Lab 5.2.6b Managing IOS Images with ROMmon and Xmodem
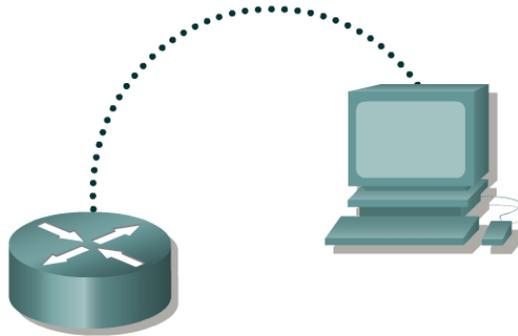
Straight-through cable	——————————
Serial cable	
Console (Rollover)	••••••••••••••••••••••
Crossover cable	– – – – – – – – – – –

Objective

- Recover a Cisco router stuck in ROM monitor (ROMmon) mode.

- Learn how to avoid having to use Xmodem to restore an IOS file.

Background/Preparation

This is a process that is needed only as an emergency when a user has deleted or erased the IOS and there is no possibility of being able to download a new version of the IOS from a TFTP server.

If the procedure cannot be avoided, this lab explains how to use the `xmodem` command at the console to download Cisco IOS® Software using the ROM monitor (ROMmon). Xmodem can be used on a group of routers (listed below) and is used in disaster recovery situations where the router has no valid Cisco IOS software to boot from and hence, only boots up in ROMmon. This procedure can also be used where there are no Trivial File Transfer Protocol (TFTP) servers or network connections, and a direct PC connection (or through a modem connection) to the router console is the only viable option. Because this procedure relies on the console speed of the router and the serial port of the PC, it can take a long time to download an image. Depending on the size of the IOS image and the console baud rate, the download can take 20 minutes or more. This process is valid for the Cisco 827, 1600, 1700, 2600, 3600, and 3700 Series Routers.

Setup a network as displayed in the figure. Refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Note: Erase and reload the router to prevent problems that may be caused by residual configurations. Instructions are available at the end of this lab.

Note: To complete this lab, a copy of the recommended Cisco IOS software image (for example, **c1700-y-mz.122-11.T.bin**) must be available on your PC.

Step 1 Enter the ROM Monitor mode

To simulate Power, cycle the router and Ctrl - Break into ROM monitor mode. Depending on the router hardware, one of several prompts such as "rommon 1 >" or simply ">" may display.

Step 2 Finding a Valid Image in Flash

From the ROM Monitor prompt, issue the `dir flash:` command for each available device. Look for a valid Cisco IOS® Software image:

```
rommon 3 >dir flash:
        File size          Checksum    File name
 3307884 bytes (0x804b4c)0x6ba0  c1700-ny-mz.121-6.bin
rommon 4 >
```

Step 3 Recover from Listed Images if there are any

Boot from any image that is listed in Step 1. If the image is valid, it will bring back normal operation mode:

```
rommon 5 >boot flash:c1700-ny-mz.121-6.bin
program load complete, entry point: 0x80008000, size: 0x804a30
Self decompressing the image : ##################################
########...
```

Step 4 Record information using show version

a. If none of the files are valid, download a new one using one of the following procedures. The first step is to have recorded the `show version` information at the initial setup. This will provide the needed information about the IOS image name.

```
Cisco Internetwork Operating System Software
IOS (tm) C1700 Software (C1700-Y-M), Version 12.2(11)T,  RELEASE
SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Wed 31-Jul-02 09:08 by ccai
Image text-base: 0x80008124, data-base: 0x807E332C

ROM: System Bootstrap, Version 12.2(7r)XM1, RELEASE SOFTWARE (fc1)

Router uptime is 15 minutes
System returned to ROM by reload
System image file is "flash:c1700-y-mz.122-11.T.bin"

cisco 1721 (MPC860P) processor (revision 0x100) with 29492K/3276K bytes
of memory.
Processor board ID FOC06380F0T (479701011), with hardware revision 0000
MPC860P processor: part number 5, mask 2
Bridging software.
X.25 software, Version 3.0.0.
1 FastEthernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
 --More—
Configuration register is 0x2102
```

b. The Highlighted lines should be recorded in case this procedure needs to be performed.

Step 5 Configure boot register to enter ROMmon mode

If not already done, configure Windows HyperTerminal for 8-N-1 at 9600 bps. Connect the PC serial port to the console port of the router. Once connected, get into the ROMmon prompt (rommon 1>). Typically, if the router Cisco IOS software image and bootflash image are both corrupt, the router only comes up in ROMmon mode. If the former is not true and it is necessary to get into the ROMmon prompt, change the configuration register. Typically, change 0x2102 as given by `show version` to 0x0 as follows:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#config-register 0x0
Router(config)#exit
Router#
*Mar  1 00:29:21.023: %SYS-5-CONFIG_I: Configured from console by
console
Router#reload
System configuration has been modified. Save? [yes/no]: n
Proceed with reload? [confirm][Enter]

*Mar  1 00:30:32.235: %SYS-5-RELOAD: Reload requested by console.
System Bootstrap, Version 12.2(7r)XM1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
C1700 platform with 32768 Kbytes of main memory

rommon 1 >
```

Step 6 View available commands from the rommon prompt

a. Enter the following at the ROM monitor prompt:

```
rommon 1 >?
alias               set and display aliases command
boot                boot up an external process
break               set/show/clear the breakpoint
confreg             configuration register utility
context             display the context of a loaded image
dev                 list the device table
dir                 list files in file system
dis                 display instruction stream
help                monitor builtin command help
history             monitor command history
meminfo             main memory information
repeat              repeat a monitor command
reset               system reset
set                 display the monitor variables
sync                write monitor environment to NVRAM
sysret              print out info from last system return
tftpdnld            tftp image download
unalias             unset an alias
unset               unset a monitor variable
xmodem              x/ymodem image download
```

b. This lab will use the `confreg` to reset the console speed. Use `xmodem` to transfer the file.

Step 7 Reset terminal speed for faster download

By specifying a data-rate of 115200 bps for example, the download rate can be increased reducing download time. These are the steps to reset the speed on the router.

```
rommon 2 >confreg
Configuration Summary
(Virtual Configuration Register: 0x1820)
enabled are:
break/abort has effect
console baud: 9600
boot: the ROM Monitor
do you wish to change the configuration? y/n  [n]:  y
enable  "diagnostic mode"? y/n  [n]:[Enter]
enable  "use net in IP bcast address"? y/n  [n]: [Enter]
enable  "load rom after netboot fails"? y/n  [n]: [Enter]
enable  "use all zero broadcast"? y/n  [n]: [Enter]
disable "break/abort has effect"? y/n  [n]:  y
enable  "ignore system config info"? y/n  [n]: [Enter]
change console baud rate? y/n  [n]:  y
enter rate: 0 = 9600,  1 = 4800,  2 = 1200,  3 = 2400
4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200  [0]:  7
change the boot characteristics? y/n  [n]: [Enter]

Configuration Summary
(Virtual Configuration Register: 0x1920)
enabled are:
console baud: 115200

boot: the ROM Monitor
do you wish to change the configuration? y/n  [n]:  n
You must reset or power cycle for new config to take effect

rommon 3 >reset
```

Note: The HyperTerminal setting must be changed to reflect the new console speed of 115200, instead of 9600 baud. Otherwise a garbled output is displayed.

```
System Bootstrap, Version 12.2(7r)XM1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
C1700 platform with 32768 Kbytes of main memory
```

Step 8 Use the xmodem command to request file from host

Before issuing the **xmodem** command, ensure that the new Cisco IOS software image is installed on the PC. From the ROMmon prompt, issue the **xmodem** command.
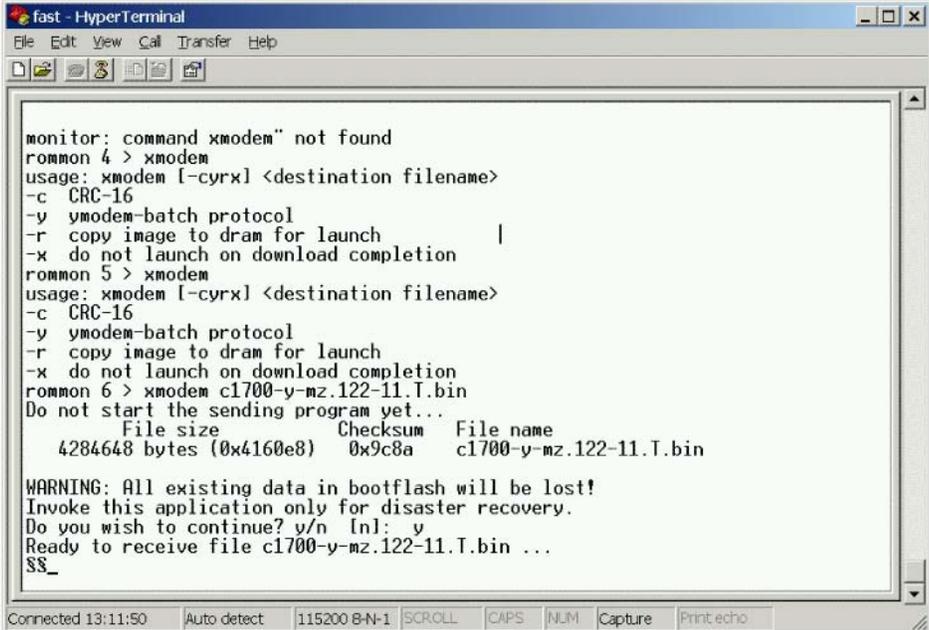
```
rommon 2 >xmodem
usage: xmodem [-cyrx] <destination filename>
-c  CRC-16
-y  ymodem-batch protocol
-r  copy image to dram for launch
-x  do not launch on download completion

rommon 3 >xmodem c1700-y-mz.122-11.T.bin
Do not start the sending program yet...
   File size     Checksum          File name
   4284648 bytes (0x4160e8)   0x9c8a  c1700-y-mz.122-11.T.bin
WARNING: All existing data in bootflash will be lost!
```

```
Invoke this application only for disaster recovery.
Do you wish to continue? y/n  [n]:  n
Ready to receive file c1700-y-mz.122-11.T.bin ...
```

Step 9 Send the file from the HyperTerminal program

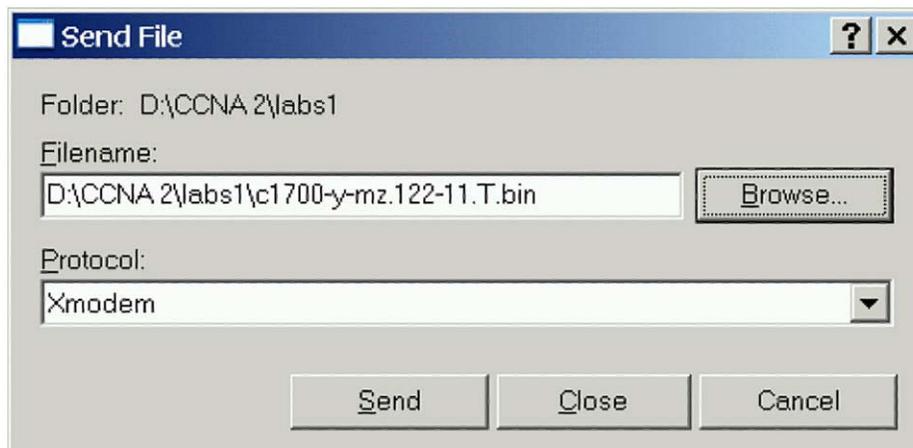a. From the HyperTerminal program send the IOS file using the steps as follows:

b. Select **Transfer** > **Send File**. Specify the location of the IOS file on the host hard drive.

c. Next click on **Send** to initiate file transfer to the router.

d. As the transfer progresses it will look like this:

e. When finished it looks like this:
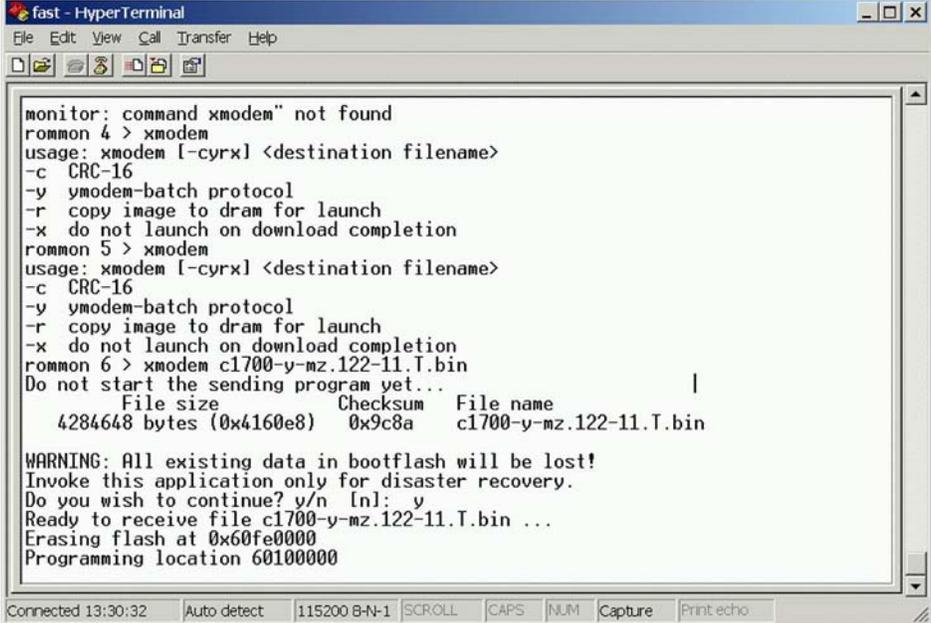
```
fast - HyperTerminal                                           _ □ x
File  Edit  View  Call  Transfer  Help

monitor: command xmodem" not found
rommon 4 > xmodem
usage: xmodem [-cyrx] <destination filename>
-c  CRC-16
-y  ymodem-batch protocol
-r  copy image to dram for launch
-x  do not launch on download completion
rommon 5 > xmodem
usage: xmodem [-cyrx] <destination filename>
-c  CRC-16
-y  ymodem-batch protocol
-r  copy image to dram for launch
-x  do not launch on download completion
rommon 6 > xmodem c1700-y-mz.122-11.T.bin
Do not start the sending program yet...              |
          File size      Checksum    File name
     4284648 bytes (0x4160e8)   0x9c8a     c1700-y-mz.122-11.T.bin

WARNING: All existing data in bootflash will be lost!
Invoke this application only for disaster recovery.
Do you wish to continue? y/n  [n]:  y
Ready to receive file c1700-y-mz.122-11.T.bin ...
Erasing flash at 0x60fe0000
Programming location 60100000

Connected 13:30:32   Auto detect   115200 8-N-1  SCROLL   CAPS   NUM  Capture   Print echo
```

f. When the process is completed the router will reload.

Step 10 Reset the boot register and the console speed

a. From the configuration prompt, set the boot register back to 0x2102 or the original setting before the IOS transfer. This is done using the **config-register** command at the global configuration prompt.

```
Router(config)#config-register 0x2102
Router(config)#exit
Router#show flash

System flash directory:
File  Length   Name/status
   1   4284648  c1700-y-mz.122-11.T.bin
[4285452 bytes used, 12491764 available, 16777216 total]
16384K bytes of processor board System flash (Read/Write)
```

Reset the console speed in HyperTerminal, to 9600.

```
Router(config)#line con 0
Router(config-line)#speed 9600
Router(config-line)#^Z
```

b. HyperTerminal will stop responding. Reconnect to the router with HyperTerminal using 9600 Baud, 8-N-1.

c. Save the configuration to NVRAM on the router.

```
Router#copy running-config startup-config
```

Step 11 Review the new settings

Reload the router and review the new settings using the **show version** command.

```
Router#show version

Cisco Internetwork Operating System Software
IOS (tm) C1700 Software (C1700-Y-M), Version 12.2(11)T,  RELEASE
SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Wed 31-Jul-02 09:08 by ccai
Image text-base: 0x80008124, data-base: 0x807E332C

ROM: System Bootstrap, Version 12.2(7r)XM1, RELEASE SOFTWARE (fc1)

Router uptime is 12 minutes
System returned to ROM by power-on
System image file is "flash:c1700-y-mz.122-11.T.bin"

cisco 1721 (MPC860P) processor (revision 0x100) with 29492K/3276K bytes
of memory
Processor board ID FOC06380F95 (3103823619), with hardware revision 0000
MPC860P processor: part number 5, mask 2
Bridging software.
X.25 software, Version 3.0.0.
1 FastEthernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
 --More—
Configuration register is 0x2102
```

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

```
Router>enable
```

If prompted for a password, enter **class**. If "class" does not work, ask the instructor for assistance.

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

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

The responding line prompt will be:

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

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router#reload
```

The responding line prompt will be:

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

Type **n** and then pess **Enter**.

The responding line prompt will be:

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

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

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

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

The responding line prompt will be:

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

Press **Enter**.

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

Router Interface Summary

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2	Interface #5
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)			
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)	
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)	
In order to find out exactly how the router is configured, look at the interfaces. This will identify the type of router as well as how many interfaces the router has. There is no way to effectively list all of the 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 string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.					