Lab 5.1.3 Powering Up an Integrated Services Router

Objectives

- Set up a new Cisco 1841 Integrated Services Router (ISR).

- Connect a computer to the router console interface.

- Configure HyperTerminal so that the computer can communicate with the router and observe the router startup sequence.

- Display router configuration information using the **show running-config** and **show startup-config** commands and restart the router using the **reload** command.

- Display router system, Cisco IOS software and configuration register information using the **show version** command.

Background / Preparation

Part 1 of this lab focuses on the initial setup of the Cisco 1841 ISR. Part 2 focuses on using **show** commands to display internal router system, Cisco IOS software, and configuration information. If a Cisco 1841 ISR is not available, you can use another router model. The information in this lab applies to other routers. A Cisco ISR combines routing and switching functions, security, voice, and LAN and WAN connectivity into a single device, which makes it appropriate for small-sized to medium-sized businesses and for ISP-managed customers.

Some steps in this lab are normally only performed once during initial setup. These steps are indicated as optional.

The following resources are required:

- Cisco 1841 ISR or other comparable router

- Power cable

- Windows PC with terminal emulation program

- RJ45-to-DB9 connector console cable

Part 1: Initial Router Setup and Startup

Step 1: Position the router and connect the ground wire (optional).

Note: This step is required only if the router is being set up for the first time. Read through it to become familiar with the process.

a. Position the router chassis to allow unrestricted airflow for chassis cooling. Keep at least 1 inch (2.54 cm) of clear space beside the cooling inlet and exhaust vents.

   Caution: Do not place any items that weigh more than 10 pounds (4.5 kilograms) on top of the chassis**,** and do not stack routers on top of each other.

b. Connect the chassis to a reliable earth ground using a ring terminal and 14 AWG (2 mm) wire using these steps.

   Note: Your instructor should inform you where a reliable earth ground is.

   1) Strip one end of the ground wire to expose approximately 3/4 inch (20 mm) of conductor.

2) Crimp the 14 AWG (2 mm) green ground wire to a UL Listed/CSA-certified ring terminal using a crimping tool that is recommended by the ring terminal manufacturer. The ring terminal provided on the back panel of the Cisco 1841 ISR router is suitable for a Number 6 grounding screw.

3) Attach the ring terminal to the chassis as shown in the figure. Use a Number 2 Phillips screwdriver and the screw that is supplied with the ring terminal, and tighten the screw.
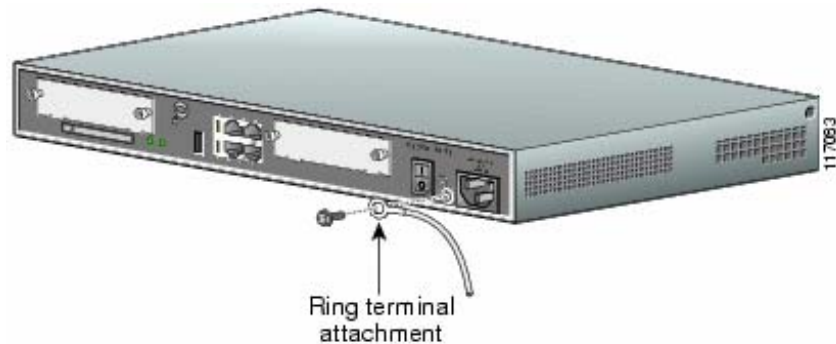
Grounding the Router

4) Connect the other end of the ground wire to a suitable earth ground that the instructor indicates.

Step 2: Install the CompactFlash memory card (optional).

Note: This step is required only if the router is being set up for the first time. To avoid wear on the memory card and ejector mechanism, do not actually perform this step. Just read through it to become familiar with the process.

a. Attach a grounding strap to your wrist to avoid electroshock damage to the card. Seat the external CompactFlash memory card properly into the slot. This step depends on the type of router. Not all routers have flash cards.

b. If the router has a CompactFlash memory card, check that the ejector mechanism is fully seated. The ejector button is next to the CompactFlash memory card.

c. Connect the power cable to the ISR and to the power outlet.

Step 3: Connect the PC and configure the terminal emulation program.

a. Connect the PC to the ISR using an RJ-45-to-DB-9 connector console cable, as shown in the figure. To view the router startup messages, connect the PC to the ISR, power up the PC, and start the terminal emulation program before powering up the router.
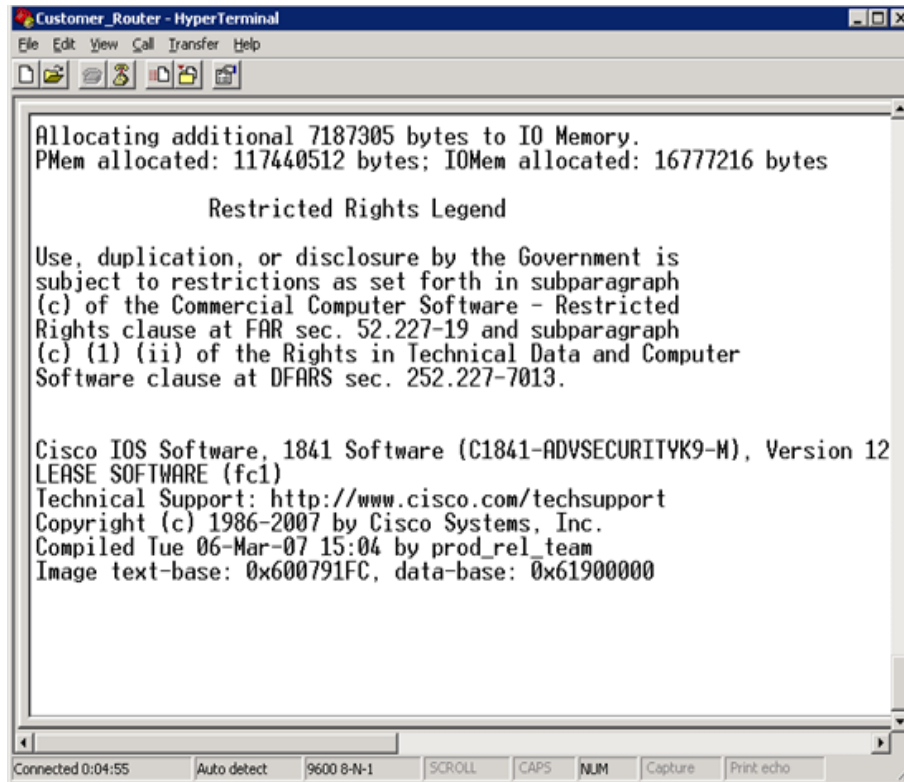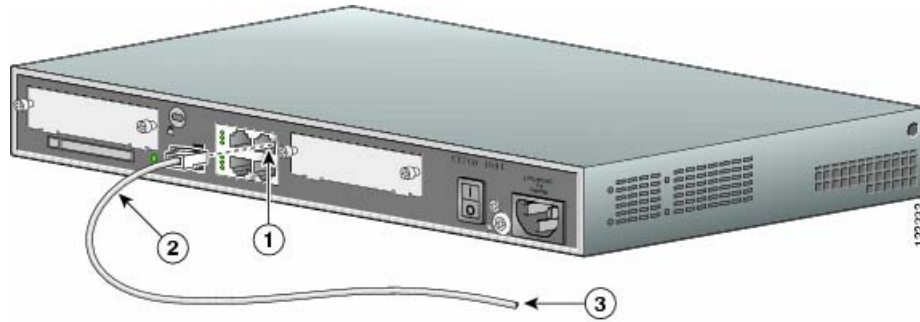
Connecting the PC to the Router

1. ISR RJ-45 console port	2. Light-blue RJ-45-to-DB-9 connector console cable
3. To PC COM port	

Caution: To ensure adequate cooling, never operate the router unless the cover and all modules and cover plates are installed.

b. Start a terminal emulation program, such as HyperTerminal, on the PC.

c. Select a COM port that matches the port where the RJ-45-to-DB-9 connector is connected to the PC. The COM port is usually COM1 or COM2.

d. Configure the terminal emulation parameters as follows:

- 9600 baud

- 8 data bits

- no parity

- 1 stop bit

- no flow control and no parity

Step 4: Power up the ISR.

a. Move the power switch on the back of the ISR to the ON position. During this step, the LEDs on the chassis turn on and off, not necessarily at the same time. The LED activity depends on what is installed in the ISR.

b. Observe the startup messages as they appear in the terminal emulation program window. While these messages are appearing, do not press any keys on the keyboard. Pressing a key interrupts the router startup process. Some examples of startup messages displayed are the amount of main memory installed and the image type of the Cisco IOS software that the router is using. Can you find these example startup messages in the following figure?

```
Customer_Router - HyperTerminal
File  Edit  View  Call  Transfer  Help

Allocating additional 7187305 bytes to IO Memory.
PMem allocated: 117440512 bytes; IOMem allocated: 16777216 bytes

                    Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.


Cisco IOS Software, 1841 Software (C1841-ADVSECURITYK9-M), Version 12
LEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Tue 06-Mar-07 15:04 by prod_rel_team
Image text-base: 0x600791FC, data-base: 0x61900000

Connected 0:04:55        Auto detect     9600 8-N-1     SCROLL   CAPS   NUM   Capture   Print echo
```

c. The figure shows that there is 117 MB of memory installed on this router, and the Cisco IOS image type is C1841-ADVSECURITYK9-M. Startup messages are generated by the operating system of the router. The messages vary depending on the software installed on the router. These messages scroll by quickly and take a few minutes to stop.

When the Cisco 1841 ISR is correctly powered up, the SYS PWR LED is a steady green light, and the fans operate. When the router is finished starting up, the following system messages appear in the terminal emulation window:

```
        --- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
Would you like to terminate autoinstall? [yes]:

Press RETURN to get started!
```

d. After pressing **Return** (Enter) to get started, several system messages regarding the interface and line status appear. If the router is in its default configuration, the user mode prompt **Router>** is displayed.

Note: It may be necessary to press **Enter** after the interface status messages are displayed.

Step 5: Troubleshoot a non-working router.

If the SYS PWR LED does not blink green, the fans do not operate, and the correct system messages do not appear in the terminal emulation window, turn off the router and verify that the power cable is securely attached to the router and plugged into the power source. If the router does not power on, ask the instructor for assistance.

Part 2: Displaying Router Information Using show Commands

Step 1: Display the router running configuration.

a. From the router user prompt, enter privileged mode using the **enable** command, and then issue the **show running-config** command to see the current router configuration in RAM.

If the router is in default configuration, the output is similar to that shown below. The default host name is Router, and none of the interfaces have IP addresses. This 1841 router has two built-in Fast Ethernet interfaces (0/0 and 0/1) and two serial interfaces (Serial0/0/0 and Serial0/0/1) if the serial card is installed in Slot 0. If the serial card is installed in Slot 1, the serial interfaces are listed as Serial0/1/0 and Serial0/1/1. This router also has a Fast Ethernet switch module installed with four ports (Fast Ethernet 0/1/0, 0/1/1, 0/1/2, and 0/1/3). In the default configuration, all interfaces are shutdown. In addition, there are no passwords set.

```
Router>enable
Router#show running-config
Building configuration...
Current configuration : 809 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
no aaa new-model
ip cef
!
interface FastEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface FastEthernet0/1/0
interface FastEthernet0/1/1
interface FastEthernet0/1/2
interface FastEthernet0/1/3
!
interface Serial0/0/0
 no ip address
 shutdown
!
interface Serial0/0/1
 no ip address
 shutdown
!
```

```
interface Vlan1
 no ip address
!
ip http server
no ip http secure-server
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

b. From the router privileged mode prompt, issue the **configure terminal** command to enter configuration mode. Change the router name using the **hostname** command, and then end configuration mode with the **end** command.

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Netacad
Netacad(config)#end
Netacad#
*Feb  8 01:13:00.999: %SYS-5-CONFIG_I: Configured from console by
console
Netacad#
```

c. What is the router prompt now? _____

d. From the router privileged mode prompt, issue the **show running-config** command again. How does the output differ from the first time you issued this command?

    _____

Step 2: Display the router startup configuration.

From the router privileged mode prompt, issue the **show startup-config** command to see the startup file stored in NVRAM. Is the output from this command the same as that from the **show running-config** command issued in Step 1d?

_____

```
Router#show startup-config
```

Step 3: Save the running-config to the startup-config.

When the router is booted up, the startup-config file is loaded into router RAM and becomes the running-config file. Changes made to the running-config take effect immediately, but do not affect the startup-config. To make running-config changes permanent, they must be copied to the startup-config using the **copy running-config startup-config** command.

a. From the router privileged mode prompt, issue the **copy running-config startup-config** command to make the changes permanent. When prompted for the destination filename, press **Enter** to accept the default name of startup-config.

```
Netacad#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Netacad#
```

b. From the router privileged mode prompt, issue the **show startup-config** command again. Is the output from this command the same as that from the **show running-config** command issued in Step 1d? _____

c. To restart the router, from the router privileged mode prompt, issue the **reload** command. This performs a software restart and loads the startup-config file from NVRAM. What is the router prompt now? _____

Step 4: Display the router system information using the show version command.

The **show version** command displays useful information about the router internal components, including the amount of RAM, Cisco IOS software version, the number and type of interfaces installed, and the configuration register, which controls how the router boots up. By default, the config register is set to hexadecimal 2102 (0x2102), which causes the router to load the operating system (Cisco IOS) from flash memory.

The information displayed by the **show version** command is displayed as part of router bootup. The output from the 1841 router is shown below. Your output may vary, depending on the router model, Cisco IOS software version, and internal components installed.

a. From the router privileged mode prompt, issue the **show version** command.

```
Netacad#show version
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version
12.4(10b),
RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Fri 19-Jan-07 15:15 by prod_rel_team

ROM: System Bootstrap, Version 12.4(13r)T, RELEASE SOFTWARE (fc1)

Netacad uptime is 55 minutes
System returned to ROM by reload at 00:35:23 UTC Fri Feb 8 2008
System image file is "flash:c1841-advipservicesk9-mz.124-10b.bin"

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be
found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco 1841 (revision 6.0) with 174080K/22528K bytes of memory.
Processor board ID FTX1111W0QF
6 FastEthernet interfaces
2 Serial(sync/async) interfaces
1 Virtual Private Network (VPN) Module
DRAM configuration is 64 bits wide with parity disabled.
191K bytes of NVRAM.
```

```
62720K bytes of ATA CompactFlash (Read/Write)

Configuration register is 0x2102
```

b. Using the output from the **show version** command, answer the following questions.

1. What is the Cisco IOS software version number? _____

2. How long has the router been up (uptime)? _____

3. What is the name of the system image file? _____

4. How many and what types of interfaces does this router have? _____

_____

5. How many bytes of NVRAM does the router have? _____

6. How many bytes of flash (RAM) memory does the router have? _____

7. What is the configuration register setting? _____

Step 5: Reflection

a. Is there anything about the router setup procedure that is risky?

_____

_____

b. Why does the router cover, all modules, and cover plates need to be installed?

_____

_____

c. How many routers can you safely stack on top of each other?

1) 0

2) 1

3) 2

4) 3

d. Why might you want to use the **show version** command?

_____

_____