Experiment#04

Lab# 4.1:- Packet Tracer – Router as DHCP server.

Topology

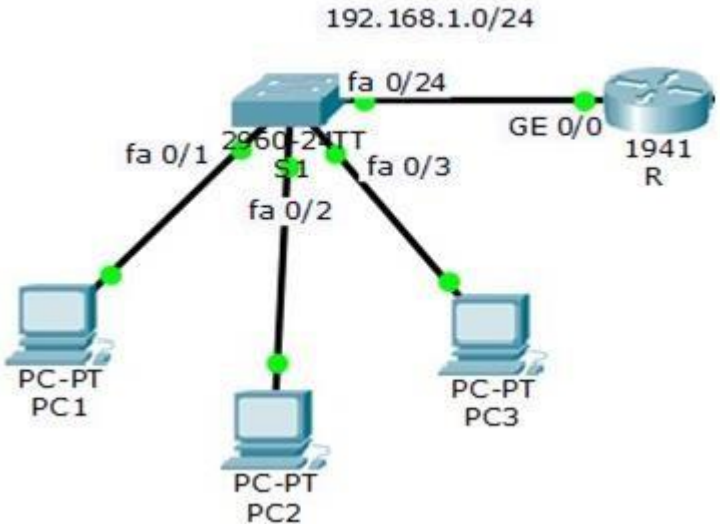


Figure 4.1

Objectives

Part 1: Connections using copper straight through wires.

Part 2: Accessing the CLI of each network device to do basic configuration.

Part 3: Assign IP Addresses to each network devices manually.

Part 4: Configure telnet on each network device.

Part 5: Configure a DHCPv4 server on a Router.

Part 6: Enable DHCP Services in PCs.

Part 7: Verify DHCP services

Part 8 Verify Network Connectivity by using PING.

Part 9: Test and verify remote management of S1 and R.

Part 10: Class activity.

Part 11: Home ativity.

Part 1: Basic Connections, Accessing the CLI and Exploring Help

In Part 1 of this activity, you connect the all the devices together using copper straight through connection as mentioned in figure 4.1.

Part 2: Accessing the CLI of each network device to do basic configuration.

- Click on S1 **switch** and then select the CLI tab to access the CISCO IOS.
- Do some basic configurations like setting the clock, assign host name to each network device, set banner, console password, privilege mode password or enable secret, virtual terminal line password and encrypt them.

Part 3 and 4: - Implement Basic Addressing on network devices manually.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R	Gi 0/0	192.168.1.1	255.255.255.0	---
S1	VLAN 1	192.168.1.2	255.255.255.0	192.168.1.1

table 4.1

Configure the Switch Management Interface

Configure S1 with an IP address.

Step 1: Configure S1 with an IP address. Also configure Virtual Terminal Line (VTY):

a. Use the following commands to configure S1 with an IP address.

S #**configure terminal**
Enter configuration commands, one per line. End with CNTL/Z.
S(config)# **interface vlan 1**
S(config-if)# **ip address 192.168.1.2 255.255.255.0**
S(config-if)# **no shutdown**
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
S(config-if)#
S(config-if)# **exit**
S (config)# **ip default-gateway 192.168.1.1**
S (config)#**exit**
S # **copy run start**
S# **exit**

b. Configure the virtual terminal (VTY) line for the switch to allow Telnet access. If you do not configure a VTY password, you will not be able to Telnet to the switch.

S1(config)# **line vty 0 15**
S1(config-line)# **password cisco**
S1(config-line)# **login**
S1(config-line)# **end**
S1#

Step 2: Configure Router's (R) Interfaces with IP addresses.

a. Use the following commands to configure S1 with an IP address

R> **enable**
R # **configure terminal**
R (config) # **interface gigabitEthernet 0/0**
R(config-if)# **ip address 192.168.1.1 255.255.255.0**
R(config-if)# **description connected to ACCOUNTS**
R(config-if)# **no shutdown**

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

R(config-if)#

R(config-if)# **end**

R# **copy run start**

R#**exit**

b. Configure the virtual terminal (VTY) line for the Router (R) to allow Telnet access. If you do not configure a VTY password, you will not be able to Telnet to the switch.

R(config)# **line vty 0 15**

R(config-line)# **password cisco**

R(config-line)# **login**

R(config-line)# **end**

R# **copy run start**

R#**exit**

R#

Step 3: Verify the IP address configuration on Router (R) and Switch (S)

Use the **show ip interface brief** command to display the IP address and status of the all the switch ports and interfaces. Alternatively, you can also use the **show running-config** command.

Part 5: - Configure a DHCPv4 on Router:

R (config)# **service dhcp**

R (config)# **ip dhcp pool ACCONUTS**

R (dhcp-config)# **network 192.168.1.0 255.255.255.0**

R (dhcp-config)# **default-router 192.168.1.1**

R (dhcp-config)# **dns-server 8.8.8.8**

R (dhcp-config)# **exit**

R (config)# **ip dhcp excluded-address 192.168.1.1 192.168.1.2**

R (config)# **ex**

R # **write memory**

R#**ex**

Part 6: Enable DHCP Services in PCs.

Click on any PC then goes on DESKTOP tab then move to IP configuration and then check on DHCP. PC acquire IP configuration from DHCP automatically after a few moments. Repeat this for each PC in the topology for IP configuration.

Part 7: Verify DHCP services on R.

a. On R, enter the **show ip dhcp binding** command to view DHCP address leases.

Along with the IP addresses that were leased, what other piece of useful client identification information is in the output?

_____

b. On R, enter the **show ip dhcp server statistics** command to view the DHCP pool statistics and message activity.

How many types of DHCP messages are listed in the output?

_____

c. On R, enter the **show ip dhcp pool** command to view the DHCP pool settings.

In the output of the **show ip dhcp pool** command, what does the Current index refer to?

_____

d. On R, enter the **show run | section dhcp** command to view the DHCP configuration in the running configuration.

Reflection

What do you think is the benefit of using DHCP relay agents instead of multiple routers acting as DHCP servers?

_____

_____

_____

_____

Part 8: Verify network connectivity:

Network connectivity can be verified using the **ping** command. It is very important that connectivity exists throughout the network. Corrective action must be taken if there is a failure. Ping S1's and R IP address from each PCs.

a. Click **PC-1**, and then click the **Desktop** tab.
b. Click **Command Prompt**.
c. Ping the IP address for PC-2.
d. Ping the IP address for S1.
e. Ping the IP address for R.
f. Ping the IP address of default gateway.
g. Ping the IP address for PC2.
h. Ping the IP address for PC3.

Note: You can also use the same **ping** command on the switch CLI and on PCs.

All pings should be successful. If your first ping result is 80%, retry; it should now be 100%. You will learn why a ping may fail the first time later in your studies. If you are unable to ping any of the devices, recheck your configuration for errors.

Part 9: Test and verify remote management of S1 and R.

You will now use Telnet to remotely access the operating system of switch S1and router R.

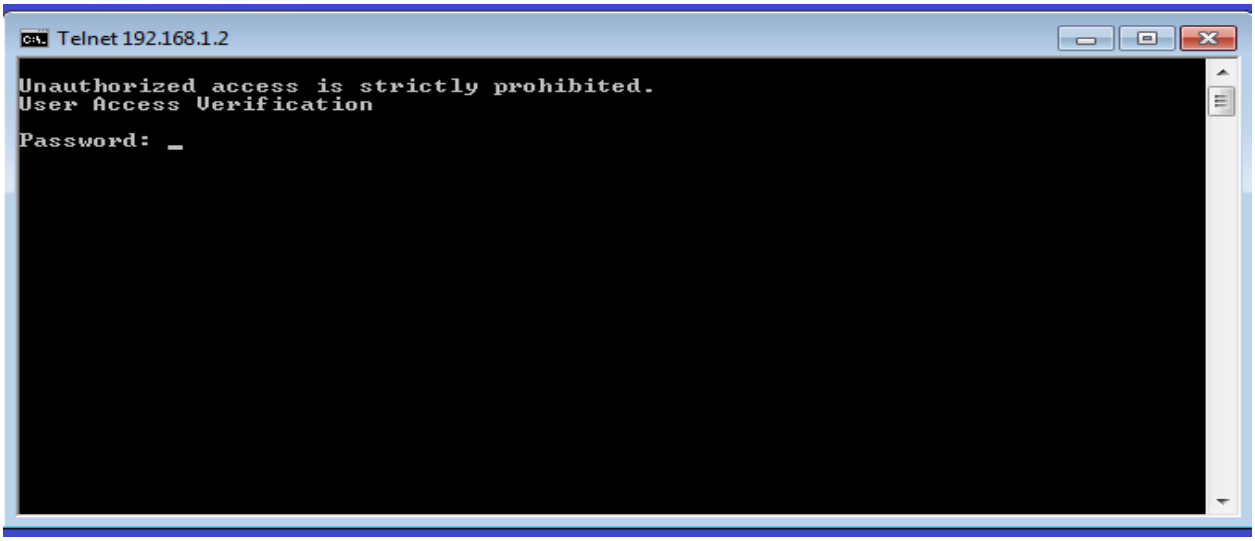
Note: Windows 7 does not natively support Telnet. The administrator must enable this protocol. To install the Telnet client, open a command prompt window and type **pkgmgr /iu:"TelnetClient"**.

C:\Users\NetAcad> **pkgmgr /iu:"TelnetClient"**

With the command prompt window still open on PC-A, issue a Telnet command to connect to S1 via the SVI management address. The password is **cisco**.

C:\Users\NetAcad> **telnet 192.168.1.2**

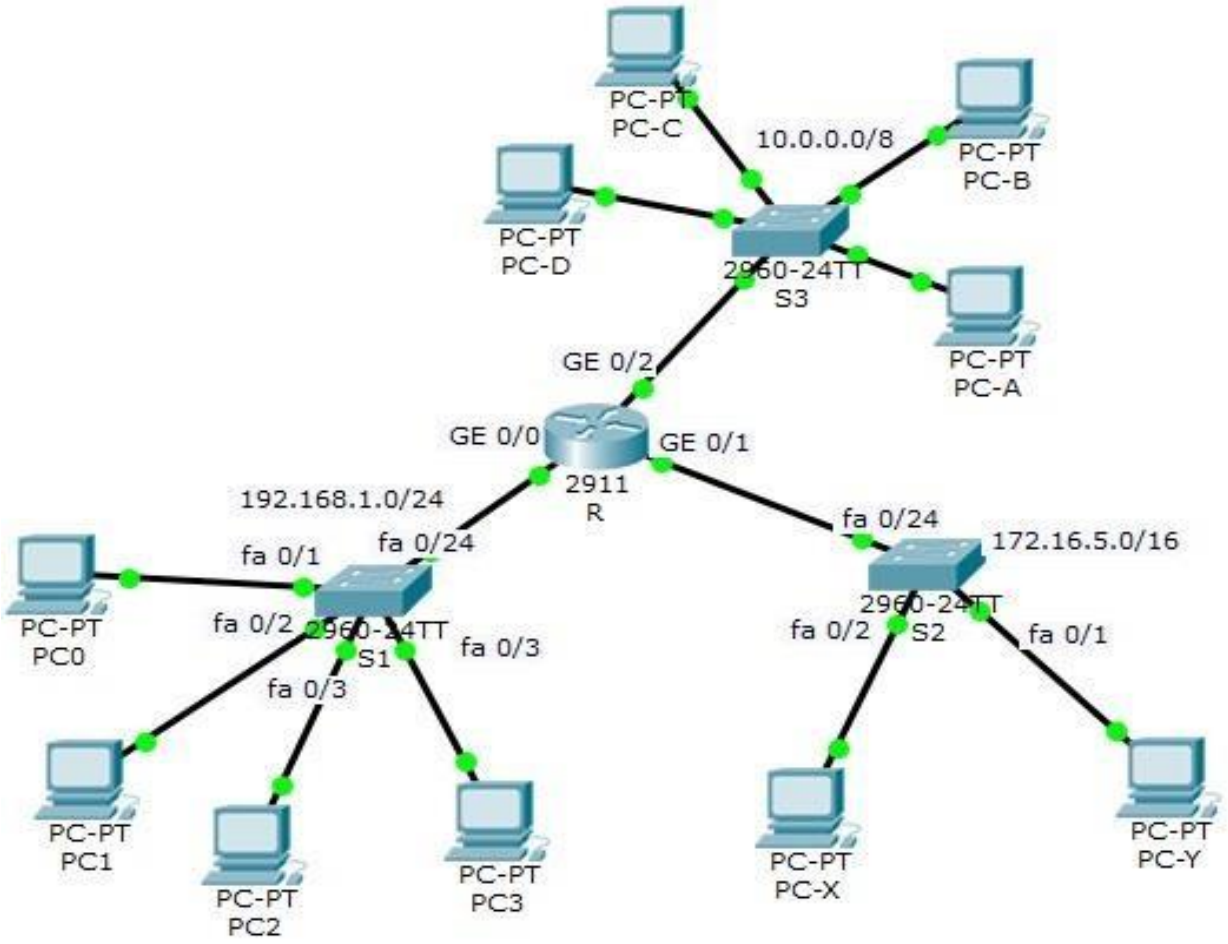
Your output should be similar to the following screen:



After entering the **cisco** password, you will be at the user EXEC mode prompt. Type **enable** at the prompt. Enter the **class** password to enter privileged EXEC mode and issue a **show run** command.

Part 10: Class Activity

Configure the following topology in the light of above configuration by using Router 2911.



Step 1. Configure Router (R):

Router >**en**
Router# **configure terminal**
Router (config)# **interface gi 0/0**
Router (config-if)# **ip address 192.168.1.1 255.255.255.0**
Router (config-if)# **description connected to FINANCE**
Router (config-if)# **no shutdown**
Router (config-if)#**exit**
Router (config)# **interface gi 0/1**
Router (config-if)# **ip address 172.16.0.1 255.255.0.0**
Router (config-if)# **description connected to ENGINEERING**
Router (config-if)# **no shutdown**
Router (config-if)#**exit**
Router (config)# **interface gi 0/2**
Router (config-if)# **ip address 10.0.0.1 255.0.0.0**
Router (config-if)# **description connected to IT**
Router (config-if)# **no shutdown**
Router (config-if)#**exit**

Router (config)#**service DHCP**
Router (config)# **ip dhcp pool FINANCE**
Router (dhcp-config)# **network 192.168.1.0 255.255.255.0**
Router (dhcp-config)# **default-router 192.168.1.1**
Router (dhcp-config)#**dns-server 64.6.64.6**
Router (dhcp-config)# **exit**
Router (config)#**ip dhcp excluded-address 192.168.1.1 192.168.1.2**

Router (config)# **ip dhcp pool ENGINEERING**
Router (dhcp-config)# **network 172.16.0.0 255.255.0.0**
Router (dhcp-config)# **default-router 172.16.0.1**
Router (dhcp-config)#**dns-server 8.8.8.8**
Router (dhcp-config)# **exit**
Router (config)#**ip dhcp excluded-address 172.16.0.1 172.16.0.2**

Router (config)# **ip dhcp pool IT**
Router (dhcp-config)# **network 10.0.0.0 255.0.0.0**
Router (dhcp-config)# **default-router 10.0.0.1**
Router (dhcp-config)#**dns-server 64.6.65.6**
Router (dhcp-config)# **exit**
Router (config)#**ip dhcp excluded-address 10.0.0.1 10.0.0.2**

Router (config)# **hostname R**
R (config)# **banner motd " Warning !!! This is a secure system. Authorized Access Only!"**
R(config)# **line console 0**
R(config-line)# **password 123**
R(config-line)#**login**
R(config-line)#**exit**
R(config)# **line vty 0 15**
R(config-line)# **password 12345**
R(config-line)#**login**
R(config-line)# **exit**

R(config)#**enable secret 1234**
R(config)# **service password-encryption**
R(config)#**exit**
R# **clock set 12:00:00 14 March 2017**
R# **write memory**

Step 2. **Configure Switch (S1):**

Switch >**en**
Switch# **configure terminal**
Switch (config)# **interface vlan 1**
Switch (config-if)# **ip address 192.168.1.2 255.255.255.0**
Switch (config-if)# **description connected to FINANCE**
Switch (config-if)# **no shutdown**
Switch (config-if)#**exit**

Switch (config)# **hostname S1**
S1(config)# **banner motd " Warning !!! This is a secure system. Authorized Access Only!"**
S1(config)# **line console 0**
S1(config-line)# **password 123**
S1(config-line)#**login**
S1(config-line)#**exit**
S1(config)# **line vty 0 15**
S1(config-line)# **password 12345**
S1(config-line)#**login**
S1(config-line)# **exit**
S1(config)#**enable secret 1234**
S1(config)# **service password-encryption**
S1(config)#**exit**
S1# **clock set 12:00:00 14 March 2017**
S1# **write memory**

Step 3. **Configure Switch (S2):**

Switch >**en**
Switch# **configure terminal**
Switch (config)# **interface vlan 1**
Switch (config-if)# **ip address 172.16.0.2 255.255.0.0**
Switch (config-if)# **description connected to ENGINEERING**
Switch (config-if)# **no shutdown**
Switch (config-if)#**exit**

Switch (config)# **hostname S2**
S2(config)# **banner motd " Warning !!! This is a secure system. Authorized Access Only!"**
S2(config)# **line console 0**
S2(config-line)# **password 123**
S2(config-line)#**login**
S2(config-line)#**exit**
S2(config)# **line vty 0 15**
S2(config-line)# **password 12345**
S2(config-line)#**login**
S2(config-line)# **exit**

S2(config)#**enable secret 1234**
S2(config)# **service password-encryption**
S2(config)#**exit**
S2# **clock set 12:00:00 14 March 2017**
S2# **write memory**

Step 4. **Configure Switch (S3):**

Switch >**en**
Switch# **configure terminal**
Switch (config)# **interface vlan 1**
Switch (config-if)# **ip address 10.0.0.2 255.0.0.0**
Switch (config-if)# **description connected to IT**
Switch (config-if)# **no shutdown**
Switch (config-if)#**exit**

Switch (config)# **hostname S3**
S3(config)# **banner motd " Warning !!! This is a secure system. Authorized Access Only!"**
S3(config)# **line console 0**
S3(config-line)# **password 123**
S3(config-line)#**login**
S3(config-line)#**exit**
S3(config)# **line vty 0 15**
S3(config-line)# **password 12345**
S3(config-line)#**login**
S3(config-line)# **exit**
S3(config)#**enable secret 1234**
S3(config)# **service password-encryption**
S3(config)#**exit**
S3# **clock set 12:00:00 14 March 2017**
S3# **write memory**

Step 5. **Verify the above configuration**

Click on any PC then goes on DESKTOP tab then move to IP configuration and then check on DHCP. PC acquire IP configuration from DHCP automatically after a few moments. Repeat this for each PC in the topology for IP configuration

Network connectivity can be verified using the **ping** command. It is very important that connectivity exists throughout the network. Corrective action must be taken if there is a failure. Ping S1's, S2's, and R's IP address from each PCs.

Verify DHCP services by using:

a. On R, enter the **show ip dhcp binding** command to view DHCP address leases.
b. On R, enter the **show ip dhcp server statistics** command to view the DHCP pool statistics and message activity.
c. On R, enter the **show ip dhcp pool** command to view the DHCP pool settings.
d. On R, enter the **show run | section dhcp** command to view the DHCP configuration in the running configuration.

You will now use Telnet to remotely access the operating system of switch S1 S2, S3 and router R.

Note: Windows 7 does not natively support Telnet. The administrator must enable this protocol. To install the Telnet client, open a command prompt window and type **pkgmgr /iu:"TelnetClient"**.

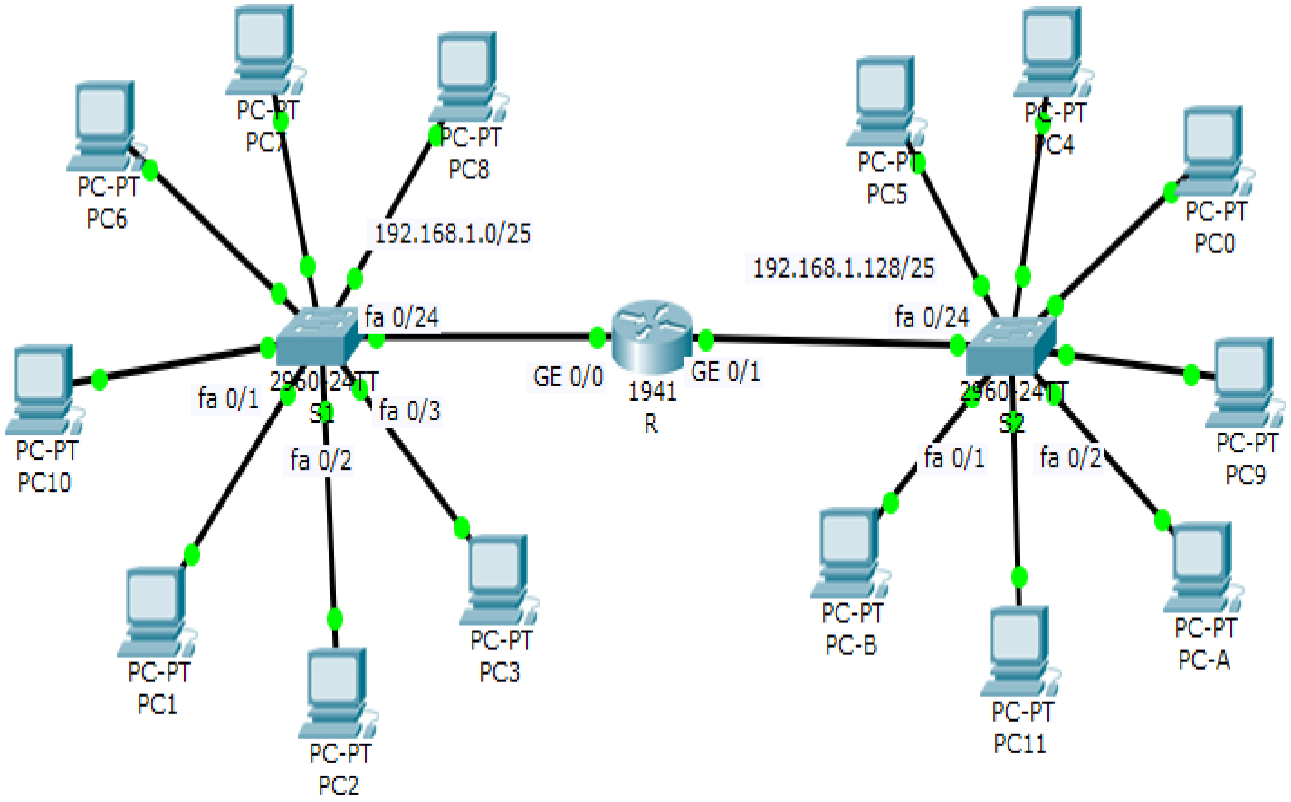
C:\Users\NetAcad> **pkgmgr /iu:"TelnetClient"**

With the command prompt window still open on PC-A, issue a Telnet command to connect to S1 via the SVI management address. The password is **cisco**.

C:\Users\NetAcad> **telnet 192.168.1.2**

Part 11: Home Activity

Suppose there are two different departments which are connected together throw a router. Configure a following topology in the light of above experiment. Attach screen shot of the topology and printout of startup configuration of each intermediary device in the end of this lab manual.



Lab's Evaluation Sheet

Students Registration No:	2112126
Date Performed:	29-March-2024
Group No:	
Date of Submission:	3-April-2024

Sr. No.	Categories	Total Marks/Grade	Marks /Grade Obtained
1	Student's Behavior	2.5	
2	Lab Performance	2.5	
3	On Time Submission	5	
4	Home Activity	10	
	Net Result	20	

Examined By: (Instructor's Name & Initial's)

Date

Router Configuaration

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname 2112126
2112126(config)#line console 0
2112126(config-line)#password letmein
2112126(config-line)#login
2112126(config-line)#exit
2112126(config)#enable secret itsasecret
2112126(config)#service password-encryption
2112126(config)#banner motd "This is secure system"
2112126(config)#interface g 0/0
2112126(config-if)#ip address 211.21.26.1 255.255.255.128
2112126(config-if)#description connected to Sabih_1
2112126(config-if)#no shut

2112126(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

2112126(config-if)#exit
2112126(config)#interface g 0/1
2112126(config-if)#ip address 211.21.26.129 255.255.255.128
2112126(config-if)#description conneceted to Sabih_2
2112126(config-if)#no shut

2112126(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

2112126(config-if)#exit
2112126(config)#service dhcp
2112126(config)#ip dhcp pool Sabih_1
2112126(dhcp-config)#network 211.21.26.0 255.255.255.128
2112126(dhcp-config)#default-router 211.21.26.1
2112126(dhcp-config)#dns-server 64.6.64.6
2112126(dhcp-config)#exit
2112126(config)#dhcp excluded-address 211.21.26.1 211.21.26.2
                 ^
% Invalid input detected at '^' marker.

2112126(config)#ip dhcp excluded-address 211.21.26.1 211.21.26.2
2112126(config)#ip dhcp pool Sabih_2
```

Switches Configuration

Sabih_1

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Sabih_1
Sabih_1(config)#line console 0
Sabih_1(config-line)#password letmein
Sabih_1(config-line)#login
Sabih_1(config-line)#exit
Sabih_1(config)#enable secret itsasecret
Sabih_1(config)#service password-encryption
Sabih_1(config)#banner motd "This is secure system"
Sabih_1(config)#interface vlan 1
Sabih_1(config-if)#ip address 211.21.26.2 255.255.255.128
Sabih_1(config-if)#description connected to Sabih_1
Sabih_1(config-if)#no shut

Sabih_1(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Sabih_1(config-if)#exit
Sabih_1(config)#line vty 0 15
Sabih_1(config-line)#password cisco
Sabih_1(config-line)#login
Sabih_1(config-line)#exit
Sabih_1(config)#end
Sabih_1#
%SYS-5-CONFIG_I: Configured from console by console

Sabih_1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Sabih_1#
```

Sabih_2

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Sabih_2
Sabih_2(config)#line console 0
Sabih_2(config-line)#password letmein
Sabih_2(config-line)#login
Sabih_2(config-line)#exit
Sabih_2(config)#enable secret itsasecret
Sabih_2(config)#service password-encryption
Sabih_2(config)#banner motd "This is secure system"
Sabih_2(config)#interface vlan 1
Sabih_2(config-if)#ip address 211.21.26.129 255.255.255.128
Sabih_2(config-if)#description connected to Sabih_2
Sabih_2(config-if)#no shut

Sabih_2(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%IP-4-DUPADDR: Duplicate address 211.21.26.129 on Vlan1, sourced by 0060.2F3B.7102

Sabih_2(config-if)#exit
Sabih_2(config)#line vty 0 15
Sabih_2(config-line)#password cisco
Sabih_2(config-line)#login
Sabih_2(config-line)#exit
Sabih_2(config)#end
Sabih_2#
%SYS-5-CONFIG_I: Configured from console by console

Sabih_2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Sabih_2#
```

Ping Check

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 211.21.26.134

Pinging 211.21.26.134 with 32 bytes of data:

Request timed out.
Reply from 211.21.26.134: bytes=32 time=15ms TTL=127
Reply from 211.21.26.134: bytes=32 time=11ms TTL=127
Reply from 211.21.26.134: bytes=32 time=12ms TTL=127

Ping statistics for 211.21.26.134:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 15ms, Average = 12ms

C:\>
```

Topology