



Name _____

Router IOS Loading and Recovery

Objective: To copy the current IOS on the router to a TFTP server, erase the IOS from the router, and then reload the IOS back onto the router.

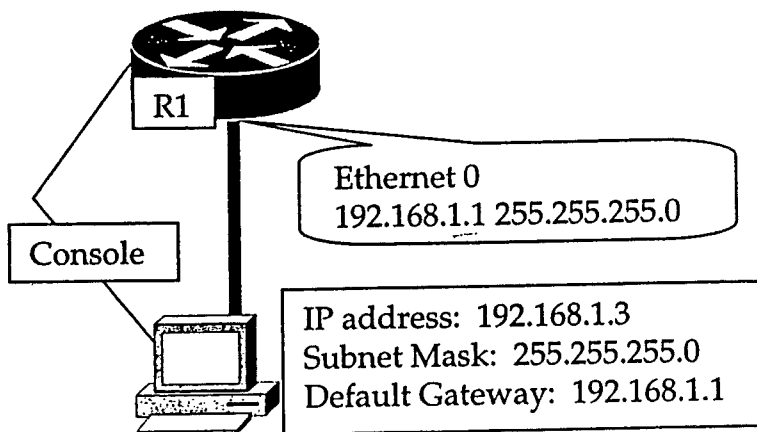
Estimated Time: 1 hour

Parts: One router
One console cable
One console connector
One crossover cable
TFTP server

Previous Skills: Skills included in the Basic Router Configuration #1 exercise



CAUTION! Get permission from whoever is in charge of the router before proceeding with this exercise. Also, if for some reason you are unable to finish the lab, inform the administrator so he/she can reload it.



1. Configure the router and workstation to match the above diagram. Be sure to give the router a hostname of R1. Test connectivity by pinging 192.168.1.1 from the workstation. If the ping fails, troubleshoot as necessary.
2. Copy the running-config to the startup-config file.

3. There are various reasons why an IOS needs to be loaded on a router such as the current copy has become corrupt or a different version needs to be loaded. There are also different ways to load an IOS onto a router. This exercise uses the command *tftpdnld*.



As a preventive measure, copy the IOS from the router to a TFTP server or burn a copy of the IOS to CD. Either of these images can be copied back to the router in case of IOS failure.

This exercise copies the current IOS on the router to the workstation via TFTP. This exercise was done with a 1700 and 2600 series router. The IOS Flash on some routers is read-only.

4. Start the TFTP server on the workstation.



The TFTP server must be running to send or receive files.

Question 1: What is the address of the TFTP server and the base directory?

5. On the router, enter the command *dir*. The output should look similar to the output below:

```
R1#dir
Directory of flash:/

 1 -rw-  5111756      <no date> c1700-bnr2sy-mz.bin
```

8388608 bytes total (3276788 bytes free)

On the router, enter the command *show flash*. The *dir* and *show flash* commands show common data. The output should look similar to the output below:

```
R1#show flash
```

```
System flash directory:
File Length Name/status
 1 5111756 c1700-bnr2sy-mz.bin
[5111820 bytes used, 3276788 available, 8388608 total]
8192K bytes of processor board System flash (Read/Write)
```

6. Copy the IOS file to the TFTP server's base directory by entering the steps below. For the source filename use the full name listed from the *dir* in the previous step


```

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
<output omitted>
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 5111756/10222592 bytes]

```

```

Verifying checksum... OK (0xF4CB)
5111756 bytes copied in 56.188 secs (91281 bytes/sec)

```

```

R1#dir
Directory of flash:/
1 -rw- 5111756 <no date> c1700-bnr2sy-mz.bin
16777216 bytes total (11665396 bytes free)

```

8. The following steps will be lengthier than the previous one because the IOS is deleted, and then reloaded from rommon.

When a router boots, it searches for an IOS in the following places and in the following order:

- Flash memory
- A TFTP server
- ROM (not a full IOS version)

Normally there is an IOS in Flash and it boots without a problem. If the IOS is removed from Flash and there is no TFTP server to load from, it enters ROM (rommon). There are two commands to remove the Flash: *delete* and *erase*. The *delete* command deletes a file; the *erase* command erases a filesystem. For routers in a lab environment either is ok, but for the purposes of this exercise, *delete* the flash using the following steps:

```

R1#delete flash:
Delete filename [ ]? flash:c1700-bnr2sy-mz.bin
Delete flash:c1700-bnr2sy-mz.bin? [confirm] Enter

```

Note that IOS commands are still available even though the IOS has just been deleted. Even though the file has been marked as deleted, the actual deletion does not become evident until the router reboots. Enter the command `dir` and then the command `show flash`.

The outputs should be similar to the following:

```

R1#dir
Directory of flash:/
No files in directory

```

8388608 bytes total (3276788 bytes free)

R1#show flash

System flash directory:

File Length Name/status

1 5111756 c1700-bnr2sy-mz.bin [deleted]

[5111820 bytes used, 3276788 available, 8388608 total]

8192K bytes of processor board System flash (Read/Write)

9. Now, reload the IOS.

Question 2: When the router reboots, what does the prompt look like?

Do not be concerned if the rommon number displayed on the monitor and in the exercise is different. Enter a ? (question mark) at the rommon prompt and notice the *tftpdnld* command.

Enter the command **TFTPDNLD** (in all uppercase letters).

Question 3: How did the router respond?



The router commands are case sensitive. Re-enter the command in all lower case letters. The output should be similar to the following:

```
rommon 2 > tftpdnld
```

```
Missing or illegal ip address for variable IP_ADDRESS
```

```
Illegal IP address.
```

```
usage: tftpdnld [-r]
```

Use this command for disaster recovery only to recover an image via TFTP.

Monitor variables are used to set up parameters for the transfer.

(Syntax: "VARIABLE_NAME=value" and use "set" to show current variables.)

"ctrl-c" or "break" stops the transfer before flash erase begins.

The following variables are **REQUIRED** to be set for tftpdnld:

IP_ADDRESS: The IP address for this unit

IP_SUBNET_MASK: The subnet mask for this unit

DEFAULT_GATEWAY: The default gateway for this unit

TFTP_SERVER: The IP address of the server to fetch from

TFTP_FILE: The filename to fetch

Note that if the router has been previously configured in this mode, the output appears very different, but that is irrelevant for succeeding steps.

The *IP_ADDRESS* refers to the router. Since the TFTP server is on the 192.168.1.0 network, the router must also be on the same network. The host part of the address is irrelevant. The router's *IP_ADDRESS* can be any address between 192.168.1.1 and 192.168.1.254 (except, of course, it cannot be the same address as the *TFTP_SERVER* address).

The *IP_SUBNET_MASK* is 255.255.255.0.

The *DEFAULT_GATEWAY* is actually irrelevant in this case, because the transfer will not be going through the router to another network; however, it must be entered. This address can be *any* valid IP address, but many people elect to use the same address that was assigned with the *IP_ADDRESS* command.

The *TFTP_SERVER* IP address is 192.168.1.3. Again, the *IP_ADDRESS* and the *TFTP_SERVER* address cannot be the same or the workstation displays the system has detected an IP address conflict.

The *TFTP_FILE* is the name of the IOS file copied to the TFTP server earlier. Be sure to type or paste the full filename including the extension.

To set the IP addresses and give the *TFTP_FILE* name, enter the following commands. The commands need to be entered precisely in respect to the upper and lower case letters and there are no spaces in any of the commands. Editing keys, such as the up arrow key to retrieve previous commands, are not available. If a line is typed incorrectly, then re-enter it. Also, there are times when the router responds by indicating it cannot find a file or it does not recognize a command, yet when the same command is re-entered it accepts it. If problems persist, try cold booting the router and starting over.

```
rommon 4 > IP_ADDRESS=192.168.1.1
rommon 5 > IP_SUBNET_MASK=255.255.255.0
rommon 6 > DEFAULT_GATEWAY=192.168.1.1
rommon 7 > TFTP_SERVER=192.168.1.3
rommon 8 > TFTP_FILE=c1700-bnr2sy-mz.bin
rommon 9 > tftpdnld
```

The process of the router reloading the IOS takes several minutes. The output will be similar to the following:

```
IP_ADDRESS: 192.168.1.1
IP_SUBNET_MASK: 255.255.255.0
DEFAULT_GATEWAY: 172.16.0.0
TFTP_SERVER: 192.168.1.3
TFTP_FILE: c1700-bnr2sy-mz.bin
```

Invoke this command for disaster recovery only.
 WARNING: all existing data in all partitions on flash will be lost!
 Do you wish to continue? y/n: [n]: y

```
Receiving c1700-bnr2sy-mz.bin from 192.168.1.3 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
<output omitted>
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!
File reception completed.
Copying file c1700-bnr2sy-mz.bin to flash.
Erasing flash at 0x60ff0000
Programming location 604e0000
rommon 10 >
```

10. To see the parameters that have been entered, type the command set.
11. Now enter the command reset at the rommon prompt and the router reboots.

Question 4: Did the router retain the configuration file?

12. Erase the configurations from the routers and reload.

_____ **Instructor's Initials**