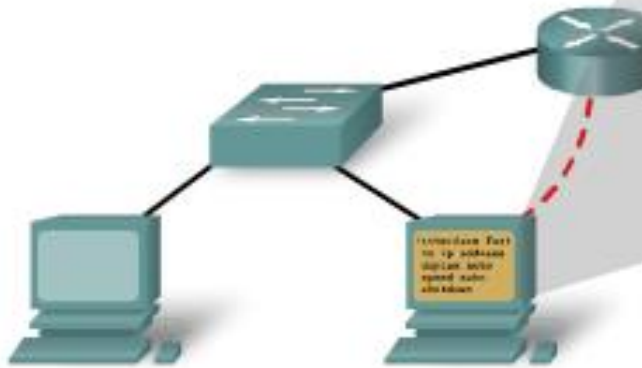


11.0.1 Introduction



```
version 12.2
!  
hostname Router
!  
!interface FastEthernet0/0  
no ip address  
duplex auto  
speed auto  
shutdown  
!  
interface Serial0/0  
no ip address  
shutdown  
!  
interface Serial0/1  
no ip address  
shutdown
```



Configuring and Testing the Network

11.1.1 Cisco IOS

The IOS is stored in
Flash Memory

Cisco IOS

- Provides devices with the following network services:**
- **Basic routing and switching functions**
 - **Reliable and secure access to networked resources**
 - **Network scalability**



Internetwork Operating System for Cisco networking devices

SECURITY

ADDRESSING

INTERFACES

ROUTING

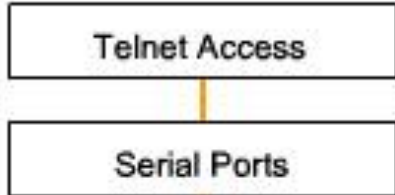
QoS

MANAGING
RESOURCES

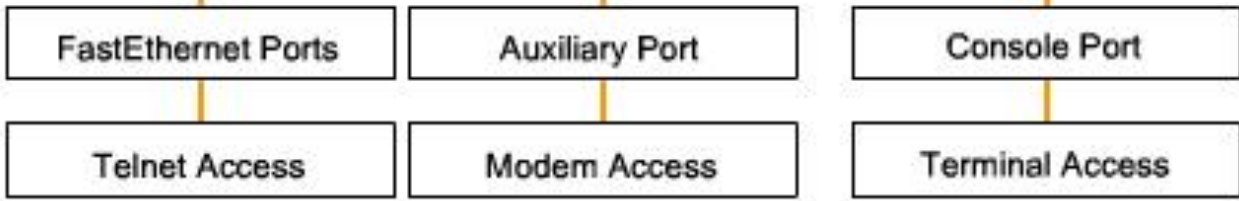
11.1.1 Cisco IOS

Accessing the Cisco IOS on a Device

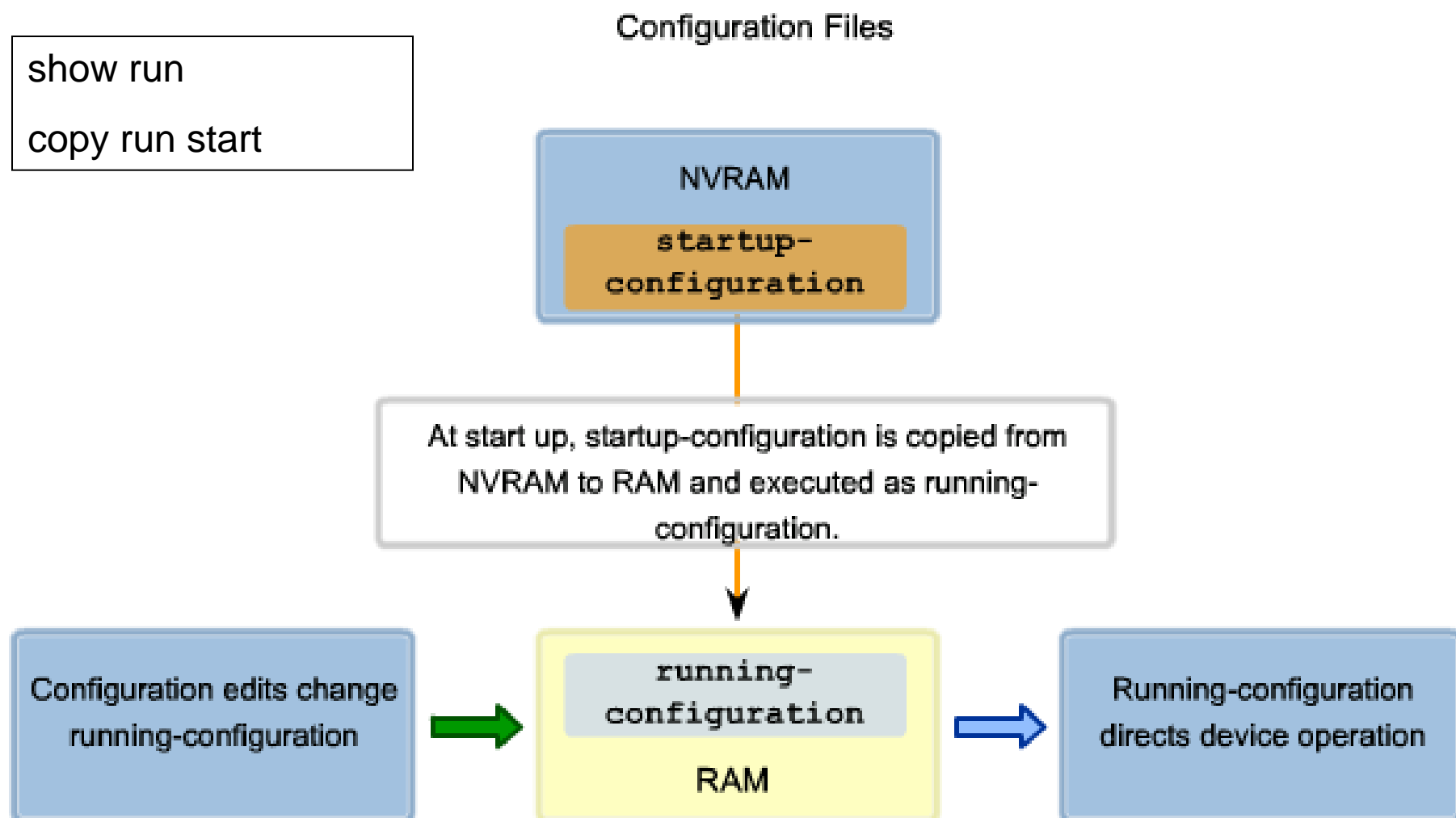
- Console Port:
- Initial configuration
- Disaster recovery
- Troubleshooting
- Password recovery



```
line con 0
password cisco
login
line aux 0
line vty 0 4
password cisco
login
end
```

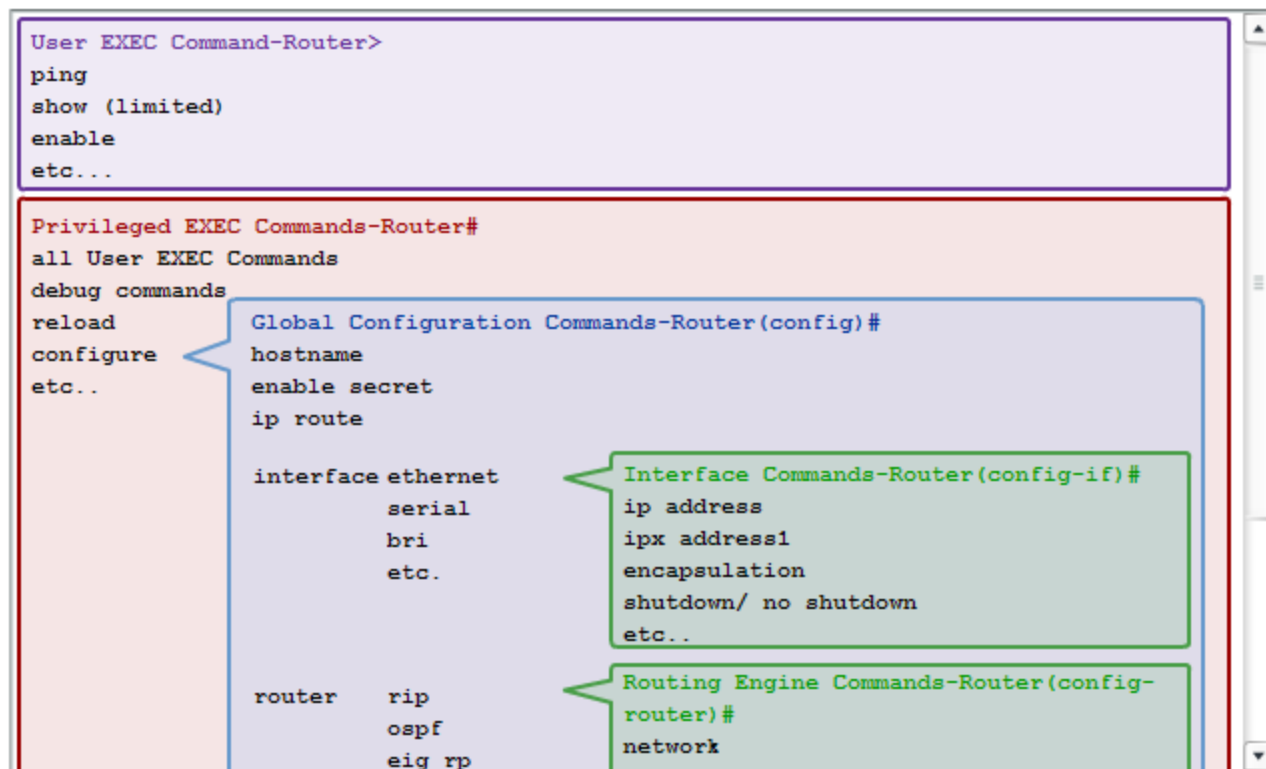


11.1.2 Configuration Files



11.1.3 Cisco IOS Modes

IOS Mode Hierarchical Structure



```
Router>
Router>enable
Router#
Router#config t
Enter configuration commands, one per line. End with END.
Router(config)#
Router(config)#int s0
Router(config-if)#
Router(config-if)#_
```

11.1.3 Cisco IOS Modes

IOS Prompt Structure

```
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**
- **Privileged executive mode**
- **Global configuration mode**
- **Other specific configuration modes**

11.1.3 Cisco IOS Modes

IOS Primary Modes

User EXEC Mode

Limited examination of router. Remote access.

```
Switch>  
Router>
```

Global Configuration Mode

Global configuration commands.

```
Switch(config)#  
Router(config)#
```

Privileged EXEC Mode

Detailed examination of router, Debugging and testing. File manipulation. Remote access.

```
Switch#  
Router#
```

Other Configuration Modes

Specific service or interface configurations.

```
Switch(config-)#  
Router(config-)#
```

11.1.3 Cisco IOS Modes

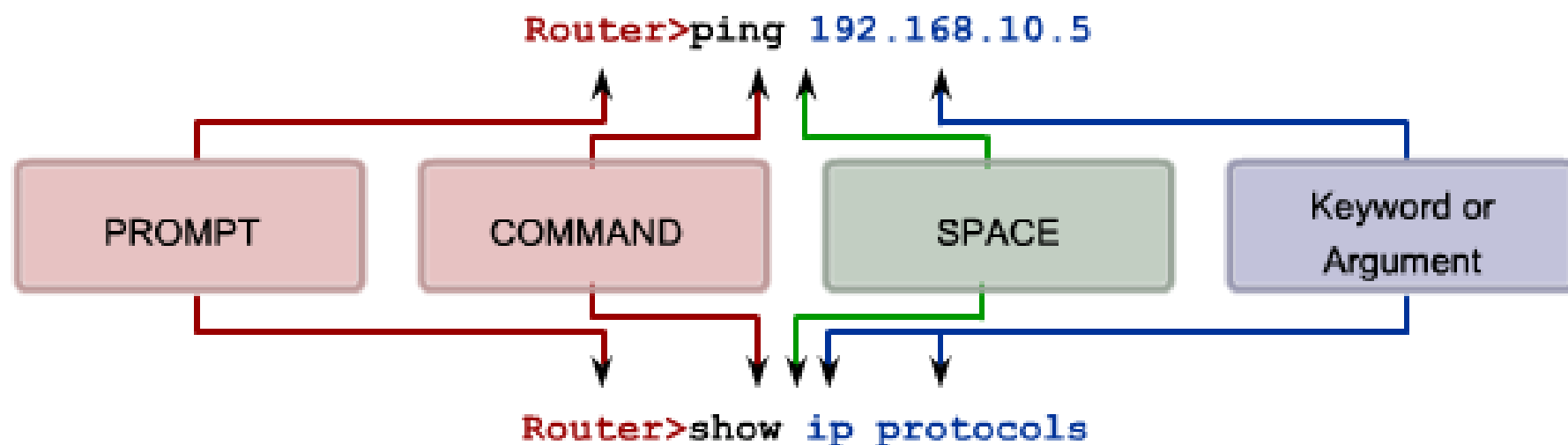
IOS Modes

```
Router con0 is now available.  
  
Press RETURN to get started.  
  
User Access Verification  
Password:  
Router> ← User-Mode Prompt  
Router>enable  
Password:  
Router# ← Privileged-Mode  
Router#disable  
Router> ← User-Mode Prompt  
Router>exit
```

Router

11.1.4 Basic IOS Command Structure

Basic IOS Command Structure



Prompt commands are followed by a space and then the keyword or arguments.

Must be in the correct IOS Mode for the command to work.

11.1.4 Basic IOS Command Structure

IOS Command Conventions

When describing the use of commands, we generally use these conventions.

Convention	Description
	Boldface text indicates commands and keywords that are entered literally as shown.
<i>italics</i>	Italic text indicates arguments where the user supplies values.
[X]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[X Y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{X Y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.

11.1.5 Using CL 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#
```

11.1.5 Using CL Help

Command Syntax Check Help

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.
```

11.1.5 Using CL Help

Command Syntax Check Help

Error Message	Meaning	Examples	How to Get Help
<pre>% Ambiguous command: 'command '</pre>	not enough characters entered for the IOS to recognize the command	<pre>Switch#c % Ambiguous command: 'c'</pre>	Reenter the command followed by a question mark (?) with no space between the command and the question mark. The possible keywords that you can enter with the command are displayed.
<pre>% Incomplete command.</pre>	not all of the required keywords or arguments were entered	<pre>Switch#clock set % Incomplete command.</pre>	Reenter the command followed by a question mark (?) with a space after last word. The required keywords or arguments are displayed.
<pre>% Invalid input detected at '^' marker</pre>	command was entered incorrectly. The error occurred where the caret mark (^) appears.	<pre>Switch#clock set 19:50:00 25 6 ^ % Invalid input detected at '^' marker.</pre>	Reenter the command followed by a question mark (?) in a place pointed by '^' mark. It can be also needed to delete last keyword(s) or argument(s).

11.1.5 Using CL Help

CLI Hot Keys and Shortcuts

CLI Line Editing

Tab	Completes a partial command name entry.
Backspace	Erases the character to the left of the cursor.
Ctrl-D	Erases the character at the cursor.

(NOTE: "Delete", the key to erase to the right of the cursor, is not recognized by terminal emulation programs.)

At the "--More--" prompt

The Enter Key	Displays the next line.
Space Bar	Displays the next screen.
Any other alphanumeric key	Returns to the EXEC prompt.

Break Keys

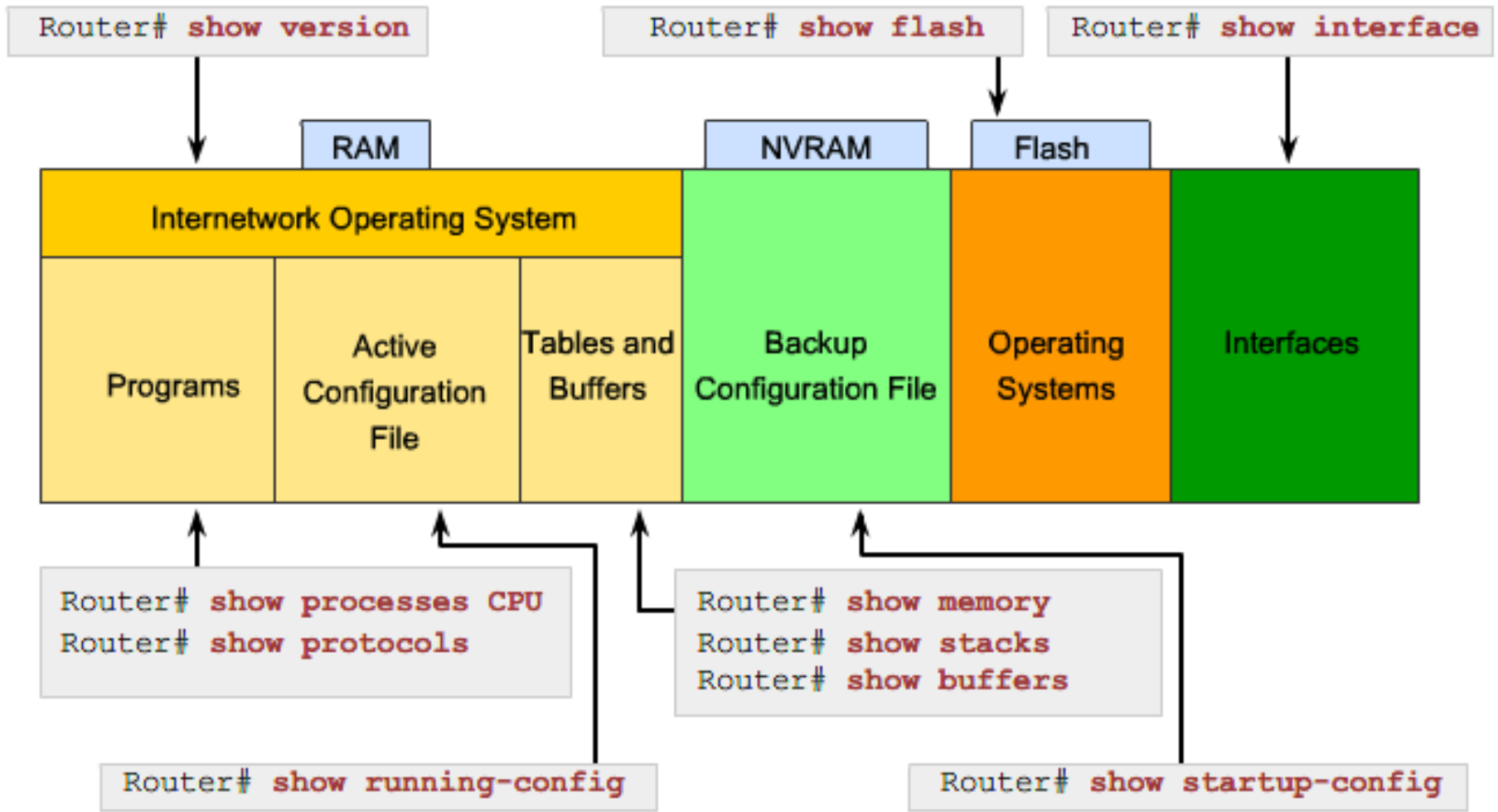
Ctrl-C	When in any configuration mode, ends the configuration mode and returns to privileged EXEC mode. When in setup mode, aborts back to the command prompt.
Ctrl-Z	When in any configuration mode, ends the configuration mode and returns to privileged EXEC mode.

Note: Control keys - Press and hold the <Ctrl> key and then press the specified letter key .

Escape sequences - Press and release the <Esc> key, and then press the letter key.

11.1.6 IOS Examination Commands

IOS `show` commands can provide information about the configuration, operation and status of parts of a Cisco router.



11.1.6 IOS Examination Commands

Example of IOS Output

```
Router#show version
Cisco IOS Software, 1841 Software (C1841-IPBASEK9-M), Version 12.4(11)T, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Sat 18-Nov-06 15:20 by prod_rel_team

ROM: System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)

Router uptime is 10 weeks, 4 days, 23 hours, 36 minutes
System returned to ROM by power-on
System restarted at 16:43:31 UTC Fri Jan 26 2007
System image file is "flash:c1841-ipbasek9-mz.124-11.T.bin"

Cisco 1841 (revision 5.0) with 115712K/15360K bytes of memory.
Processor board ID FTX0932W21Y
 2 FastEthernet interfaces
 2 Low-speed serial(sync/async) interfaces
DRAM configuration is 64 bits wide with parity disabled.
191K bytes of NVRAM.
31360K bytes of ATA CompactFlash (Read/Write)

Configuration register is 0x2102

Router#
```

```
Router#show version
```


11.1.7 IOS Configuration Modes

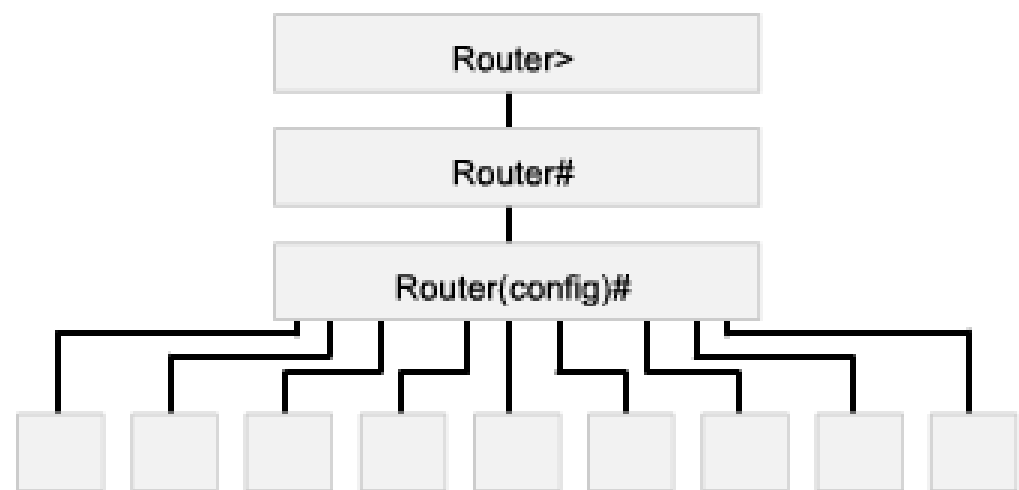
IOS Configuration Modes

User EXEC mode

Privileged EXEC mode

Global configuration mode

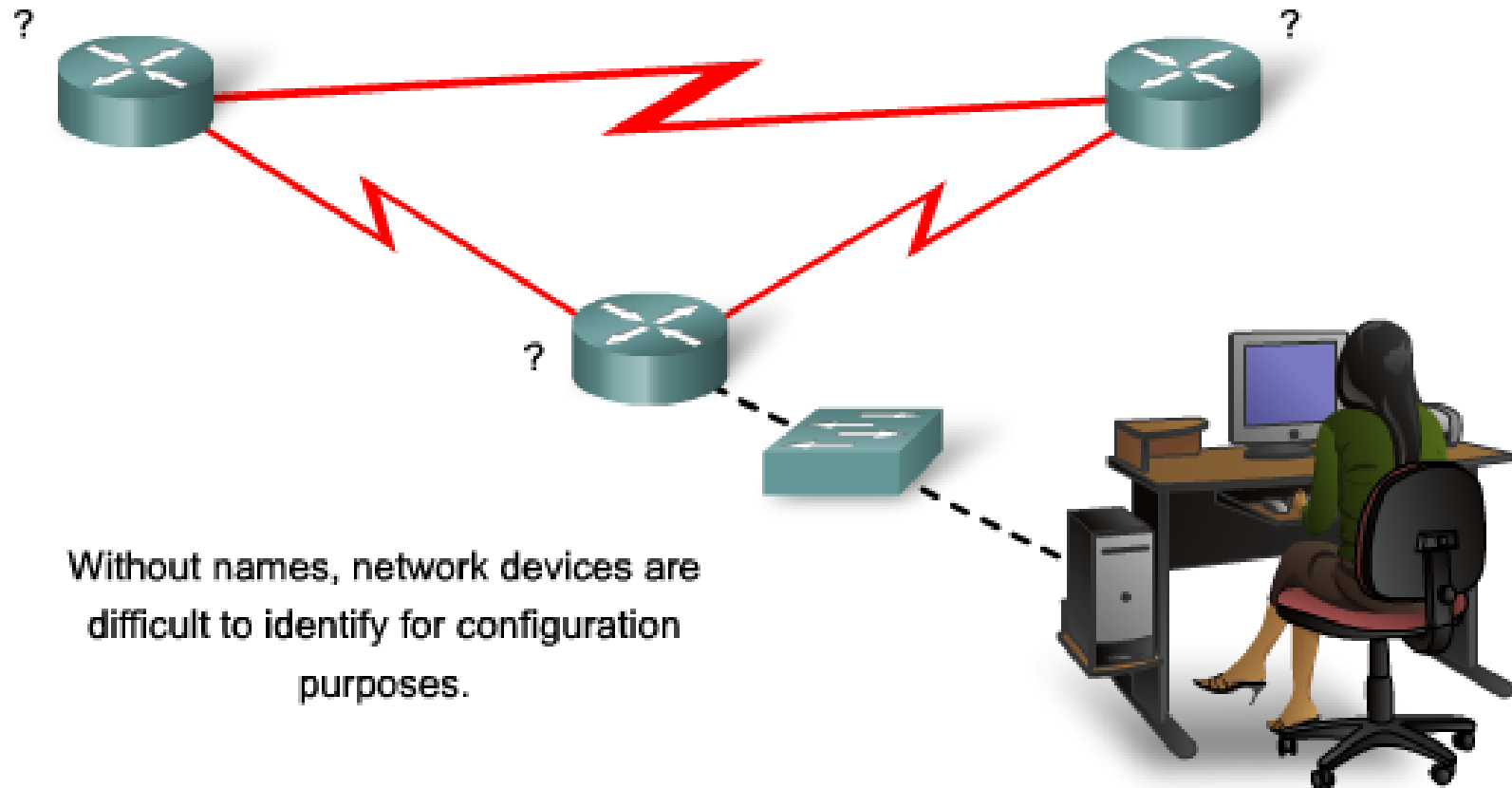
Specific configuration mode



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

11.2.1 Devices Need Names

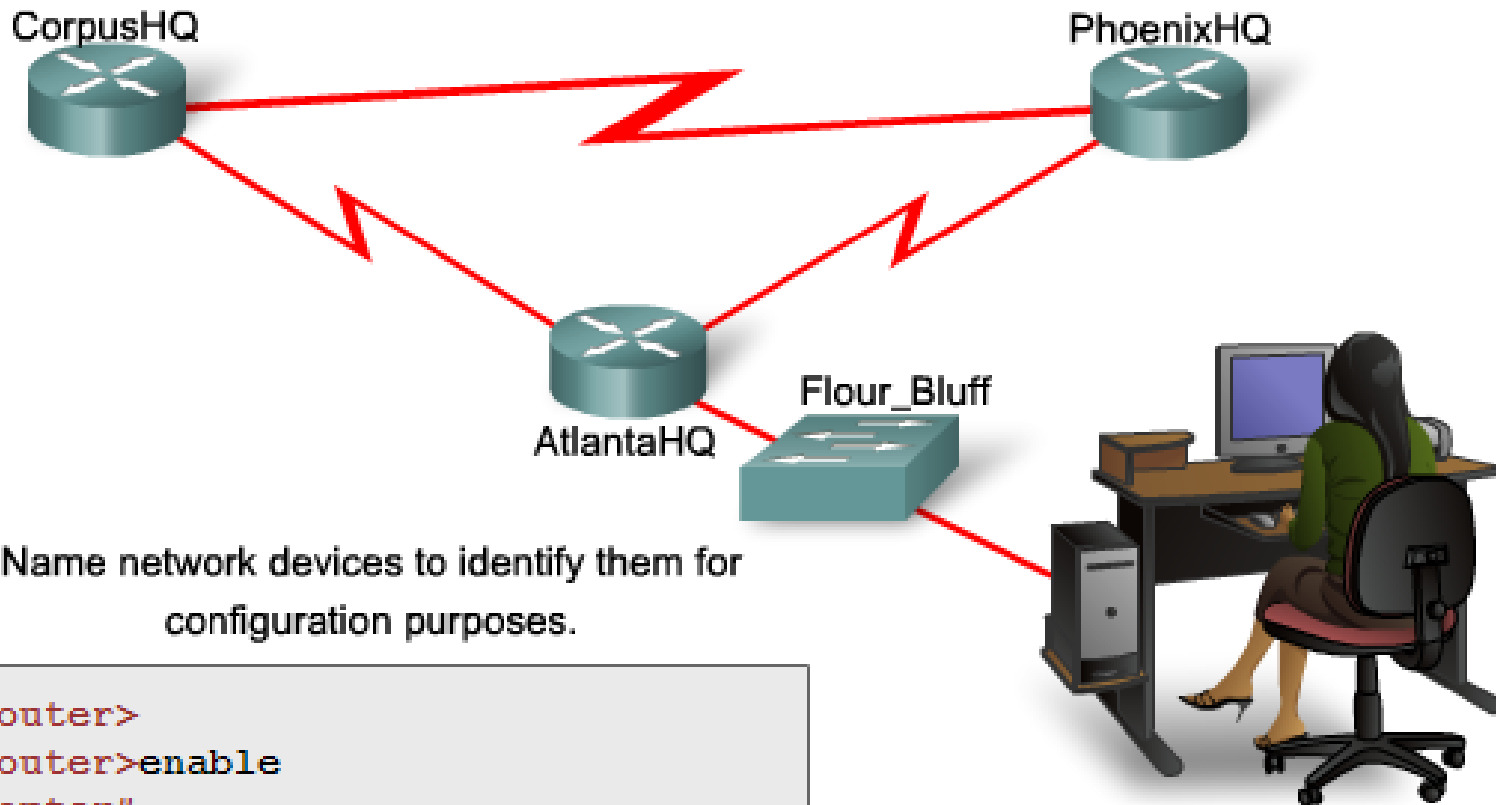
Basic Configuration Using Cisco IOS



Without names, network devices are difficult to identify for configuration purposes.

11.2.1 Devices Need Names

Configuring Device Names



Name network devices to identify them for configuration purposes.

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

11.2.2 Configuring Passwords and Banners

Limiting Device Access - Configuring Console Passwords

Console Password

```
Switch(config)#line console 0  
Switch(config-line)#password cisco  
Switch(config-line)#login
```

```
Press RETURN to get started!  
User Access Verification  
Password:   
Switch>
```

This configuration requires
a console login when the
switch is next accessed.

Password characters not displayed
when entered

11.2.2 Configuring Passwords and Banners

Limiting Device Access

Configuring Telnet and Password Encryption

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
```



Strongly encrypted password

11.2.2 Configuring Passwords and Banners

Limiting Device Access – Login Banner

```
LAB_A(config)#banner motd # This is a secure system. Authorized Access ONLY!!! #
```

Delimiting characters not included in message

This configuration results
in this message of the day
banner

Router

```
LAB_A con0 is now available
```

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

```
This is a secure system. Authorized Access  
ONLY!!!
```

```
User Access Verification
```

```
password:
```

```
LAB_A>enable
```

```
Password:
```

```
LAB_A#
```

11.2.3 Managing Configuration Files

Checking Configuration Files

```
Router# show running-configuration
```

Lists the complete configuration currently active in RAM.

The active configuration can be copied to NVRAM.

```
version 12.2

hostname Router

!interface FastEthernet0/0

no ip address
duplex auto
speed auto
shutdown

interface Serial0/0
no ip address
shutdown
!
interface Serial0/1
no ip address
```

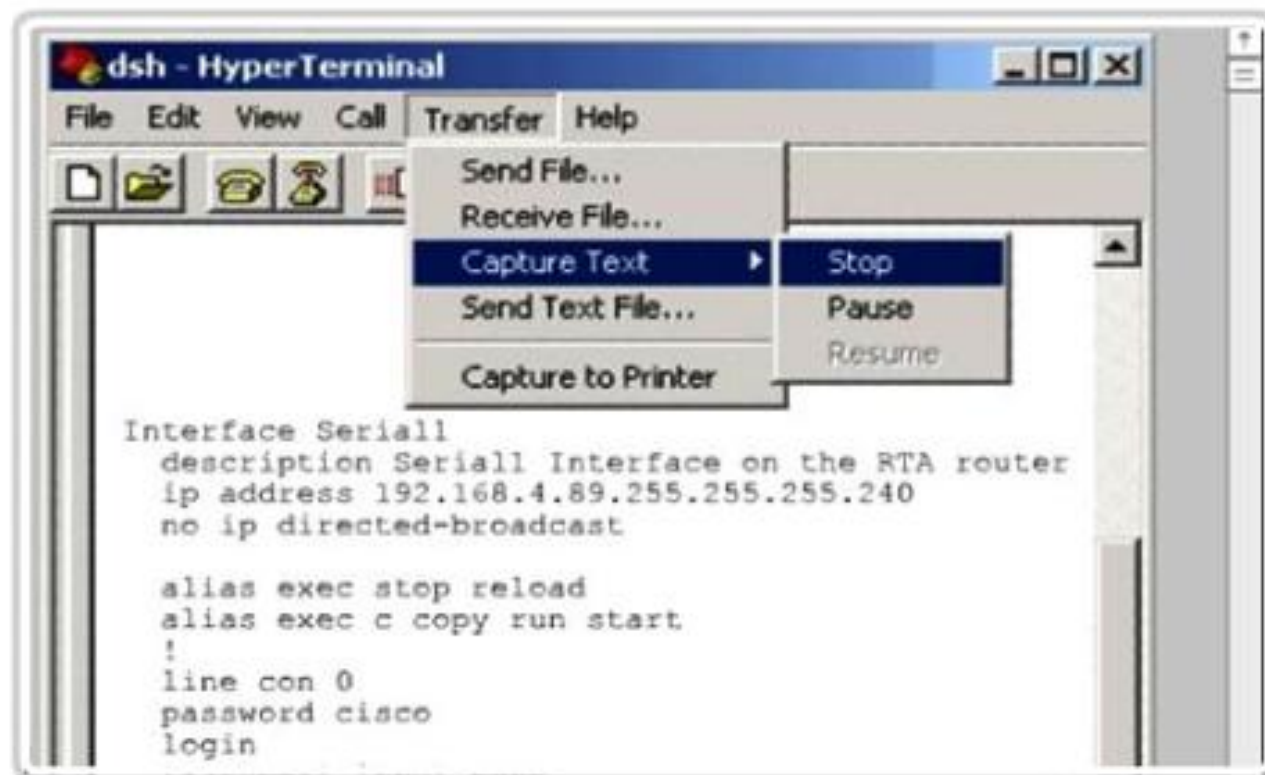
```
Router# copy running-configuration startup-configuration
```

11.2.3 Managing Configuration Files

```
Router#copy running-config tftp
Remote host []? 131.108.2.155
Name of configuration file to write[tokyo-config]?tokyo.2
Write file tokyo.2 to 131.108.2.155? [confirm] y
Writing tokyo.2 !!!!! [OK]
```


11.2.3 Managing Configuration Files

Saving to a Text File in HyperTerminal

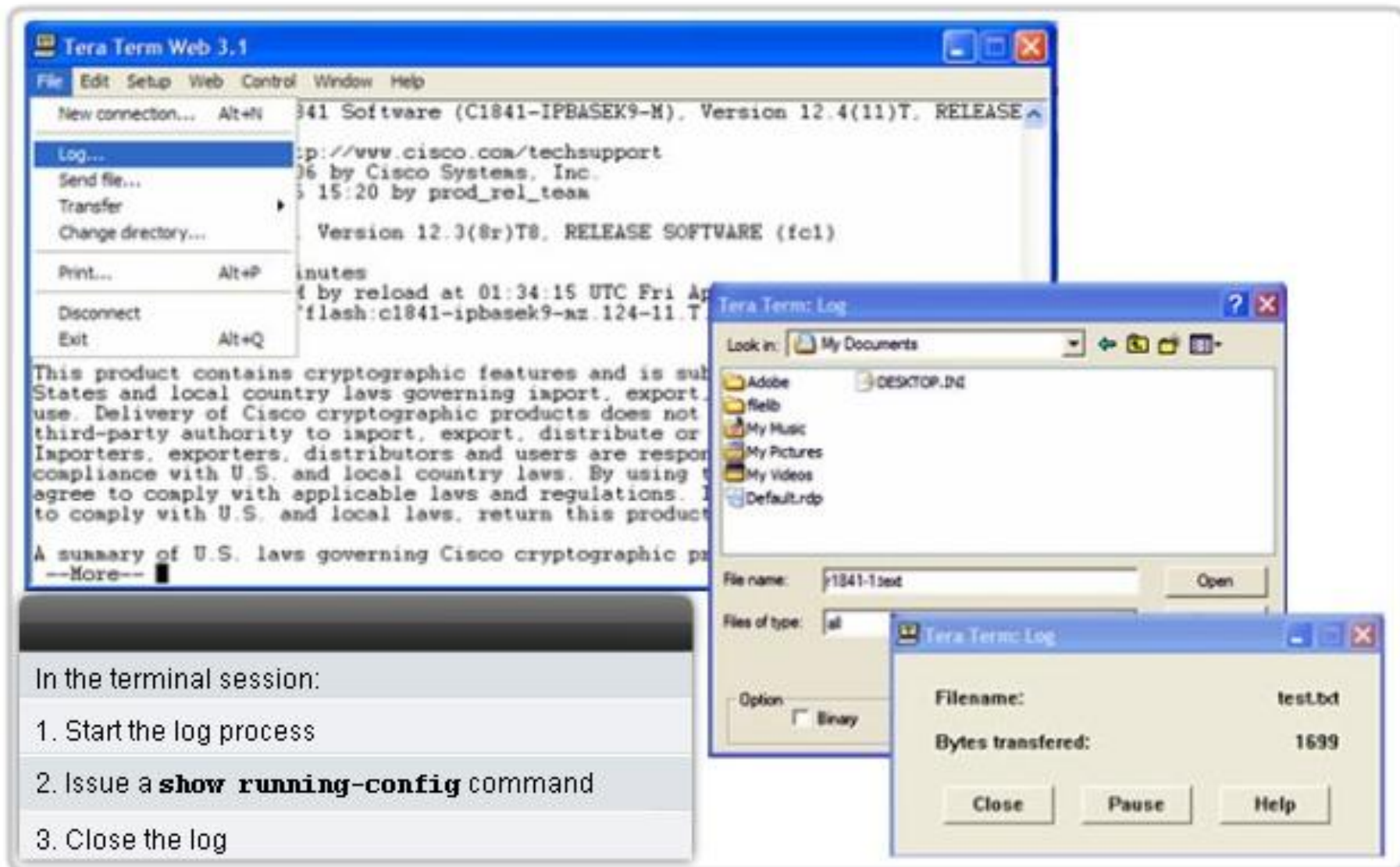


In the terminal session:

1. Start the text capture process
2. Issue a **show running-config** command
3. Stop the capture process
4. Save the text file

11.2.3 Managing Configuration Files

Saving to a Text File in TeraTerm



The screenshot shows the TeraTerm Web 3.1 interface. The main window displays a terminal session with the following text:

```
341 Software (C1841-IPBASEK9-M), Version 12.4(11)T. RELEASE  
http://www.cisco.com/techsupport  
06 by Cisco Systems, Inc.  
15:20 by prod_rel_team  
Version 12.3(8r)T8. RELEASE SOFTWARE (fcl)  
minutes  
4 by reload at 01:34:15 UTC Fri Ap  
flash:c1841-ipbasek9-az.124-11.T
```

Below the terminal output, there is a legal disclaimer:

This product contains cryptographic features and is sub States and local country laws governing import, export, use. Delivery of Cisco cryptographic products does not third-party authority to import, export, distribute or Importers, exporters, distributors and users are respon compliance with U.S. and local country laws. By using t agree to comply with applicable laws and regulations. I to comply with U.S. and local laws, return this product A summary of U.S. laws governing Cisco cryptographic p
--More--

Overlaid on the terminal window are two dialog boxes:

- Tera Term: Log** (top): A file selection dialog box. The "Look in:" field is set to "My Documents". The "File name:" field contains "1341-1.txt". The "Files of type:" field is set to "all". There is an "Open" button.
- Tera Term: Log** (bottom): A summary dialog box. It displays "Filename: test.txt" and "Bytes transfered: 1699". There are "Close", "Pause", and "Help" buttons.

In the terminal session:

1. Start the log process
2. Issue a **show running-config** command
3. Close the log

11.2.4 Configuring Interfaces

Configuring Router 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
```

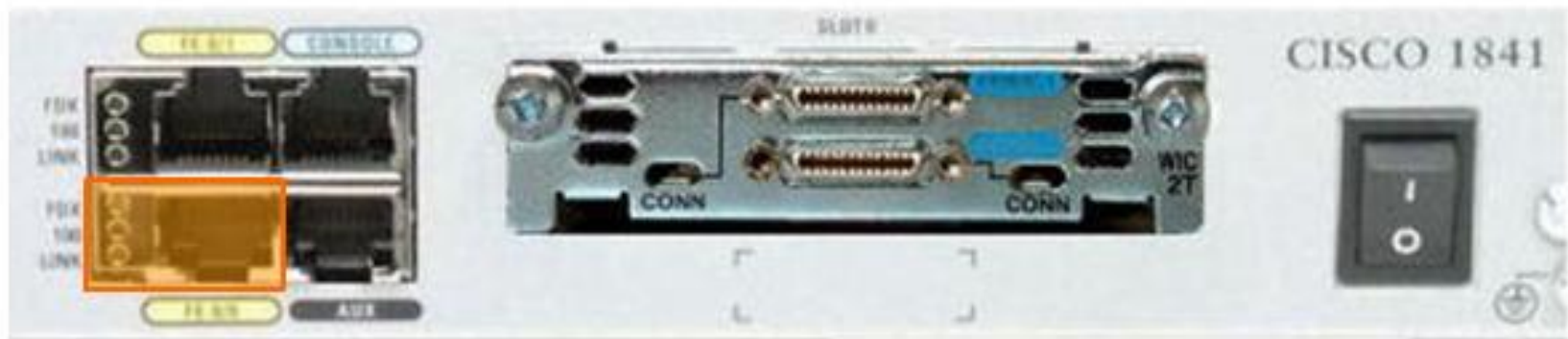
The following command is used to quit the current interface configuration mode:

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

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

11.2.4 Configuring Interfaces

Configuring Router Ethernet Interfaces

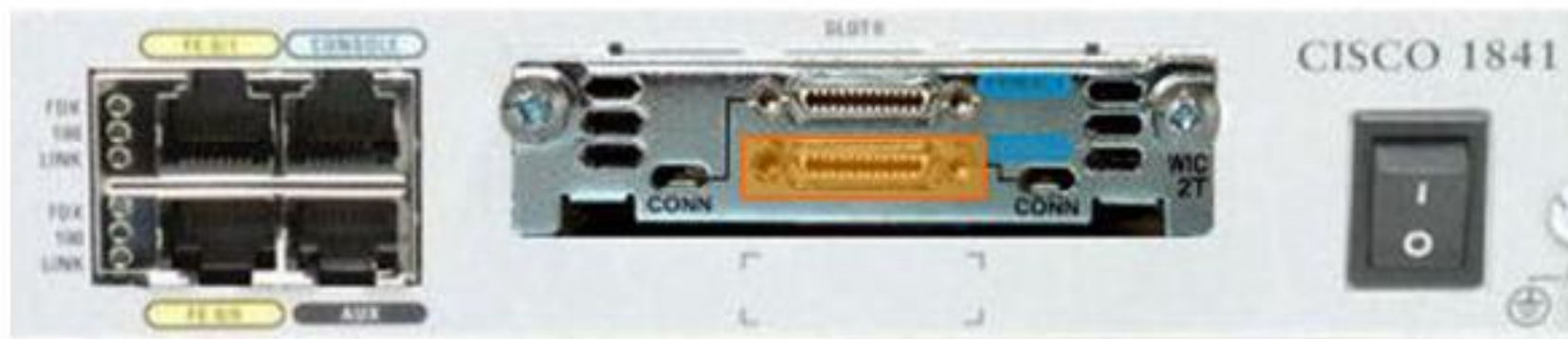


```
Router(config)#interface FastEthernet 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#
```

Configure Router Ethernet Interfaces

11.2.4 Configuring Interfaces

Configure Router Serial Interfaces



```
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)#
```

Configure Router Serial Interfaces

11.2.4 Configuring Interfaces

Router Interfaces Descriptions



```
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

Switch Configuration

```
Switch#configure terminal
Switch(config)#interface FastEthernet 0/0
Switch(config-if)#description To TAM switch
Switch(config-if)#exit
Switch(config)#hostname Flour_Bluff
Flour_Bluff(config)#exit
Flour_Bluff#
```

Switch Configuration

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface vlan 1
Switch(config-if)#ip address 192.168.1.2 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#ip default-gateway 192.168.1.1
Switch(config)#exit
Switch#
```


11.3.1 Testing the Stack

Testing Local TCP/IP Stack

Pinging the local host confirms that TCP/IP is installed and working on the local network adapter.

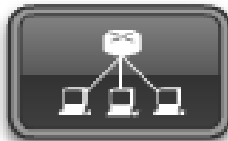


Pinging 127.0.0.1 causes a device to ping itself.



11.3.2 Testing the Interface Assignment

Device
Output



Interface Testing

```
Router1#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	192.168.254.254	YES	NVRAM	up	up
FastEthernet0/1/0	unassigned	YES	unset	down	down
Serial0/0/0	172.16.0.254	YES	NVRAM	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down

```
Router1#ping 192.168.254.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.254.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

```
Router1#traceroute 192.168.0.1
```

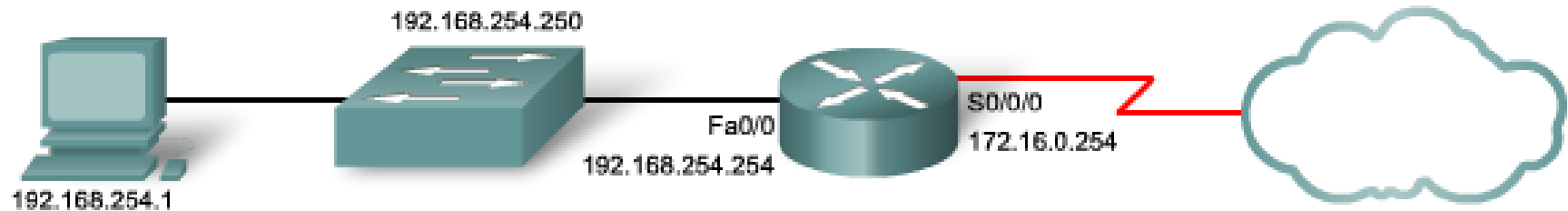
Type escape sequence to abort.

Tracing the route to 192.168.0.1

1 172.16.0.253 8 msec 4 msec 8 msec

2 10.0.0.254 16 msec 16 msec 8 msec

3 192.168.0.1 16 msec * 20 msec



11.3.2 Testing the Interface Assignment

```
Switch1#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
Vlan1	192.168.254.250	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	down	down
FastEthernet0/2	unassigned	YES	unset	up	up
FastEthernet0/3	unassigned	YES	unset	up	up

```
<output omitted>
```

```
Switch1#ping 192.168.254.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.254.1, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

```
Switch1#traceroute 192.168.0.1
```

```
Type escape sequence to abort.
```

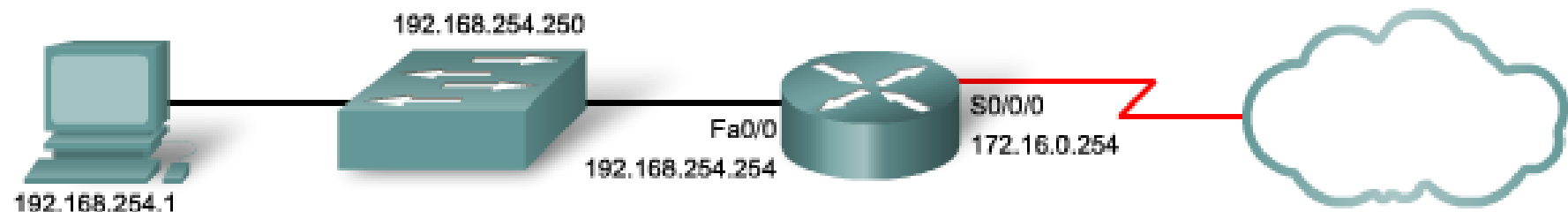
```
Tracing the route to 192.168.0.1
```

```
 0 192.168.254.254  4 msec 2 msec 3 msec
```

```
 1 172.16.0.253    8 msec 4 msec 8 msec
```

```
 2 10.0.0.254     16 msec 16 msec 8 msec
```

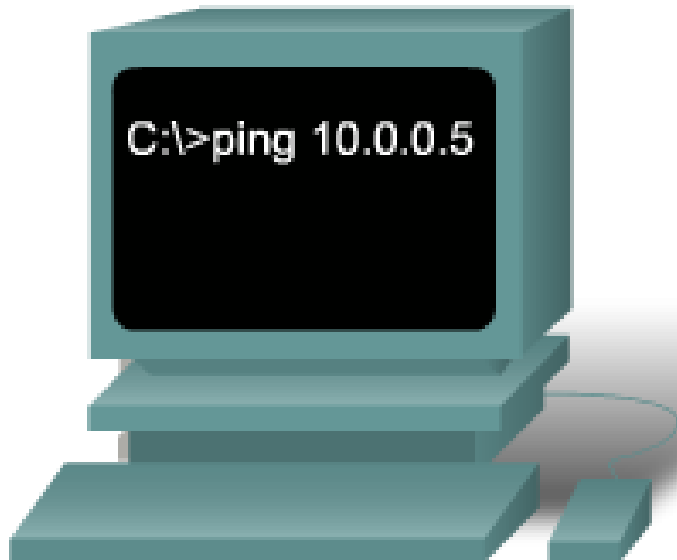
```
 3 192.168.0.1   16 msec * 20 msec
```



11.3.2 Testing the Interface Assignment

Testing the Local NIC Assignment

```
IP Address . . . . . : 10.0.0.5
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . : 10.0.0.254
```

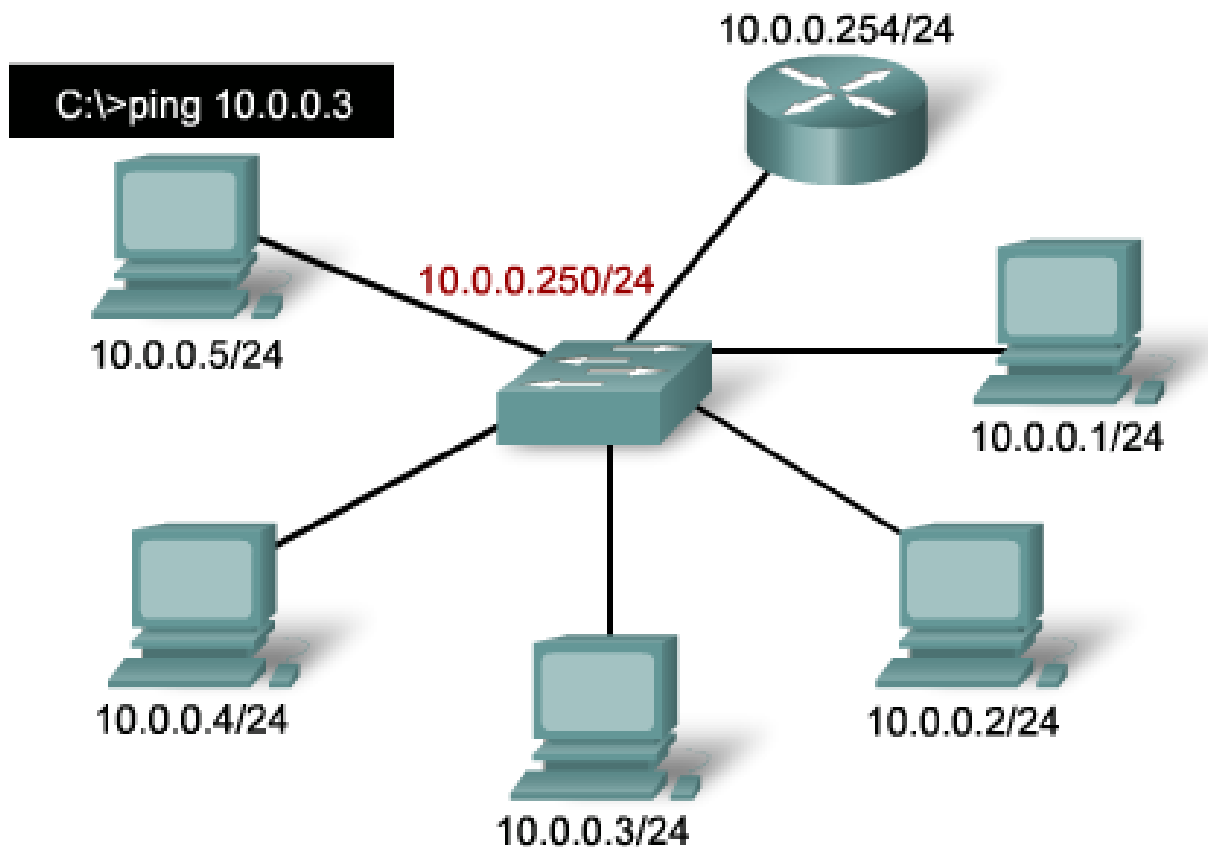


Verify the host NIC address is bound and ready for transmitting signals across the media by pinging its own IP address.

11.3.3 Testing Local Network

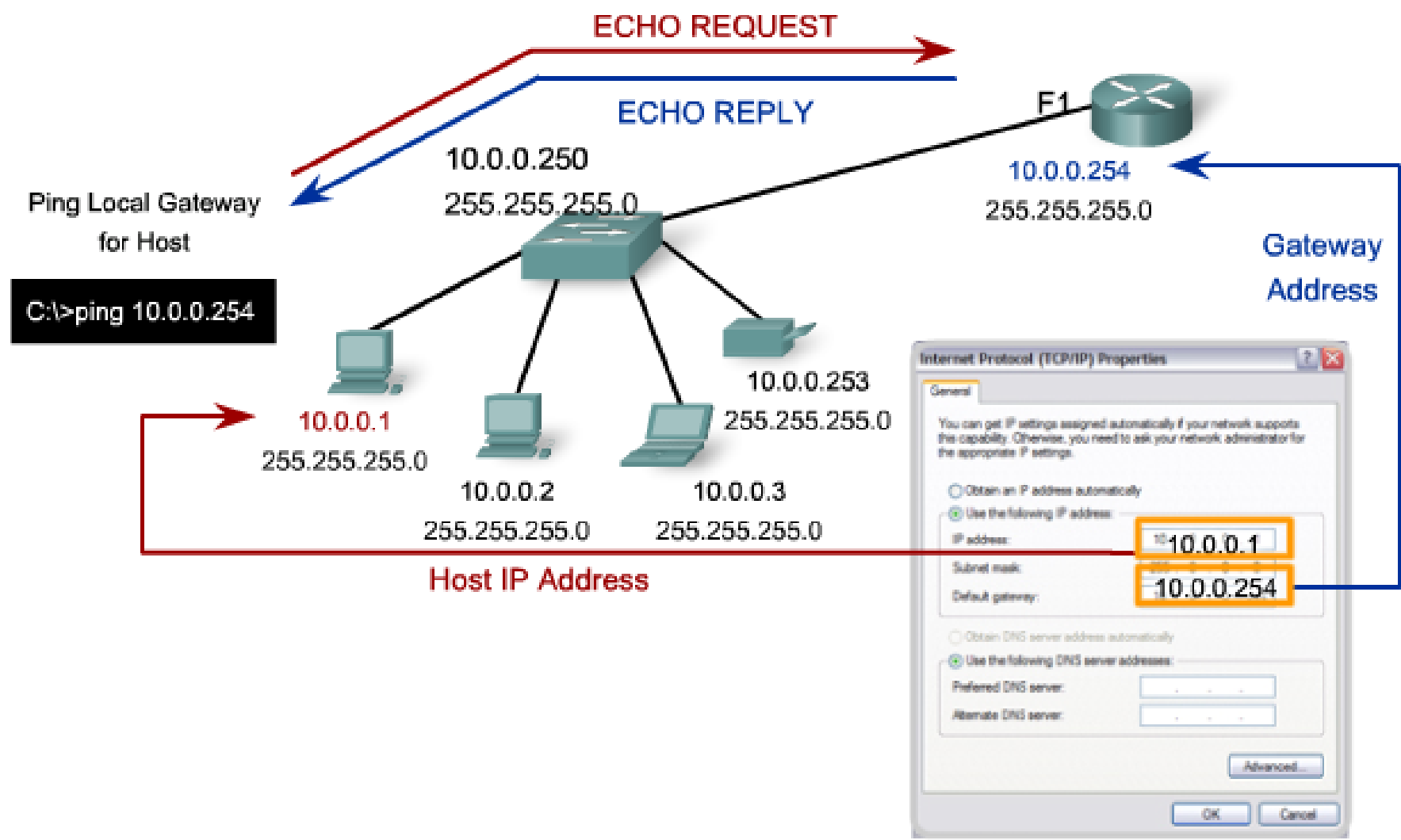
Testing Local Network

Successfully pinging the other host's IPv4 addresses will verify that not only the local host is configured properly but the other hosts are configured correctly as well.



11.3.4 Testing Gateway Connectivity

Testing Gateway Connectivity

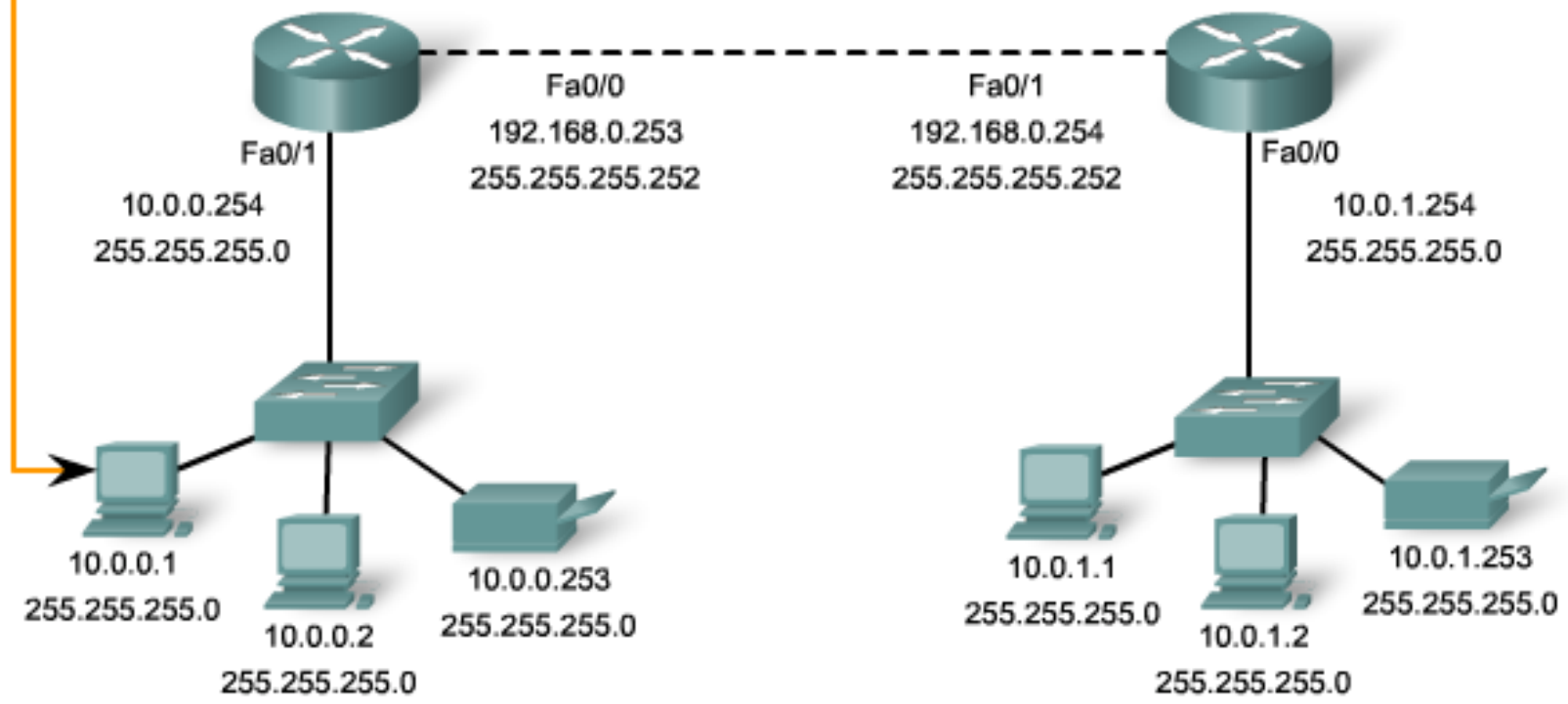


11.3.4 Testing Gateway and Remote Connectivity

Testing Remote Connectivity

```
C:\>ping 192.168.0.253  
C:\>ping 192.168.0.254  
C:\>ping 10.0.1.254  
C:\>ping 10.0.1.1
```

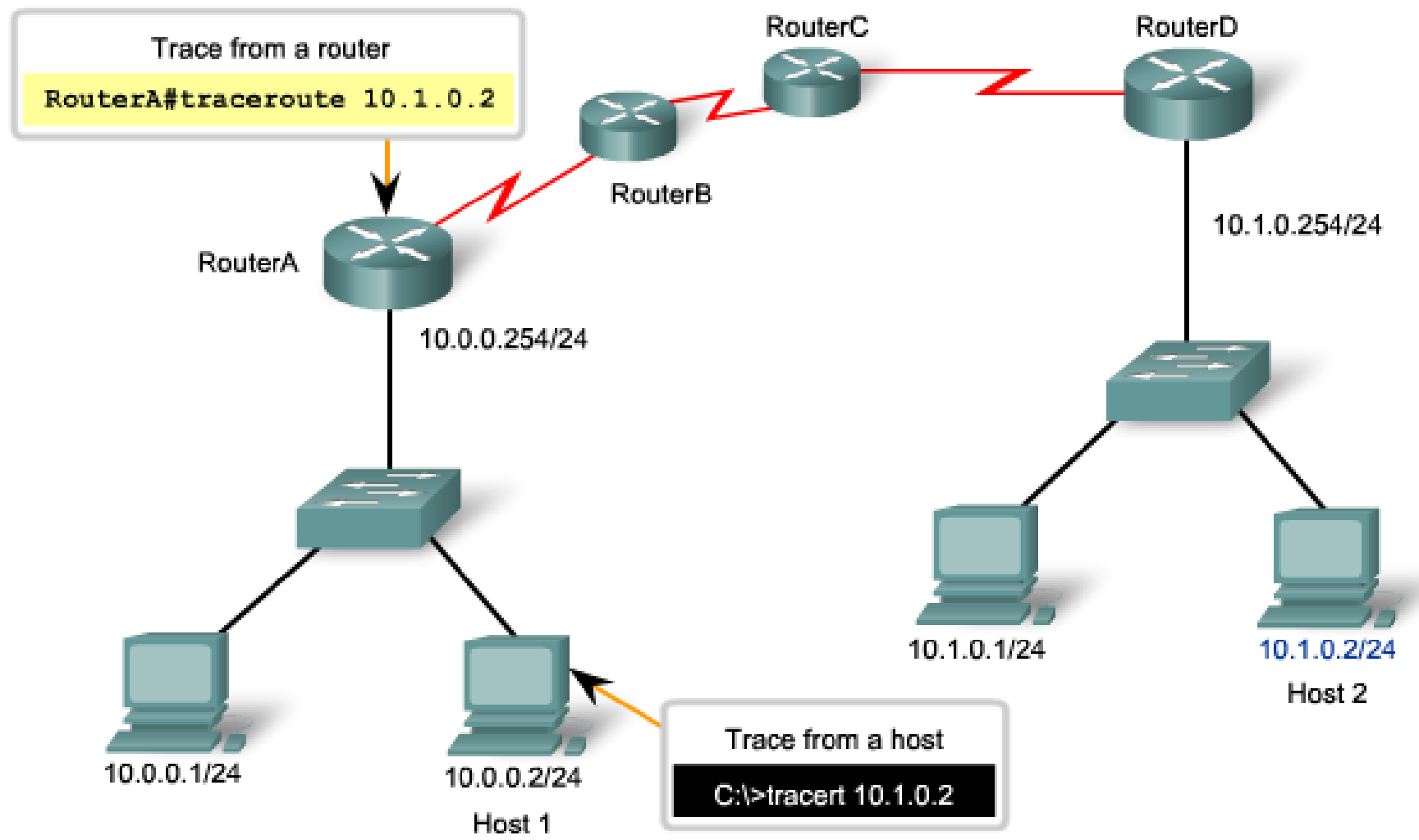
Ping each hop to the remote host



Ping to a remote host from a local host

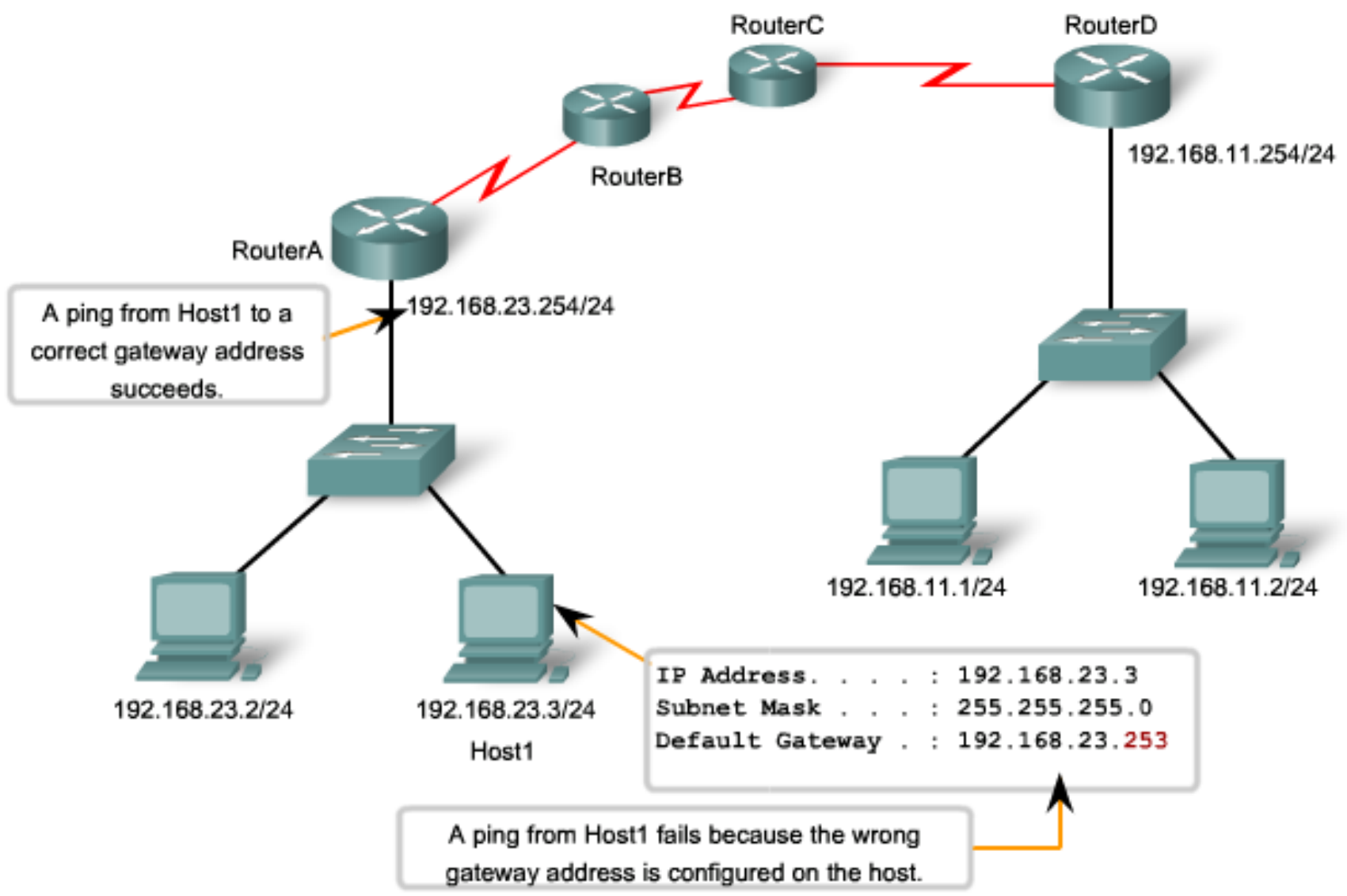
11.3.5 Tracing and Interpreting Trace Results

Testing the Path to a Remote Host



11.3.5 Tracing and Interpreting Trace Results

Interpreting Test Results



11.4.1 Basic Network Baselines

Baseline with ping

FEB 2, 2007 08:14:43

```
C:\>ping 10.66.254.159

Pinging 10.66.254.159 with 32 bytes of data:

Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
```

MAR 17, 2007 14:41:06

```
C:\>ping 10.66.254.159

Pinging 10.66.254.159 with 32 bytes of data:

Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
Reply from 10.66.254.159: bytes=32 time<6ms TTL=128
```

Run same tests at different times and compare values

Run the same test

At different times

Compare values

Rollover an instruction.

11.4.1 Basic Network Baselines

Host Ping Capture

```
C:\WINDOWS\system32\cmd.exe
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.0.1

Ethernet adapter Local Area Connection 2:

    Connection-specific DNS Suffix  . : 
    IP Address . . . . . : 10.66.254.159
    Subnet Mask . . . . . : 255.0.0.0
    Default Gateway . . . . . : 10.66.254.159

C:\>ping 10.66.254.159

Pinging 10.66.254.159 with 32 bytes of data:

Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128
Reply from 10.66.254.159: bytes=32 time<1ms TTL=128

Ping statistics for 10.66.254.159:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>_
```

Copy and Paste

Issue the ping command.

Ping results

11.4.1 Basic Network Baselines

Router Ping Capture - Saving to a text file



In the terminal session:

- 1. Start the text capture process.**
- 2. Issue a ping <ip address> command.**
- 3. Stop the capture process.**
- 4. Save the text file.**

11.4.2 Capturing and Interpreting Trace Information

Capturing Traceroute

```
C:\>tracert www.cisco.com
```

```
Tracing route to www.cisco.com [198.133.219.25]  
over a maximum of 30 hops:
```

1	1 ms	<1 ms	<1 ms	192.168.0.1
2	20 ms	20 ms	20 ms	nexthop.wa.ii.net [203.59.14.16]
3	20 ms	19 ms	20 ms	gi2-4.per-qv1-bdr1.ii.net [203.215.4.32]
4	79 ms	78 ms	78 ms	gi0-14-0-0.syd-ult-core1.ii.net [203.215.20.2]
5	79 ms	81 ms	79 ms	202.139.19.33
6	227 ms	228 ms	227 ms	203.208.148.17
7	227 ms	227 ms	227 ms	203.208.149.34
8	225 ms	225 ms	226 ms	208.30.205.145
9	236 ms	249 ms	233 ms	sl-bb23-ana-8-0-0.sprintlink.net [144.232.9.23]
10	241 ms	244 ms	240 ms	sl-bb25-sj-9-0.sprintlink.net [144.232.20.159]
11	238 ms	238 ms	239 ms	sl-gw8-sj-10-0.sprintlink.net [144.232.3.114]
12	238 ms	239 ms	240 ms	144.228.44.14
13	240 ms	242 ms	248 ms	sjce-dmzbb-gw1.cisco.com [128.107.239.89]

11.4.2 Capturing and Interpreting Trace Information

Router Traceroute Capture - Saving to a text file

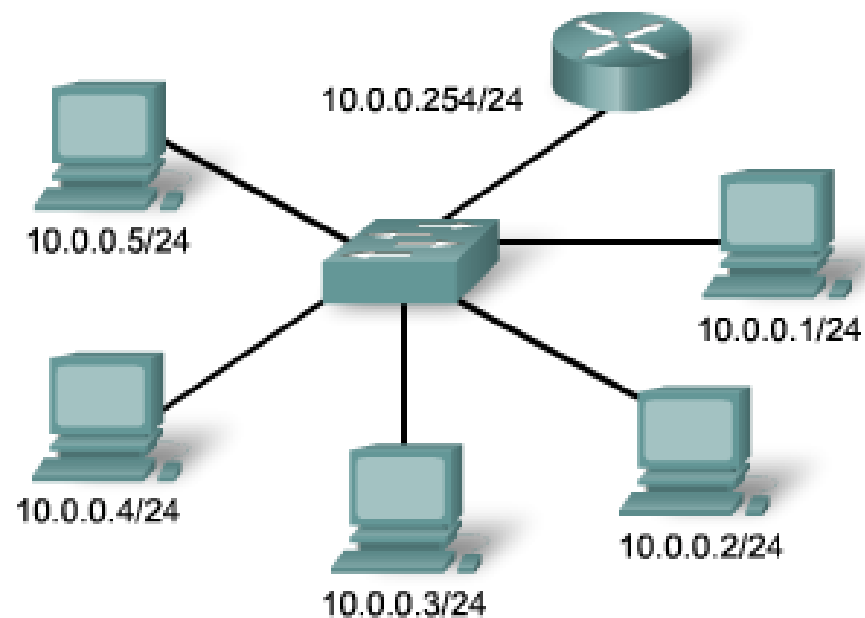


In the terminal session:

1. Start the text capture process.
2. Issue a `traceroute <ip address>` command.
3. Stop the capture process.
4. Save the text file.

11.4.3 Learning about Nodes on the Network

Learning About the Nodes on the Network



```
C:\ >arp -a
Internet Address      Physical Address      Type
10.0.0.2             00-08-a3-b6-ce-04    dynamic
10.0.0.3             00-0d-56-09-fb-d1    dynamic
10.0.0.4             00-12-3f-d4-6d-1b    dynamic
10.0.0.254          00-10-7b-e7-fa-ef    dynamic
```

IP- MAC Address Pair

11.4.3 Learning about Nodes on the Network

Switch Connections

```
Sw1-2950#show mac-address-table
```

Mac Address Table

Vlan	Mac Address	Type	Ports
All	0014.a8a8.8780	STATIC	CPU
All	0100.0ccc.cccc	STATIC	CPU
All	0100.0ccc.cccd	STATIC	CPU
All	0100.0cdd.dddd	STATIC	CPU
1	0001.e640.3b4b	DYNAMIC	Fa0/23
1	0002.fde1.6acb	DYNAMIC	Fa0/14
1	0006.5b88.dfc4	DYNAMIC	Gi0/2
1	0006.5bdd.6fee	DYNAMIC	Fa0/23
1	0006.5bdd.7035	DYNAMIC	Fa0/23
1	0006.5bdd.72fd	DYNAMIC	Fa0/23
1	0006.5bdd.73b0	DYNAMIC	Fa0/23
1	000e.0cb6.2b51	DYNAMIC	Fa0/2
1	000f.8f28.b7b5	DYNAMIC	Fa0/18
1	0011.1165.8acf	DYNAMIC	Fa0/1
1	0013.720b.40c3	DYNAMIC	Fa0/19
1	0080.9120.1766	DYNAMIC	Fa0/8
1	00a0.c949.702a	DYNAMIC	Fa0/15
1	00c0.b770.6c19	DYNAMIC	Fa0/22
1	00c0.b770.6c8e	DYNAMIC	Fa0/21
1	00c0.b770.6c8f	DYNAMIC	Fa0/20
1	00e0.1e68.0987	DYNAMIC	Fa0/17

Multiple devices connected
to Fa0/23

Table showing MAC addresses connected to switch interfaces

11.6.1 Summary and Review

In this chapter, you learned 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.













