VANIER COLLEGE – Computer Engineering Technology – Autumn 2021

Network Systems Design (247-509-VA)

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LABORATORY EXPERIMENT 7

Basic Topology and Cisco Device Configuration

NOTE:
To be completed in one lab session of 3 hrs.

No formal report required. Answer all questions and include discussion and conclusion.

To be submitted via Lea, before the deadline stated.

This exercise is to be done individually except where specified in the procedure. **Each** student must submit the work with original observations and conclusions.

OBJECTIVES:

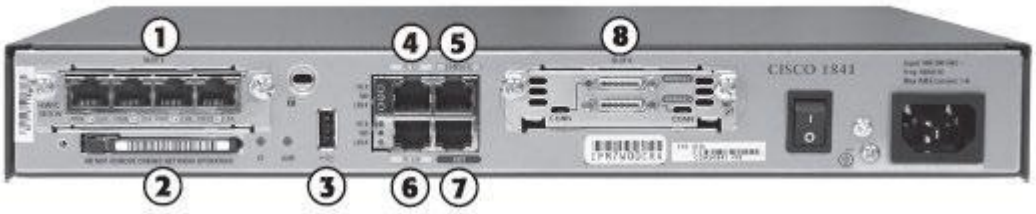
After performing this experiment, the student will be able to:

1. Design logical network.
2. Configure physical lab topology and verify LAN connectivity.
3. Access Cisco IOS router via console session.
4. Configure a Cisco router and switch.
5. Familiarize with physical ports and functionality of Cisco router.

PROCEDURE

HyperTerminal is a simple Windows-based terminal emulation program for serial communication that can be used to connect to the console port on Cisco IOS devices. A serial interface on a computer is connected to the Cisco device via a rollover cable (blue cable). Using HyperTerminal is the most basic way to access a router for checking or changing its configuration. Another popular serial communication utility is **Tera Term**.

Part A: Ports of Cisco Router



Choose the correct label description for each number shown in the above figure of a Cisco router.

7	Alternative management port that can support remote access through a modem.
3	Singe-slot USB port.
1	4-port Cisco EtherSwitch 10BASE-T/100BASE-TX autosensing high-speed WAN interface card.
6	FastEthernet port 0/0.
8	High-speed WAN interface card with two serial interfaces.
2	Compact flash module.
5	Management port used for local access to the device; must be used for initial configuration.
4	FastEthernet port 0/1.

Part B: Creating a small lab topology *(team up in a group of 2 or 3)*

In this lab you will create a small network that requires connecting network devices and configuring host computers for basic network connectivity. SubnetA and SubnetB are subnets that are currently needed. SubnetC and SubnetD are anticipated subnets, not yet connected to the network.

1. Given an IP address and mask of 172.20.0.0/24, design an IP addressing scheme that satisfies the following requirements, with minimum waste on host number:

Subnet	Number of Hosts
SubnetA	2
SubnetB	6
SubnetC	47
SubnetD	125

*Host computers from each subnet will use the **first** available IP address in the address block.*
*Router interfaces will use the **last** available IP address in the address block.*

Provide the following information for each of the subnet:

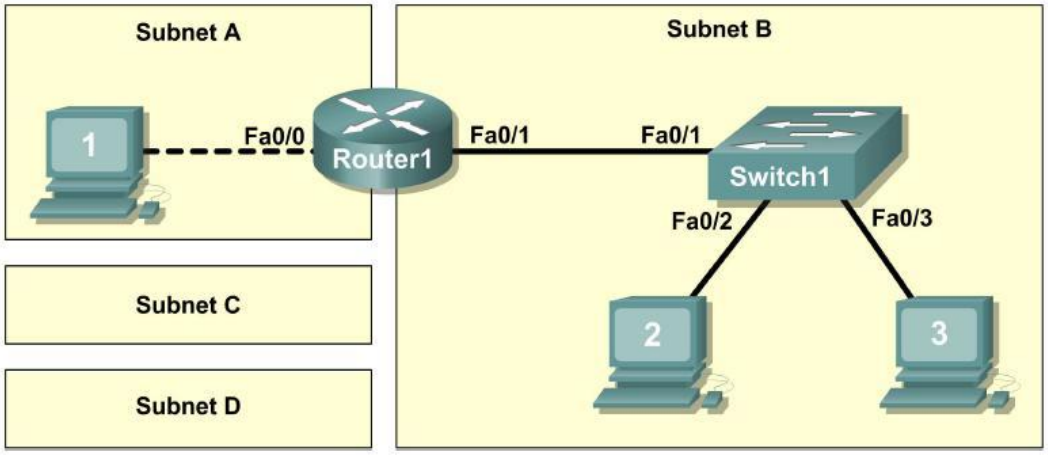
- Network Address and mask.
- First host address.
- Last host address.
- Broadcast address.

Complete subnetting table for the above problem:

Given IP: 172.20.0.0
Subnet mask: 255.255.255.0

Subnets	Required Host bits	Subnet Address	Usable Range	Broadcast Address	Prefix (mask)
D: 125 hosts	7 (2^7 = 128)	172.20.0.0	172.20.0.1 to 172.20.0.126	172.20.0.127 (172.20.0.0111 1111)	/25 (255.255.255.1000 0000)
C: 47 hosts	6 (2^6 = 64)	172.20.0.128 (172.20.0.127 + 1)	172.20.0.129 to 172.20.0.190	172.20.0.191 (172.20.0.1011 1111)	/26 (255.255.255.1100 0000)
B: 6 hosts	3 (2^3 = 8)	172.20.0.192 (172.20.0.191 + 1)	172.20.0.193 to 172.20.0.198	172.20.0.199 (172.20.0.1100 0111)	/29 (255.255.255.1111 1000)
A: 2 hosts	2 (2^2 = 4)	172.20.0.200 (172.20.0.199 + 1)	172.20.0.201 to 172.20.0.202	172.20.0.203 (172.20.0.1100 1011)	/30 (255.255.255.1111 1100)

2. Configure the physical lab topology as shown below.



a) Cable the network devices as shown in the above figure.

b) From IP address information obtained in step 1, write down the IP address information for each computer. Configure all the 2 host computers accordingly.

Host1	
IP address	172.20.0.201
IP mask	/30
Gateway address	172.20.0.202

Host2	
IP address	172.20.0.193
IP mask	/29
Gateway address	172.20.0.198

Host3 *(for team of 3)*	
IP address	172.20.0.194
IP mask	/29
Gateway address	172.20.0.198

3. Verify your network connectivity using Windows ping command. Use the following table to methodically verify and record connectivity with each network device. Take corrective action to establish connectivity if a test fails, clearly explain any of this situation.

From	To	IP Address	Ping Results
Host1	Gateway(Router1, Fa0/0)	172.20.0.202	Success
Host1	Router1, Fa0/1	172.20.0.198	Success
Host1	Host2	172.20.0.193	Success
Host2	Gateway(Router1, Fa0/1)	172.20.0.198	Success
Host2	Router1, Fa0/0	172.20.0.202	Success
Host2	Host1	172.20.0.201	Success

   - One issue that was encountered was when testing communication from Host1 to Host2 and vice versa. Windows firewall has to be turned off in order to view successful ping result when testing communication from Host1 to Host2 and vice versa.

4. Download HyperTerminal or Tera Term software from internet.

5. Connect the router from one of the host computers with console cable.

6. Run your terminal emulation program. Depending on the tool you use, you might need to setup the **serial** port based on the following settings:

Setting	Value
Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

7. When the terminal session window comes up, press **Enter** key. There should be a response from the router. This indicates that connection has been successfully completed.
   a) Enter command **`show ip interface brief`**. Explain the output that you observed.

```
Router1>show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            172.20.0.202    YES NVRAM  up                    up
FastEthernet0/1            172.20.0.198    YE
Serial0/0/0                unassigned      YE
Serial0/0/1                unassigned      YE
Router1>
```

Physical interfaces in use on the router for Subnet A and Subnet B (default gateways for the two subnets).

Figure 1. Using the command issued in the screenshot above, all installed physical interfaces on the system are listed, along with other information such as their status and IP-Address. Only two interfaces are in use for this lab, Fa0/0 and Fa0/1. Fa0/0 is the default gateway for Subnet A and Fa0/1 is the default gateway for Subnet B (IP addresses for the two shown above and in the table on the previous page).

   b) Enter command **`show ip route`**. Explain the output that you observed.

```
Router1>show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS su                    level-1, L2 - IS-IS level-2
       ia - IS-IS inter area,                      ult, U - per-user static route
       o - ODR, P - periodic do                    oute

Gateway of last resort is not set

     172.20.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.20.0.200/30 is directly connected, FastEthernet0/0
C       172.20.0.192/29 is directly connected, FastEthernet0/1
Router1>
```

No default route set!

Local routes stored on router for Subnet A and Subnet B (automatically populated).

Figure 2. Using the command issued in the screenshot above, the router's local routing table is shown. Only two local routes are shown, which are the default gateways for Subnet A (172.20.0.200 on interface Fa0/0) and Subnet B (172.20.0.192 on interface Fa0/1). There is no default route set.

8. Before turning off power to the router, remove the NVRAM configuration file from each device with the privileged exec command (password : Cisco) **`erase startup-config`**.

Part C : Basic Cisco Device Configuration *(team up in a group of 2 or 3)*

Common configuration tasks include setting the ***hostname, access passwords, and MOTD banner***.

Interface configuration is extremely important. In addition to assigning a Layer 3 IP address, enter a description that describes the destination connection speeds troubleshooting time. Configuration changes are effective immediately.

Cisco IOS calls RAM configuration storage the running configuration, and it calls **non-volatile RAM (NVRAM)** configuration storage the startup configuration. For configurations to survive rebooting or power restarts, the RAM configuration must be copied into NVRAM. This does not occur automatically. Configuration changes may also be saved off-line in a text file.

NVRAM must be manually updated after any changes are made.

Cisco IOS switch configuration is similar to Cisco IOS router configuration.

9. Given an IP address of 198.133.219.0/24, with 4 bits borrowed for subnets, fill in the following information in the table below.
   a) What is the maximum number of usable subnets?
      - The maximum number of usable subnets is 16 (2^# of borrowed bits = total number of subnets. Therefore, 2^4 = 16).
   b) What is the maximum number of usable hosts per subnet?
      - The maximum number of usable hosts per subnet is 14 (2^# of host bits – 2 = total number of usable hosts per subnet. Therefore, 2^4 – 2 = 14).
   c) What is the subnet mask?
      - The subnet mask is 255.255.255.240 (255.255.255.1111 0000, where the yellow portion represents the host bits, and the green portion represents the borrowed bits).

Refer to the next page for the complete subnetting table for the above problem.

Verify your addresses with the instructor. You will then be assigned subnetworks.

Complete subnetting table for the previous problem:

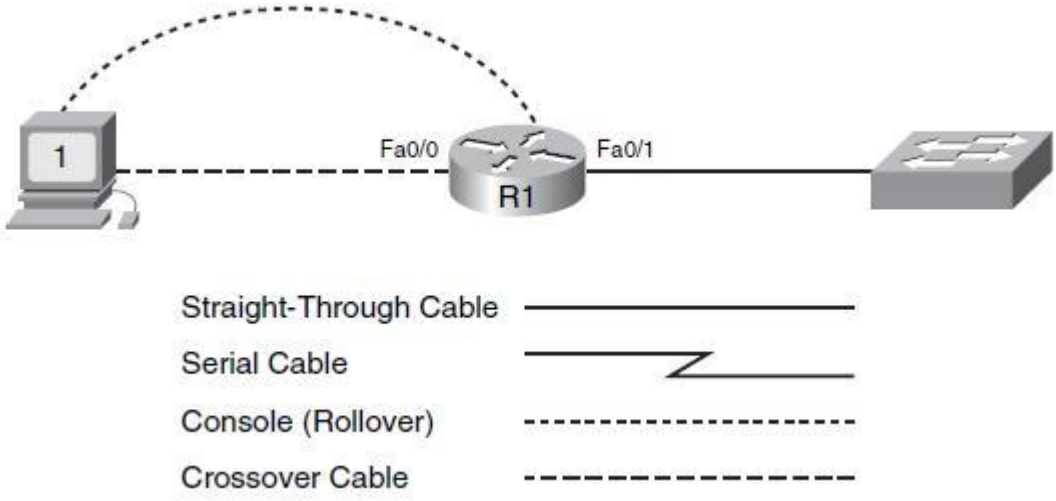
Given IP: 198.133.219.0
Subnet mask: 255.255.255.0

Given IP: 198.133.219.0 (198.133.219.0000 0000)
New subnet mask: 255.255.255.240 (255.255.255.1111 0000)

Green portion represents the borrowed bits (a.k.a subnet bits).
Yellow portion represents the host bits.

Subnet ID	Subnet Address	Usable Range	Broadcast Address	Prefix (mask)
0	198.133.219.0 (198.133.219.0000 0000)	198.133.219.1 to 198.133.219.14	198.133.219.15 (198.133.219.0000 1111)	/28
1	198.133.219.16 (198.133.219.0001 0000)	198.133.219.17 to 198.133.219.30	198.133.219.31 (198.133.219.0001 1111)	/28
2	198.133.219.32 (198.133.219.0010 0000)	198.133.219.33 to 198.133.219.46	198.133.219.47 (198.133.219.0010 1111)	/28
3	198.133.219.48 (198.133.219.0011 0000)	198.133.219.49 to 198.133.219.62	198.133.219.63 (198.133.219.0011 1111)	/28
4	198.133.219.64 (198.133.219.0100 0000)	198.133.219.65 to 198.133.219.78	198.133.219.79 (198.133.219.0100 1111)	/28
5	198.133.219.80 (198.133.219.0101 0000)	198.133.219.81 to 198.133.219.94	198.133.219.95 (198.133.219.0101 1111)	/28
6	198.133.219.96 (198.133.219.0110 0000)	198.133.219.97 to 198.133.219.110	198.133.219.111 (198.133.219.0110 1111)	/28
7	198.133.219.112 (198.133.219.0111 0000)	198.133.219.113 to 198.133.219.126	198.133.219.127 (198.133.219.0111 1111)	/28
8	198.133.219.128 (198.133.219.1000 0000)	198.133.219.129 to 198.133.219.142	198.133.219.143 (198.133.219.1000 1111)	/28
9	198.133.219.144 (198.133.219.1001 0000)	198.133.219.145 to 198.133.219.158	198.133.219.159 (198.133.219.1001 1111)	/28
10	198.133.219.160 (198.133.219.1010 0000)	198.133.219.161 to 198.133.219.174	198.133.219.175 (198.133.219.1010 1111)	/28
11	198.133.219.176 (198.133.219.1011 0000)	198.133.219.177 to 198.133.219.190	198.133.219.191 (198.133.219.1011 1111)	/28
12	198.133.219.192 (198.133.219.1100 0000)	198.133.219.193 to 198.133.219.206	198.133.219.207 (198.133.219.1100 1111)	/28
13	198.133.219.208 (198.133.219.1101 0000)	198.133.219.209 to 198.133.219.222	198.133.219.223 (198.133.219.1101 1111)	/28
14	198.133.219.224 (198.133.219.1110 0000)	198.133.219.225 to 198.133.219.238	198.133.219.239 (198.133.219.1110 1111)	/28
15	198.133.219.240 (198.133.219.1111 0000)	198.133.219.241 to 198.133.219.254	198.133.219.255 (198.133.219.1111 1111)	/28

10. Connect the console cable to the console port on the router. Connect the host computer to router through terminal emulation program.



If the router terminal is in configuration mode, exit by entering no:

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

Press RETURN to get started!

```
Router>
```

In privileged EXEC command mode, the router attempts to translate any misspelled or unrecognized commands as a domain name. Because no domain server is configured, a delay occurs while the request times out. This can take from several seconds to several minutes. To terminate the domain name lookup process, press **Ctrl-Shift-6**, release, and then press X.

11. Configure global configuration of router.

a) From user EXEC mode, enter privileged EXEC mode. To leave this mode, use `exit` or `end`.

```
Router> enable
Router#
```

b) Verify a clean configuration file using the privileged EXEC command `show running-config`. If a configuration was previously saved, ask your instructor to remove the configuration.

c) Examine the different configuration modes that can be entered with the command `configure ?`. Write down the list of configuration modes and describe them.

Configuration mode	Description
`Confirm`	Confirm replacement of running-config with a new config file.
`Memory`	Configure from NV memory.
`Network`	Configure from a TFTP network host.
`Overwrite-network`	Overwrite NV memory from TFTP network host.
`Replace`	Replace the running-config with a new config file.
`Terminal`	Configure from the terminal.

d) From privileged EXEC mode, enter global configuration mode:

```
Router# config terminal
Router(config)#
```

e) Set the device hostname to Router1:

```
Router(config)# hostname
Router1 Router1(config)#
```

f) Configure the MOTD banner. In production networks, banner content may have a significant legal impact on the organization. For example, a court might interpret a friendly "Welcome" message as permission for an attacker to hack into the router. A banner should include information about authorization, penalties for unauthorized access, connection logging, and applicable local laws. Use the following command to explore option to set banner.

```
Router1(config)# banner motd %
```

g) Cisco IOS supports two commands that set access to privileged EXEC mode. One command, `enable password`, contains no encryption or weak cryptography, and should never be used if the `enable secret` command is available. Set the privileged EXEC password to class:

```
Router1(config)# enable secret class
Router1(config)#
```

h) Set the console access password to cisco. The console password controls console access to the router.

```
Router1(config)# line console 0
Router1(config-line)# password cisco
Router1(config-line)# login
```

i) Issue the command **exit**. What is the router prompt? What is the mode?
- The mode is global configuration mode. The router prompt is `<Router1(config)#>`.

j) Issue the command **end**. What is the router prompt? What is the mode?
- The mode is privileged EXEC mode. The router prompt is `<Router1#>`.

12. In this step, you will configure your Cisco router interfaces Fa0/0.

a) What is your subnet number and mask, and IP address for router fa0/0 interface?
- My subnet number is 14, my subnet mask is 255.255.255.240 and my IP address for router interface Fa0/0 is 198.133.219.238. Refer to complete subnetting table on page 8 of this lab report for other details.

b) Prepare a short description for the Fa0/0 interface on router. Apply the following command to configure your router:

```
Router1(config)# interface fa0/0 Router1(config-if)#
description your router interface description

Router1(config-if)# ip address address mask
Router1(config-if)# no shutdown
Router1(config-if)# end
Router1#
```

c) Using the same approach, configure your router fa0/1 interface accordingly.
- My partner's subnet number is 15, his subnet mask is /28, and his IP address for router interface Fa0/1 is 198.133.219.254. Refer to same table mentioned before for more details.

d) What Cisco IOS command can you use to verify the interface status? Show your results.
- The command used to verify the interface status was <show ip interface brief> while in privileged EXEC mode. Refer to screenshot below for additional proof.

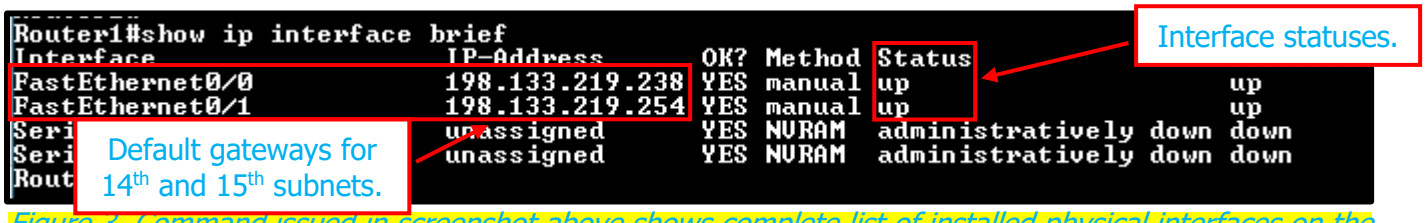


Figure 3. Command issued in screenshot above shows complete list of installed physical interfaces on the router. The statuses of these interfaces can be found in the far-right column.

13. Configure your host computer with the appropriate network settings.
- My host's IP address is 198.133.219.225, my subnet mask is 255.255.255.240 and my default gateway is 198.133.219.238. My partner's host's IP address is 198.133.219.241, his subnet mask is 255.255.255.240 and his default gateway is 198.133.219.254.

14. Verify your network connectivity using ping command, to the router.
- A ping to my default gateway (interface Fa0/0 on Router1) yields successful. Refer to screenshot below for additional proof.

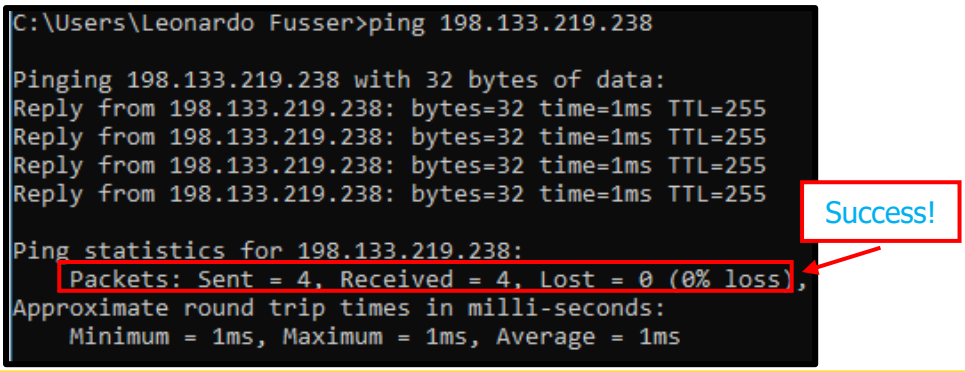


Figure 4. Result of ping command issued to default gateway of 14th subnet from Host 1 shown above.

15. Save the router configuration files

a) Use the Cisco IOS show command to view RAM and NVRAM configurations. The configuration is displayed one screen at a time. If the output of NVRAM is missing, it is because there is no saved configuration, as shown below.

```
Router1# show startup-config
startup-config is not present
Router1#
Display the contents of RAM.
Router1# show running-config
```

How large is the configuration file?

- The configuration file is 1.397kB large (196.6kB maximum size).

b) For a configuration to be used the next time the router is powered on or reloaded, it must be manually saved in NVRAM using the following command:

```
Router1# copy running-config startup-config

Destination filename [startup-config]? <ENTER>
```

16. Cisco IOS switch configuration is similar to configuring a Cisco IOS router. Connect host to the switch console, and configuration the following global settings.

a) Set the device hostname to Switch1.

b) Configure the MOTD banner.

c) Configure the privileged EXEC password.

d) Configure the console password.

e) Configure all the 3 interface descriptions. Example:

```
Switch1(config)# interface fa0/1 Switch1(config-if)#
description Connection to Router1
```

f) Save the RAM configuration to NVRAM. A short cut for the command is as shown below:

```
Switch1# copy run start
Destination filename [startup-config]? <ENTER>
```

17. It is often necessary, and always handy, to save the configuration file to an offline text file. Explore how this can be done using your terminal emulation software. Explain the approach used and attach a copy of your configuration file in your lab report.

Method used on Router1:

- The approach used on Router1 was to take advantage of the integrated TFTP feature in Router1 to copy the startup-config file stored in NVRAM on the router to a directory on my computer. My computer was the TFTP server and Router1 was the TFTP client.

  On the computer side, an application called Tftpd64 was used and configured as a TFTP server so that it can receive a copy of the startup-config stored on Router1 and place it in a directory specified in Tftp64. The application was set to listen all TFTP requests on my host's NIC (with IP of 198.133.219.225) and that all files received would be saved to my downloads folder. Refer to screenshot below.

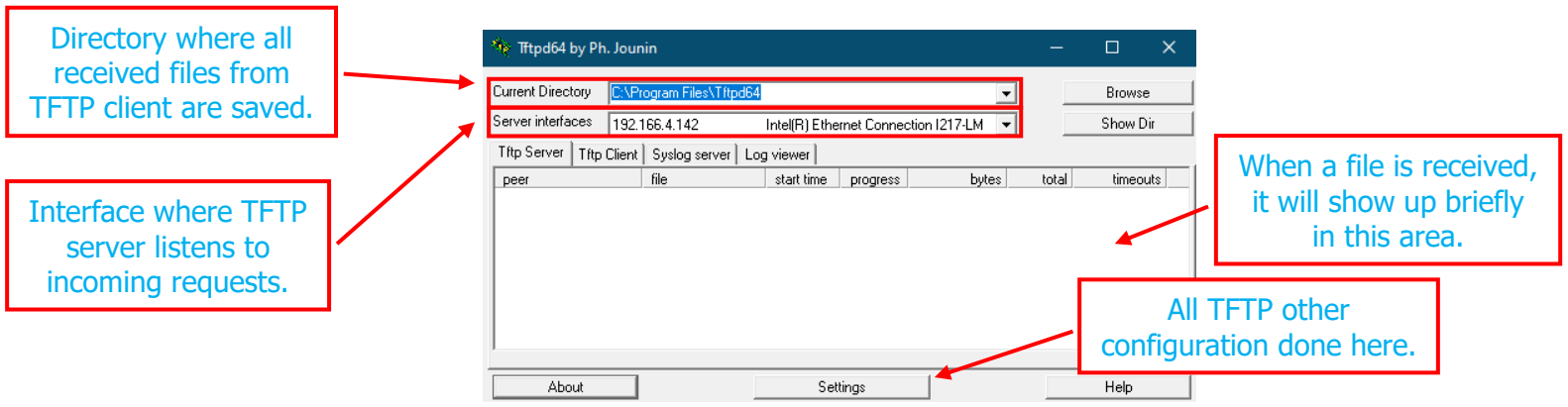


Figure 4. Basic overview of Tftpd64 software shown above.

On the router side, it was only a matter of being in privileged EXEC mode and issuing one command so that the startup-config file could be sent over to my computer to be saved in my downloads folder (configured in Tftpd64 software beforehand). No configuration needed to be done so that Router1 would act as a TFTP client. Refer to screenshot below.

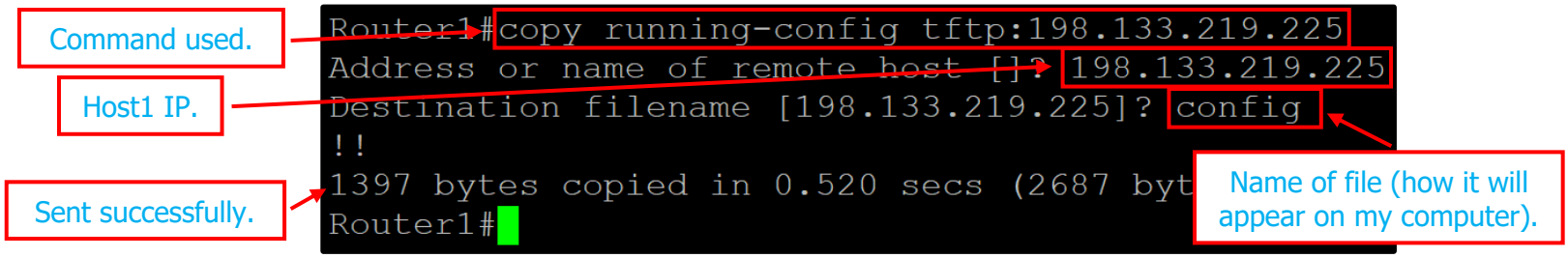


Figure 5. Command issued on Router1 to copy startup-config file to my computer via TFTP.

*In the above screenshot, running-config was used instead of startup-config. This was just because I used the wrong one, although the outcome would still be the same since the running-config was already saved in the startup-config beforehand.

Method used on Switch1:

- The approach used on the switch was the same as what was mentioned above.

[Router1 startup-config]

```
Using 1397 out of 196600 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$1ewA$Uws414iAvs785ZRE.MmU90
!
no aaa new-model
ip cef
!
!
!
!
!
!
!
!
!
!
!
interface FastEthernet0/0
 description SubnetA
 ip address 198.133.219.238 255.255.255.240
 duplex auto
 speed auto
!
interface FastEthernet0/1
 description SubnetB
 ip address 198.133.219.254 255.255.255.240
 duplex auto
 speed auto
!
interface Serial0/0/0
 no ip address
 shutdown
 no fair-queue
 clock rate 2000000
!
interface Serial0/0/1
 no ip address
 shutdown
 clock rate 2000000
!
!
!
```

<continuation from previous page>

```
ip http server
no ip http secure-server
!
!
!

!
!
control-plane
!
!
banner motd ^C
**********************************************************************
*                                                                    *
* Team: Gabriel & Leo                                                *
*                                                                    *
* Network Systems Design                                             *
* Day Yann Fong                                                      *
* Lab 7                                                              *
*                                                                    *
* Device: Router1                                                    *
*                                                                    *
*~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~*
*                                                                    *
*                              WARNING                               *
*                     UNAUTHORIZED ACCESS NOT ALLOWED!               *
*                                                                    *
*                          STAY OUT OF MY ROUTER!                    *
*                                                                    *
*~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~*
**********************************************************************
^C
!
line con 0
 password cisco
 login
line aux 0
line vty 0 4
 login
!
scheduler allocate 20000 1000
end
```

<End of Router1 startup-config>

[Switch1 startup-config]

```
Using 2785 out of 65536 bytes
!
version 12.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Switch1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$rQwh$OreFOHksrAf0hb3LXiB48.
!
no aaa new-model
system mtu routing 1500
ip subnet-zero
!
!
!
!
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
!
!
interface FastEthernet0/1
 description Connection to SubnetB (Router1 Fa0/1)
!
interface FastEthernet0/2
 description Connection to Host2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
```

<continuation from previous page>

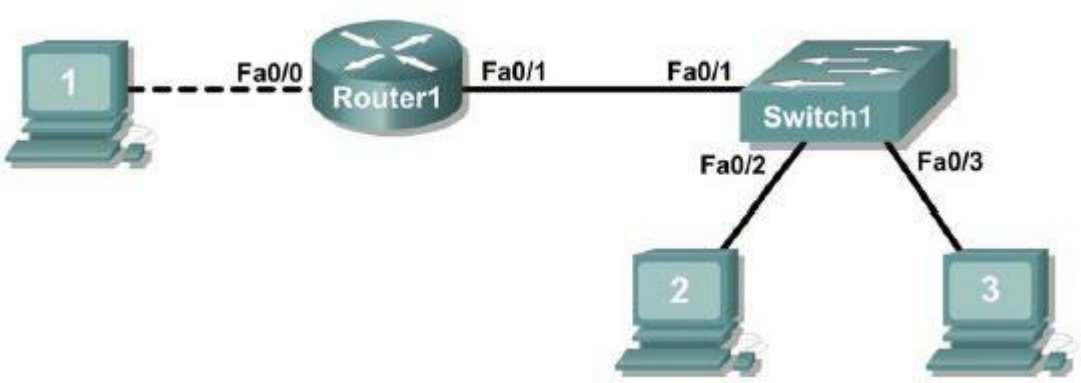
```
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
```

<continuation from previous page>

```
interface Vlan1
 no ip address
 no ip route-cache
 shutdown
!
ip http server
ip http secure-server
!
control-plane
!
banner motd ^C
**************************************************************************
*                                                                        *
* Team: Gabriel & Leo                                                    *
*                                                                        *
* Network Systems Design                                                 *
* Day Yann Fong                                                          *
* Lab 7                                                                  *
*                                                                        *
* Device: Switch1                                                        *
*                                                                        *
*~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~*
*                                                                        *
*                              WARNING                                   *
*                  UNAUTHORIZED ACCESS NOT ALLOWED!                      *
*                                                                        *
*                        STAY OUT OF MY SWITCH!                          *
*                                                                        *
*~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~*
**************************************************************************
^C
!
line con 0
 password cisco
 login
line vty 0 4
 login
line vty 5 15
 login
!
end
```

<End of Switch1 startup-config>

18. Finally, connect up the topology as shown below with your team member and verify your network connection using ping command.



19. Show your working system to your instructor.

20. Before turning off power to the router and switch, remove the NVRAM configuration file from each device with the privileged exec command **`erase startup-config`**.

21. Complete your lab work with discussion and conclusion.

Discussion:

- We started off the lab in Part A by getting familiar with the physical overview of the Cisco 1841 routers that are installed in D-265 along with the Cisco Catalyst 2960 switches installed there as well. We were asked to identify certain physical interfaces on the router such as Ethernet interfaces, Serial interfaces, and the console interface. We were not asked to identify any physical interfaces on the switch.

  Continuing on, in Part B, we were asked to design a small network using the router, switch and two host computers (one for me and the other for my partner). We were given a topology, outlining how our small network would be connected up. We then came up with a complete subnetting table (using VLSM method) that satisfied the constraints that were given. For this part, aside from physical wiring, no configuration needed to be done on the router or switch, only on our hosts. Once that was complete, tests were done to ensure that communication was good between Host1 and Host2.

  For the last part of the lab, in Part C, we asked to do something similar as what was done in Part B, but completely from scratch. We were given a topology and some constraints similar as before. Unlike with the previous part, this time fixed-sized subnets were used. No new physical wiring was needed since the given topology for this part was identical to the one used in the previous part. Unlike with the previous part, simple configuration needed to be done on the router and the switch. For both devices, passwords, interfaces, and other small details were configured. The newly created configurations on the router and switch were saved using appropriate methods to ensure that during reload, the configurations would stay the same. Once that was complete, similar to as before, our hosts were configured with the appropriate networking settings. To complete the small network design, tests were done to ensure that communication was good between Host1 and Host2. The configuration files for the router and the switch were also saved offline, and the approach used is described under Q17 of this report. Other small details about some of the router and switch functionalities were asked as well.

  The overall lab was a success.

Conclusion:

- Successfully designed a small local network.
- Successfully configured a physical lab topology and verified functionality.
- Successfully managed and accessed a Cisco router and switch via console.
- Successfully configured a Cisco router and switch.
- Successfully familiarized physical ports and functionality of a Cisco router and switch.