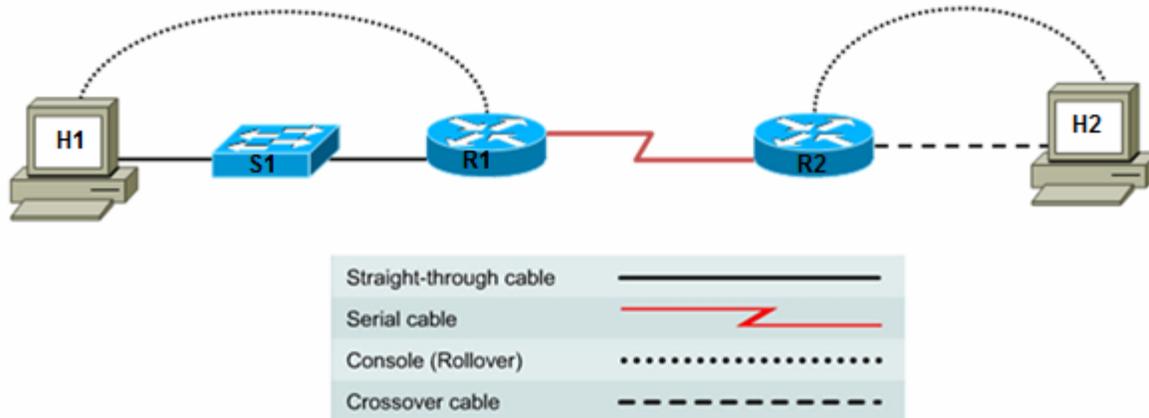


Lab 5.3.5 Configuring Basic Router Settings with the Cisco IOS CLI



Device	Host Name	Interface	IP Address	Subnet Mask
R1	R1	Serial 0/0/0 (DCE)	172.17.0.1	255.255.0.0
		FastEthernet 0/0	172.16.0.1	255.255.0.0
R2	R2	Serial 0/0/0 (DTE)	172.17.0.2	255.255.0.0
		FastEthernet 0/0	172.18.0.1	255.255.0.0

Objectives

- Configure the device host name for a router.
- Configure console, privileged EXEC mode, and vty passwords.
- Configure Ethernet and serial interfaces, including description.
- Configure a message of the day (MOTD) banner.
- Configure the routers to not perform domain lookup of host names.
- Configure synchronous console logging.
- Verify connectivity between hosts and routers.

Background / Preparation

In this lab, you build a multi-router network and configure the routers to communicate using the most common Cisco IOS configuration commands.

Set up a network similar to the one in the topology diagram. Any router that meets the interface requirements displayed in that diagram—such as 800, 1600, 1700, 1800, 2500, or 2600 routers, or a combination of these—can be used. See the Router Interface Summary table at the end of the lab to determine which interface identifiers to use based on the equipment in the lab. Depending on the model of the router, output may vary from what is shown in this lab.

Required Resources

The following resources are required:

- Two routers, each with an Ethernet and serial interface. These should be non-SDM routers, if possible, because the required SDM startup configuration is deleted when the startup-config is erased.
- Two Windows XP computers with HyperTerminal installed
- Two straight-through Category 5 Ethernet cables (H1 to S1 and S1 to R2)
- Crossover Category 5 Ethernet cable (H2 to R2)
- Null serial cable (R1 to R2)
- Console cables (H1 to R1 and H2 to R2)
- Access to the host H1 and H2 command prompt
- Access to the host H1 and H2 network TCP/IP configuration

From each host computer, start a HyperTerminal session to the attached router.

Note: Before continuing, on all routers perform the steps in the section “Erasing and Reloading the Router” at the end of this lab.

Step 1: Configure host computer IP settings.

- a. Make sure that the host computers are connected according to the topology diagram.
- b. Configure the hosts with static IP addresses using the following settings.

H1 attached to the S1 switch:

```
IP address: 172.16.0.2  
Subnet mask: 255.255.0.0  
Default gateway: 172.16.0.1
```

H2 attached to R2 directly:

```
IP address: 172.18.0.2  
Subnet mask: 255.255.0.0  
Default gateway: 172.18.0.1
```

Step 2: Log in to each router and configure the basic settings.

Note: Perform each step for both routers.

- a. Configure a host name for each of the two routers.

```
Router>enable  
Router#configure terminal  
Router(config)#hostname R1
```

Note: Use **R2** for the name of the second router.

- b. Configure a console password and enable login for each of the two routers. Examples are provided for R1. Repeat these commands on R2.

```
R1(config)#line console 0  
R1(config-line)#password cisco  
R1(config-line)#login  
R1(config-line)#exit  
R1(config)#
```

- c. Configure the password on the vty lines for each of the two routers.

```
R1(config)#line vty 0 4
```

```
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#
```

- d. Configure the enable and enable secret passwords for each of the two routers.

```
R1(config)#enable password cisco
R1(config)#enable secret class
R1(config)#exit
```

Note: Remember that the enable secret password is encrypted when viewing the configuration. Also do not type **enable secret password class**. If you do, the secret password will be **password**, not **class**. The enable secret password takes precedence over the enable password. When an enable secret password is configured, the enable password is no longer accepted. It will be necessary to enter the enable secret password to enter privileged EXEC mode. Some network administrators may choose to configure only the enable secret password.

- e. Configure a message-of-the-day (MOTD) banner using the **banner motd** command. When a user connects to the router, the MOTD banner appears before the login prompt. In this example, the number sign (#) is used to start and end the message. The # is converted to ^C when the running-config is displayed.

```
R1(config)#banner motd #Unauthorized Use Prohibited#
```

- f. Configure the router to not attempt to resolve host names using a DNS server. If this is not configured, the router assumes that any mistyped command is a host name and attempts to resolve it by looking for a DNS server. On some routers, it can take considerable time before the prompt returns.

```
R1(config)#no ip domain lookup
```

- g. Configure the router so that console messages do not interfere with command input. This is helpful when exiting configuration mode, because it returns you to the command prompt and prevents having messages from breaking into the command line.

```
R1(config)#line console 0
R1(config-line)#logging synchronous
```

Step 3: View the router running configuration.

- a. From the privileged EXEC prompt, issue the **show running-config** command. This command can be abbreviated as **sh run**.

```
R1#show running-config

*** Some output omitted ***

Building configuration...
Current configuration : 605 bytes
!
hostname R1
!
enable secret 5 $1$eJB4$SH2vZ.aiT7/tczUJP2zwT1
enable password cisco
!
no ip domain lookup
!
interface FastEthernet0/0
 no ip address
 shutdown
 duplex auto
```

```
    speed auto
    !
interface Serial0/0/0
    no ip address
    shutdown
    !
interface Serial0/0/1
    no ip address
    shutdown
    !
banner motd ^CUnauthorized Use Prohibited^C
    !
line con 0
    password cisco
    logging synchronous
    login
line aux 0
line vty 0 4
    password cisco
    login
    !
end
```

- b. Is there an encrypted password? _____
- c. Are there any other passwords? _____
- d. Are any of the other passwords encrypted? _____

Step 4: Configure the serial interface on R1.

In global configuration mode, configure serial interface 0/0/0 on R1. See the Router Interface Summary table at the end of the lab for the proper designation of the serial interface on the router that you are using. Because the R1 serial 0/0/0 interface is acting as the DCE for the WAN link, it is necessary to configure the clock rate. When configuring an interface, always use the **no shutdown** command to enable it.

```
R1(config)#interface serial 0/0/0
R1(config-if)#description WAN link to R2
R1(config-if)#ip address 172.17.0.1 255.255.0.0
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config-if)#exit
```

Note: Enter the clock rate only on the router serial interface to which the DCE interface end of the cable is attached. The cable type (DTE or DCE) is printed on the outside of each end of the null serial cable. When in doubt, enter the **clock rate** command on both router serial interfaces. The command is ignored on the router to which the DTE end is attached. The **no shutdown** command turns on the interface. The **shutdown** command turns the interface off.

Step 5: Display information about the serial interface on R1.

- a. Enter the **show interfaces** command on R1.

```
R1#show interfaces serial 0/0/0

Serial0/0/0 is down, line protocol is down
  Hardware is PowerQUICC Serial
  Description: WAN link to R2
```

```
Internet address is 172.17.0.1/16
MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input never, output hang never
Last clearing of "show interface" counters 00:01:55
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue :0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  6 packets output, 906 bytes, 0 underruns
  0 output errors, 0 collisions, 3 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
DCD=down DSR=down DTR=up RTS=up CTS=down
```

- b. What did you discover by issuing the **show interfaces** command?

Serial 0/0/0 status is _____ Line protocol is _____

Internet address _____

Encapsulation _____

To which OSI layer is the encapsulation referring? _____

- c. If the serial interface was configured, why did the **show interfaces serial 0/0/0** indicate that the interface is down?
-

Step 6: Configure the serial interface on R2.

In global configuration mode, configure serial 0/0/0 on router R2. See the Router Interface Summary table at the end of the lab for the proper designation of the serial interface on the router that you are using.

```
R2(config)#interface serial 0/0/0
R2(config-if)#description WAN link to R1
R2(config-if)#ip address 172.17.0.2 255.255.0.0
R2(config-if)#no shutdown
R2(config-if)##exit
R2(config)#exit
```

Step 7: Display information about the serial interface on R2.

- a. Enter the **show interfaces** command on R2.

```
R2#show interfaces serial 0/0/0
```

```
Serial0/0/0 is up, line protocol is up
Hardware is PowerQUICC Serial
Description: WAN link to R1
Internet address is 172.17.0.2/16
MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
```

```
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:00:08, output 00:00:08, output hang never
Last clearing of "show interface" counters 00:04:54
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue :0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  3 packets input, 72 bytes, 0 no buffer
  Received 3 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  6 packets output, 933 bytes, 0 underruns
  0 output errors, 0 collisions, 2 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
  DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

- b. What did you discover by issuing the **show interfaces** command?

Serial 0/0/0 status is _____ Line protocol is _____

Internet address _____

Encapsulation _____

To which OSI layer is the encapsulation referring? _____

- c. Why did the **show interfaces serial 0/0/0** indicate that the interface is up?
-

Step 8: Verify that the serial connection is functioning.

- a. Use the **ping** command to test connectivity to the serial interface of the other router. From R1, ping the R2 router serial interface.

```
R1#ping 172.17.0.2
```

Does the ping work? _____

- b. From R2, ping the R1 router serial interface.

```
R2#ping 172.17.0.1
```

Does the ping work? _____

- c. If the answer is **no** for either question, troubleshoot the router configurations to find the error. Then ping the interfaces again until the answer to both questions is **yes**.

Step 9: Configure the Fast Ethernet interface on R1.

In global configuration mode, configure the Fast Ethernet 0/0 interface on router R1. See the Router Interface Summary table at the end of the lab for the proper designation of the Ethernet interface on the router that you are using.

```
R1(config)#interface FastEthernet 0/0
R1(config-if)#description R1 LAN Default Gateway
R1(config-if)#ip address 172.16.0.1 255.255.0.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#exit
```

Note: Ethernet interfaces do not have a DTE or DCE distinction; therefore, it is not necessary to enter the **clock rate** command.

Step 10: Display information about the Fast Ethernet interface on R1.

- a. Enter the **show interfaces** command on R1.

```
R1#show interfaces FastEthernet 0/0
```

```
FastEthernet0/0 is up, line protocol is up
  Hardware is AmdFE, address is 000c.3076.8460 (bia 000c.3076.8460)
  Description: R1 LAN Default Gateway
  Internet address is 172.16.0.1/16
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto Speed, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:18, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
  52 packets output, 5737 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets
  0 babbled, 0 late collision, 0 deferred
  52 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out
```

- b. What did you discover by issuing the **show interfaces** command?

Fast Ethernet 0/0 status is _____ Line protocol is _____

Internet address _____

Encapsulation _____

To which OSI layer is the encapsulation referring? _____

- c. Why did the **show interfaces FastEthernet 0/0** command show that the interface is up?
-

Step 11: Configure the Fast Ethernet interface on R2.

In global configuration mode, configure the Fast Ethernet 0/0 interface on R2. Refer to the Router Interface Summary table at the end of the lab for the proper designation of the Ethernet interface on the router that you are using.

```
R2(config)#interface FastEthernet 0/0
R2(config-if)#description R2 LAN Default Gateway
R2(config-if)#ip address 172.18.0.1 255.255.0.0
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#exit
```

Step 12: Display information about the Fast Ethernet interface on R2.

- a. Enter the **show interfaces** command on R2.

```
R2#show interfaces FastEthernet 0/0
```

```
FastEthernet0/0 is up, line protocol is up
  Hardware is AmdFE, address is 000c.3076.8460 (bia 000c.3076.8460)
  Description: R2 LAN Default Gateway
  Internet address is 172.16.0.1/16
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto Speed, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
    14 packets output, 1620 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 babbles, 0 late collision, 0 deferred
    14 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

- b. What did you discover by issuing the **show interfaces** command?

Fast Ethernet 0/0 status is _____ Line protocol is _____

Internet address _____

Encapsulation _____

To which OSI layer is the encapsulation referring? _____

- c. Why did the **show interfaces FastEthernet 0/0** command show that the interface is up?
-

Step 13: Save the configuration on both routers.

Save the running configuration to the startup configuration from the privileged EXEC prompt.

```
R1#copy running-config startup-config
```

```
R2#copy running-config startup-config
```

Note: Save the running configuration for the next time that the router is restarted. The router can be restarted either by a software **reload** command or a power cycle. The running configuration is lost if it is not saved. The router uses the startup configuration when the router is started.

Step 14: Check both router configurations.

Issue the **show running-config** command in privileged EXEC mode on both routers, and verify all the configuration commands you have entered so far. Note that this command can be abbreviated as **sh run**.

```
R1#show running-config
R2#sh run
```

Step 15: Verify that the Fast Ethernet connection to each router is functioning.

- On host H1, open a Command Prompt window by choosing **Start > Run** and typing **cmd**. Alternatively, you can choose **Start > All programs > Accessories > Command Prompt**.
- Use the **ping** command to test connectivity to the Fast Ethernet interface of each router from its associated host computer. From H1, ping the R1 router Fast Ethernet interface.

```
C:\>ping 172.16.0.1
```

Was the ping successful? _____

From host H2, ping the R2 router Fast Ethernet interface.

```
C:\>ping 172.18.0.1
```

Was the ping successful? _____

- If the answer is **no** for either question, troubleshoot the router configurations to find the error. Then ping the interfaces again until the answer to both questions is **yes**.

Step 16: (Optional challenge) Test end-to-end connectivity.

In previous steps, you tested network connectivity by pinging from R1 to the serial interface of R2. You also pinged from each host to its respective default gateway. These pings were successful because, in each case, the source and destination IP addresses were on the same network. Now you will ping from R1 to the R2 Fast Ethernet interface and then from H1 to H2. The source and destination IP addresses for these pings are not on the same network.

- From R1, ping the R2 Fast Ethernet interface.

```
R1#ping 172.18.0.1
```

Was the ping successful? _____

- From host H1, use the **ping** command to test end-to-end connectivity from H1 (172.16.0.2) to H2 (172.18.0.2).

```
C:\>ping 172.18.0.2
```

Was the ping successful? _____

The pings from R1 to the R2 Fast Ethernet interface and from H1 to H2 do not work because router R1 has no knowledge of how to get to the R2 Ethernet network (172.18.0.0). In addition, R2 has no knowledge of the Ethernet network on R1 (172.16.0.0). The pings cannot get from R1 or H1 to the R2 Ethernet network. Even if they could, they could not return. For the pings to work from one host computer to the other, default routes and/or static routes must be configured on the routers, or there must be a dynamic routing protocol set up between them.

Erasing and Reloading the Router

- a. Enter privileged EXEC mode by typing **enable**.

```
Router>enable
```

- b. In privileged EXEC mode, enter the **erase startup-config** command.

```
Router#erase startup-config
```

The responding line prompt is:

```
Erasing the nvram filesystem will remove all files! Continue?  
[confirm]
```

- c. Press **Enter** to confirm.

The response is:

```
Erase of nvram: complete
```

- d. In privileged EXEC mode, enter the **reload** command.

```
Router#reload
```

The responding line prompt is:

```
System configuration has been modified. Save? [yes/no]:
```

- e. Type **n** and then press **Enter**.

The responding line prompt is:

```
Proceed with reload? [confirm]
```

- f. Press **Enter** to confirm.

The first line of the response is:

```
Reload requested by console.
```

After the router has reloaded, the line prompt is:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

- g. Type **n** and then press **Enter**.

The responding line prompt is:

```
Press RETURN to get started!
```

- h. Press **Enter**.

The router is ready for the assigned lab to be performed.

Router Interface Summary Table

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	Fast Ethernet 0 (FA0)	Fast Ethernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
1800	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)

Note: To find out exactly how the router is configured, look at the interfaces. The interface identifies the type of router and how many interfaces the router has. There is no way to effectively list all combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The information in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.