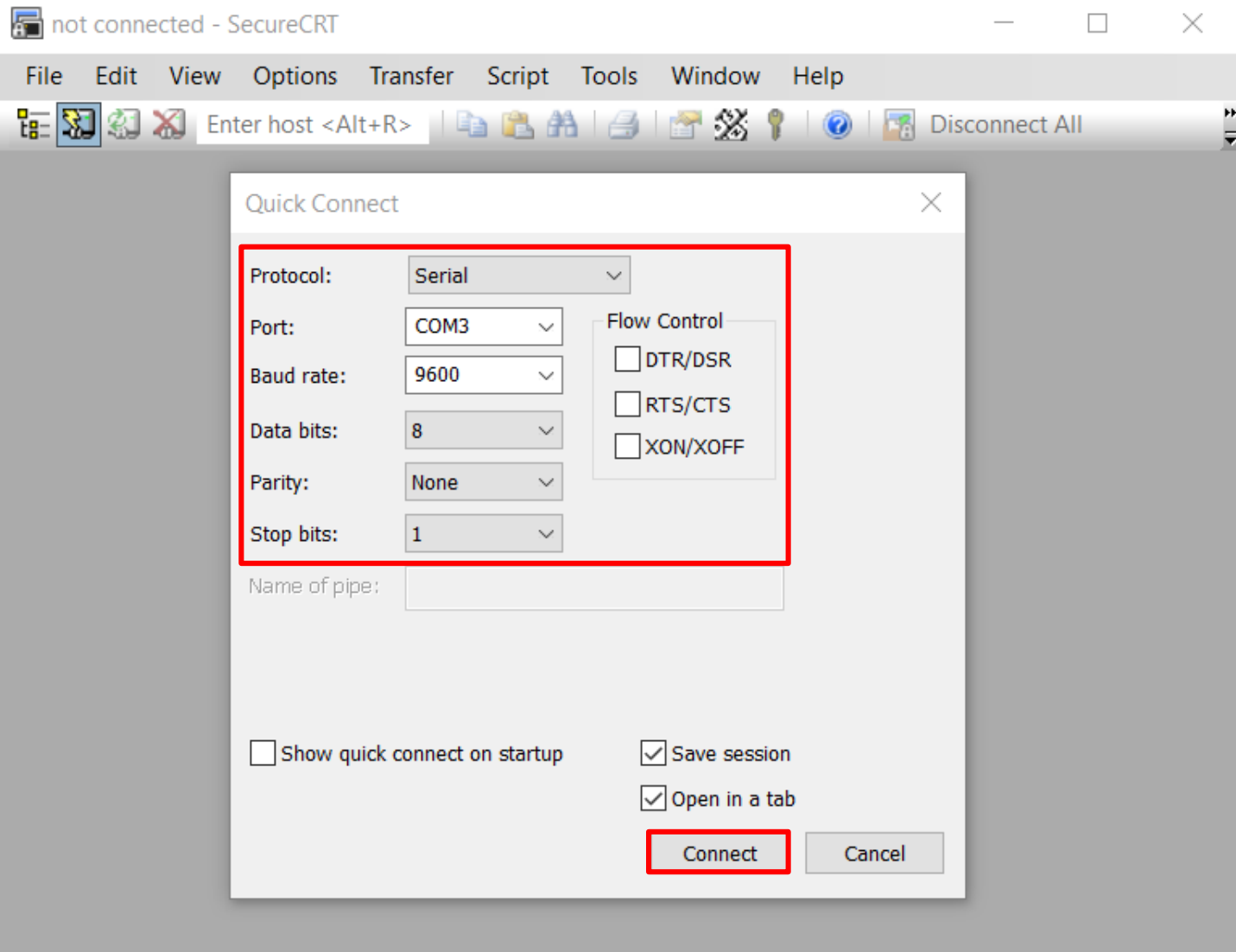
Saved Sessions:

Default Settings:

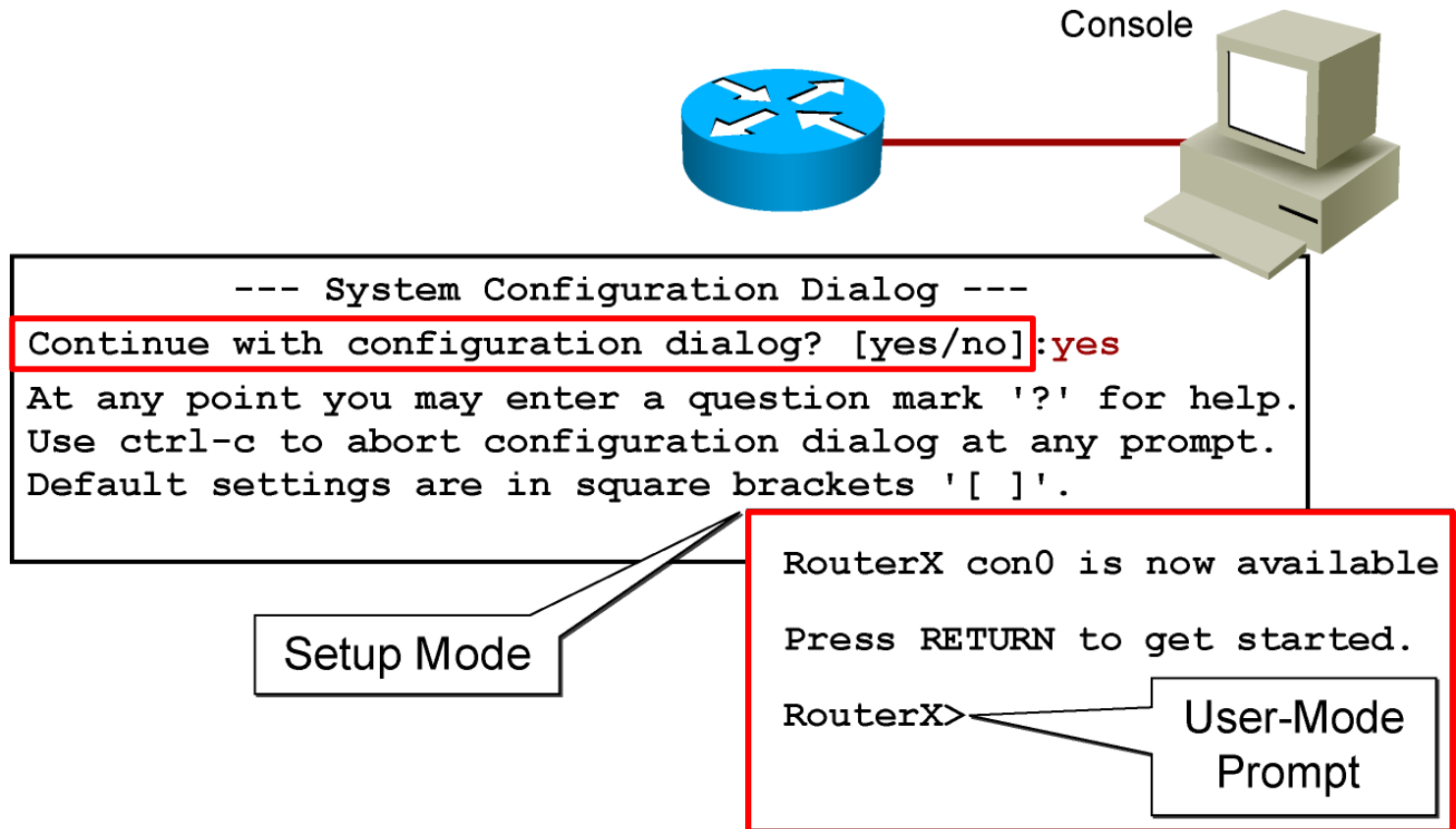
Close window on exit:

☐ Always ☐ Never ☒ Only on clean exit

SecureCRT Example



Bootup Output from the Router



Unconfigured vs. Configured Router

Setup Mode

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]:



no

CLI

(Command-Line Interface)

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

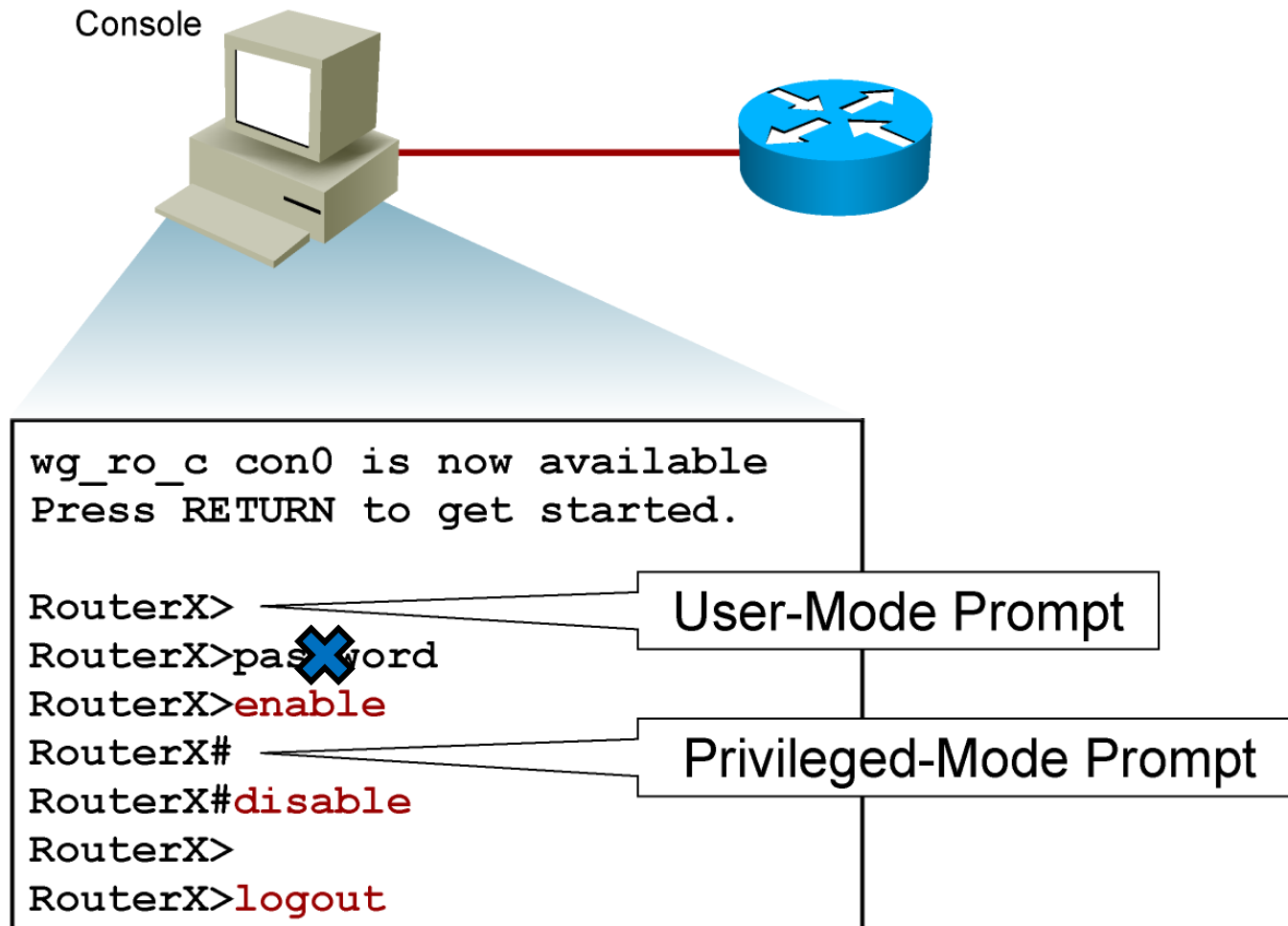
Would you like to enter basic management setup? [yes/no]: yes
Configuring global parameters:

Enter host name [Router]: Router_A We changed hostname to "Router_A"

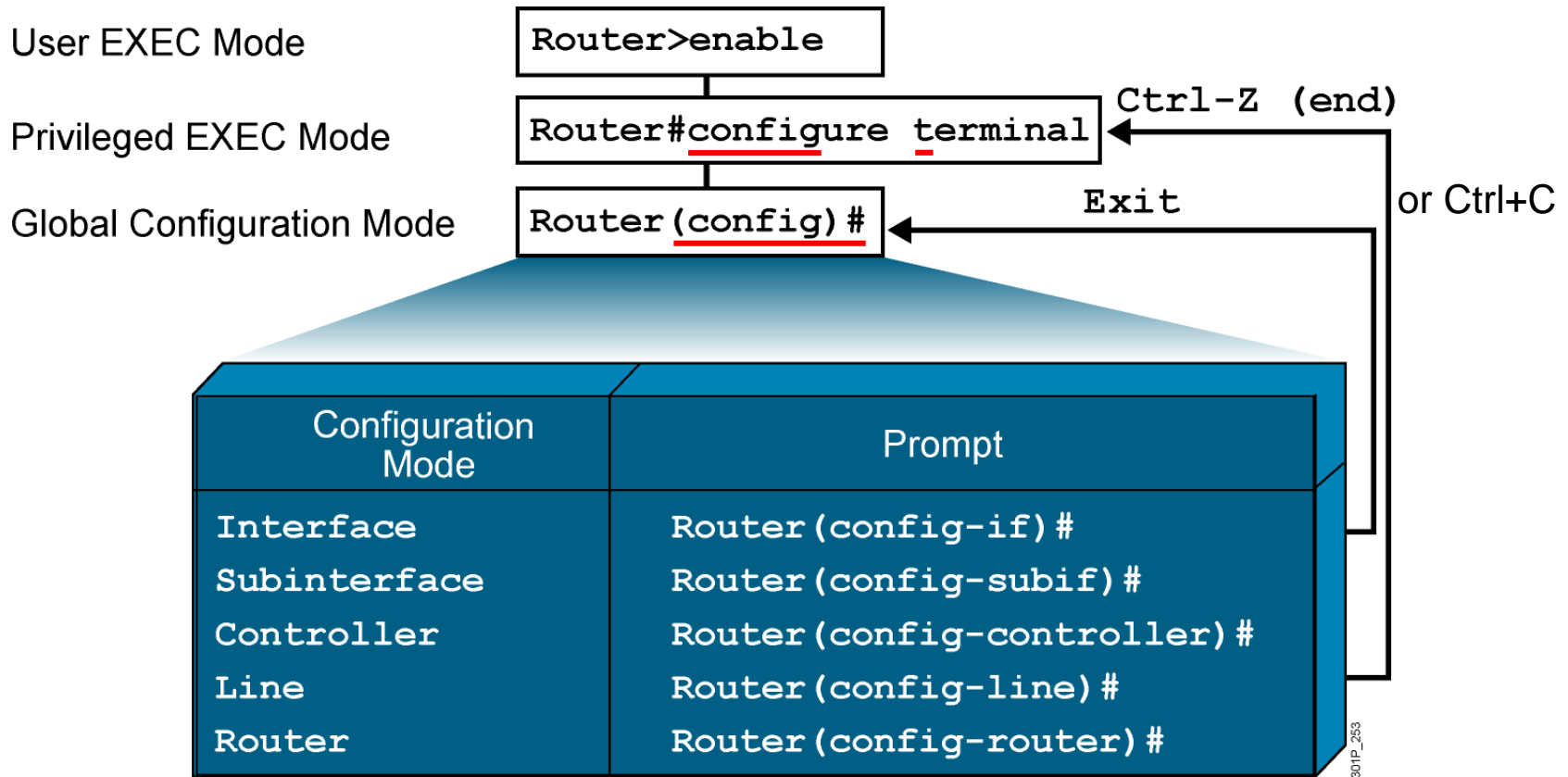
The enable secret is a password used to protect access to
privileged EXEC and configuration modes. This password, after
entered, becomes encrypted in the configuration.

Enter enable secret: cisco

Logging in to the Cisco Router



Overview of Router Modes



Router User-Mode Command List

RouterX>?

Exec commands:

access-enable	Create a temporary Access-List entry
access-profile	Apply user-profile to interface
clear	Reset functions
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
help	Description of the interactive help system
lat	Open a lat connection
lock	Lock the terminal
login	Log in as a particular user
logout	Exit from the EXEC

-- More --

You can abbreviate a command to the fewest characters that make a unique character string.

Router Privileged-Mode Command List

RouterX#?

Exec commands:

access-enable	Create a temporary Access-List entry
access-profile	Apply user-profile to interface
access-template	Create a temporary Access-List entry
bfe	For manual emergency modes setting
cd	Change current directory
clear	Reset functions
clock	Manage the system clock
configure	Enter configuration mode
connect	Open a terminal connection
copy	Copy from one file to another
debug	Debugging functions (see also 'undebug')
delete	Delete a file
dir	List files on a filesystem
disable	Turn off privileged commands
disconnect	Disconnect an existing network connection
enable	Turn on privileged commands
erase	Erase a filesystem
exit	Exit from the EXEC
help	Description of the interactive help system
-- More --	

You can complete a command string by entering the unique character string, then pressing the Tab key.

show version Command

	Router#show version
	Cisco Internetwork Operating System Software
IOS Version ←	IOS(tm)2500 Software (C2500-I-L),Version 12.0(17a),RELEASE SOFTWARE (fc1)
	Copyright (c)1986-2002 by cisco Systems,Inc.
	Compiled Mon 11-Feb-02 05:55 by kellythw
	image text-base:0x00001000
Bootstrap Version ←	ROM:system Bootstrap,Version 11.0(10c),SOFTWARE
	BOOTFLASH :3000 Bootstrap Software (IGS-BOOT-R),Version 11.0(10c),RELEASE SOFTWARE(fc1)
IOS image file ←	System image file is "flash:c2500-i-l.120-17a.bin"
Model and CPU ←	cisco 2500 (68030 processor(revision N) With 2048K/2048K bytes of memory.
Amount of RAM ←	processor bord ID 08860060,with hardware revision 00000000
	Bridging software.
	X.25 software,version 3.0.0.
Number and type of interfaces ←	1 Ethernet/IEEE 802.3 interface(s)
	2 Serial network interface(s)
Amount of NVRAM ←	32K bytes of non-volatile Configuration memory.
Amount of flash ←	8192K bytes of processor board system flash (Read ONLY)
Configuration register ←	Configuration register is 0x2102
	Router#_

Configuring Router Identification

Router Name

```
Router(config) #hostname RouterX  
RouterX(config) #
```

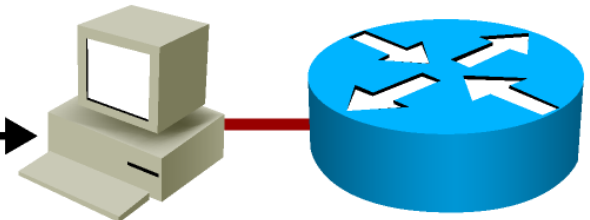
Message-of-the-Day Banner

```
RouterX(config) #banner motd #  
Enter TEXT message. End with  
the character #. You have  
entered a secured system.  
Authorized access only! #
```

result

```
Press RETURN to get started.
```

```
You have entered a secured system.  
Authorized access only!  
RouterX#
```



Console-Line Commands

```
RouterX (config) #line console 0
```

```
RouterX (config-line) #exec-timeout 20 30
```

minutes *seconds* (Default: 10 mins)

- Modifies console session timeout

```
RouterX (config) #line console 0
```

```
RouterX (config-line) #logging synchronous
```

- Redisplays interrupted console input

(Before)

```
RouterX#  
*Mar  1 00:39:18.911: %SYS-5-CONFIG_I: configured from console by consoleABC  
RouterX#ABC ← Tab
```

(After)

```
RouterX#  
*Mar  1 00:40:16.271: %SYS-5-CONFIG_I: configured from console by console  
RouterX#
```

Useful Command

```
RouterX (config) # no ip domain-lookup
```

- Disable DNS lookup function (enabled by default)

(Before)

```
RouterX#abc
Translating "abc"...domain server (255.255.255.255)
(255.255.255.255)
Translating "abc"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
RouterX#
```

(After)

```
RouterX#abc
Translating "abc"
Translating "abc"
% Unknown command or computer name, or unable to find computer address
RouterX#
```

Configuring an Interface

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

- **type** includes serial, ethernet, token ring, fddi, hssi, loopback, dialer, null, async, atm, bri, tunnel, and so on
- **number** is used to identify individual interfaces

```
RouterX(config) #interface type slot/port  
RouterX(config-if) #
```

- For modular routers, selects an interface

*FastEthernet 0/0
or
Fa0/0*



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

- Quits from current interface configuration mode

Configuring an Interface Description

RouterX(config-if) # **description** string

- *string* is a comment or a description to help you remember what is attached to this interface.
- The maximum number of characters for the *string* argument is 238.



```
RouterX#show interfaces description
```

Interface	Status	Protocol	Description
Fa0/0	up	up	<u>LAN</u>
Se0/0	admin down	down	
Fa0/1	up	up	<u>WAN</u>

Disabling or Enabling an Interface

```
RouterX#configure terminal
RouterX(config)#interface serial 0
RouterX(config-if)#shutdown
%LINK-5-CHANGED: Interface Serial0, changed state to administratively down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
```

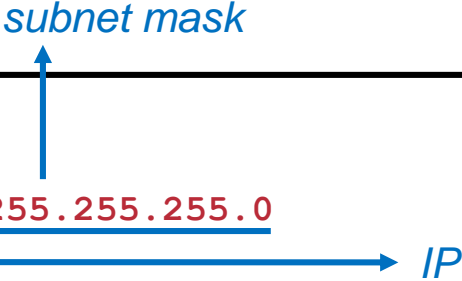
- Administratively turns off an interface

```
RouterX#configure terminal
RouterX(config)#interface serial 0
RouterX(config-if)#no shutdown
%LINK-3-UPDOWN: Interface Serial0, changed state to up
%LINEPROTO-5-UPDOWN: Line Protocol on Interface Serial0, changed state to up
```

- Enables an interface that is administratively shut down

Configuring IP Addresses

```
RouterX#configure terminal
RouterX(config)#interface FastEthernet 0/0
RouterX(config-if)#ip address 192.168.1.1 255.255.255.0
RouterX(config-if)#no shutdown
%LINK-3-UPDOWN: Interface Serial0, changed state to up
%LINEPROTO-5-UPDOWN: Line Protocol on Interface Serial0, changed state to up
```



RouterX#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	192.168.1.1	YES	manual	up	up
Serial0/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1	unassigned	YES	unset	up	up
Serial0/1	unassigned	YES	unset	administratively down	down
FastEthernet1/0	unassigned	YES	unset	administratively down	down
FastEthernet2/0	unassigned	YES	unset	administratively down	down

Router show interfaces Command

```
RouterX#show interfaces
```

```
Ethernet0 is up, line protocol is up
```

```
Hardware is Lance, address is 00e0.1e5d.ae2f (bia 00e0.1e5d.ae2f)
```

```
Internet address is 10.1.1.11/24
```

```
MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
```

```
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
```

```
ARP type: ARPA, ARP Timeout 04:00:00
```

```
Last input 00:00:07, output 00:00:08, output hang never
```

```
Last clearing of "show interface" counters never
```

```
Queueing strategy: fifo
```

```
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
```

```
5 minute input rate 0 bits/sec, 0 packets/sec
```

```
5 minute output rate 0 bits/sec, 0 packets/sec
```

```
81833 packets input, 27556491 bytes, 0 no buffer
```

```
Received 42308 broadcasts, 0 runts, 0 giants, 0 throttles
```

```
1 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort
```

```
0 input packets with dribble condition detected
```

```
55794 packets output, 3929696 bytes, 0 underruns
```

```
0 output errors, 0 collisions, 1 interface resets
```

```
0 babbles, 0 late collision, 4 deferred
```

```
0 lost carrier, 0 no carrier
```

```
0 output buffer failures, 0 output buffers swapped out
```

Interpreting the Interface Status

```
RouterX#show interfaces fa 0/0
```

```
fa 0/0 is up, line protocol is up
```

```
Hardware is HD64570
```

```
Description: 64Kb line to San Jose
```

```
:: :: : :: :: :: :: :: :: ::
```

Carrier Detect

Keepalives

Operational.....fa 0/0 is up, line protocol is up

Connection problem.....fa 0/0 is up, line protocol is down

Interface problemfa 0/0 is down, line protocol is down

Disabled.....fa 0/0 is administratively down, line protocol is down

Context-Sensitive Help

SwitchX# **clock**

Translating "CLOCK"

% Unknown command or computer name, or unable to find computer address

SwitchX# **cl?**

clear clock

SwitchX# **clock**

% Incomplete command.

SwitchX# **clock ?**

set Set the time and date

SwitchX# **clock set**

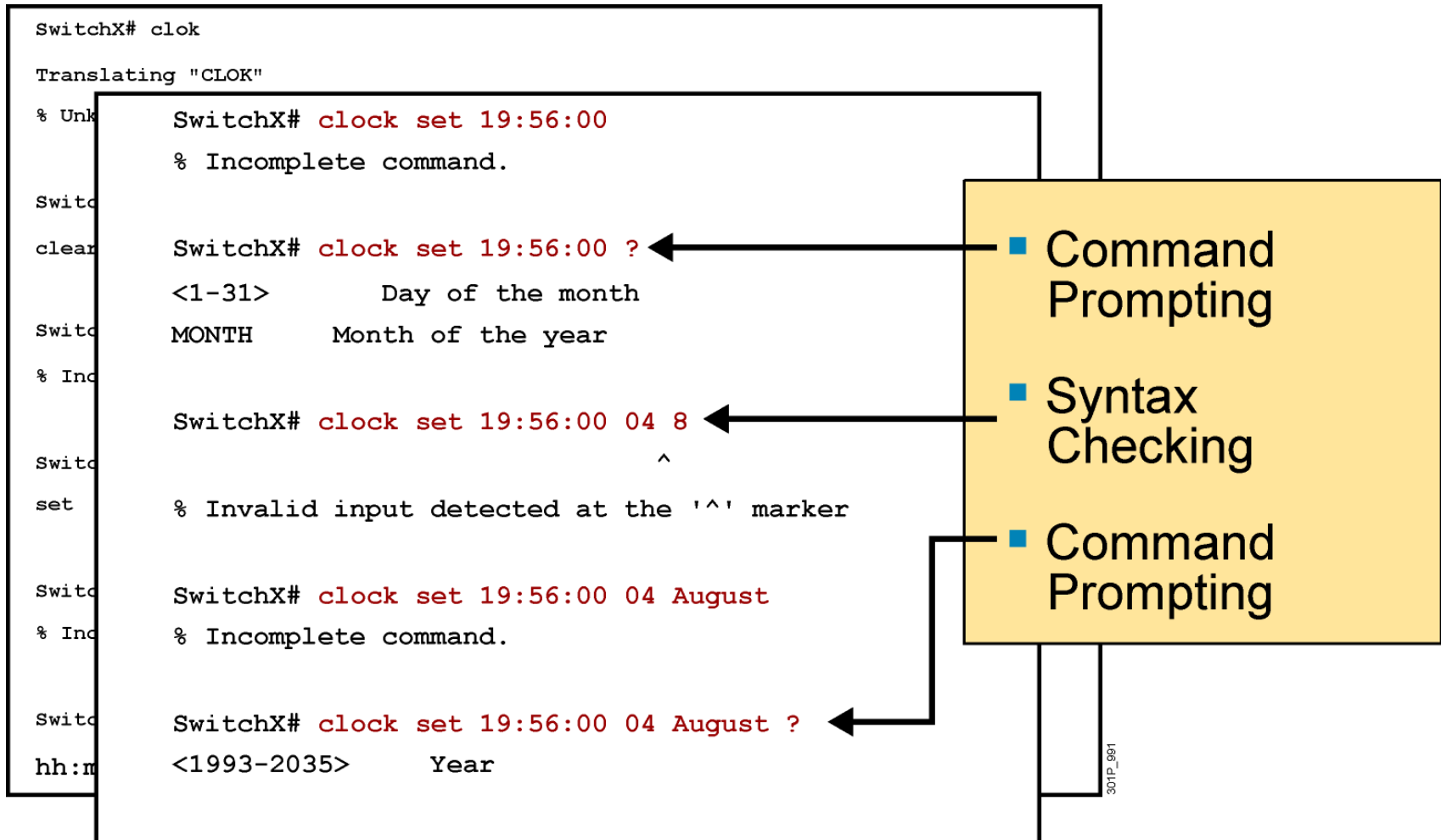
% Incomplete command.

SwitchX# **<Ctrl-P> clock set**

hh:mm:ss Current Time

- Symbolic Translation
- Command Prompting
- Last Command Recall

Context-Sensitive Help (Cont.)



Enhanced Editing Commands (Cont.)

SwitchX>\$ value for customers, employees, and partners.

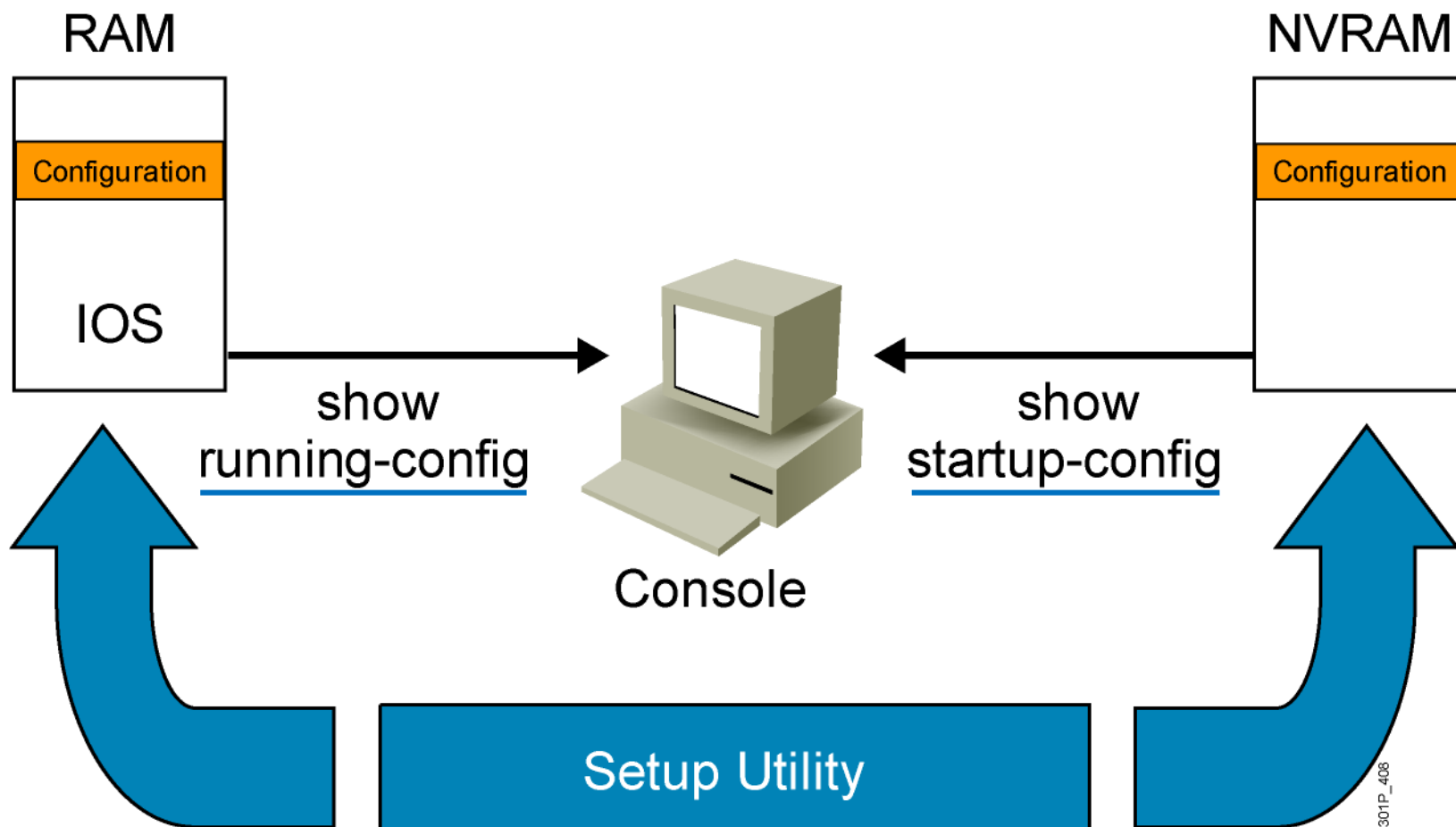
	(Automatic scrolling of long lines)
Ctrl-A	Move to the beginning of the command line.
Ctrl-E	Move to the end of the command line.
Esc-B	Move back one word.
Esc-F	Move forward one word.
Ctrl-B	Move back one character.
Ctrl-F	Move forward one character.
Ctrl-D	Delete a single character.

Router Command History

	Ctrl-P or Up Arrow	Recalls last (previous) commands.
	Ctrl-N or Down Arrow	Recalls more recent commands.
#	<code>show history</code>	Shows command buffer contents.
#	<code>terminal history size <u>lines</u></code>	Sets session command buffer size.

↓
0 - 256
(Default: 10)

Viewing the Configuration



Saving Configurations

```
RouterX#  
RouterX#copy running-config startup-config  
Destination filename [startup-config]?  
Building configuration..  
  
RourterX#
```

Copies the current configuration to NVRAM

~ write memory
~ wr

show running-config and show startup-config Commands

In RAM

```
SwitchX#show running-config
Building configuration...??
Current configuration:?
!
version 12.0
!
-- More --
```

In NVRAM

```
SwitchX#show startup-config
Using 1359 out of 32762 bytes
!
version 12.0
!
-- More --
```

Displays the current and saved configuration

Note

