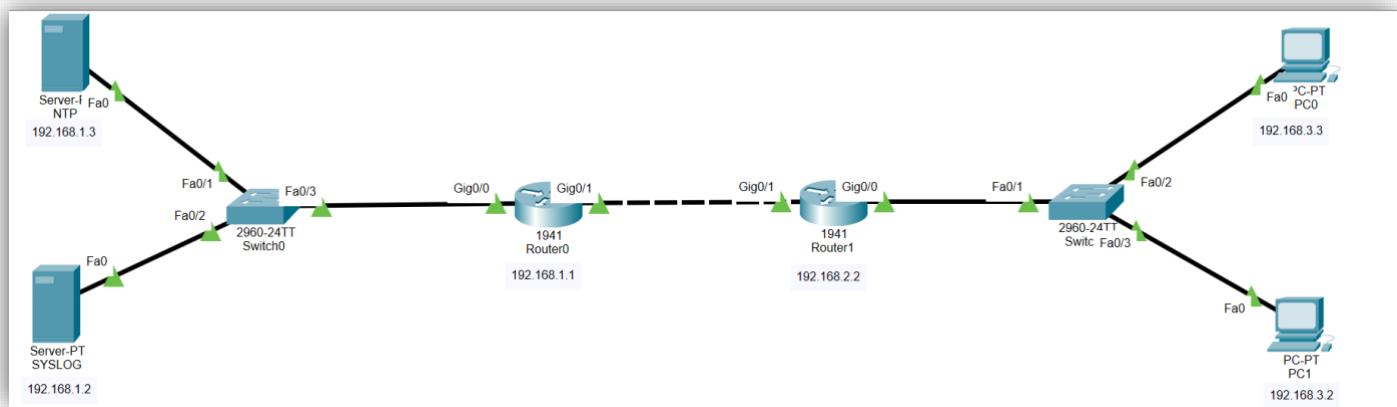


## Security in Computing

**Practical No 1 – Configure Routers**

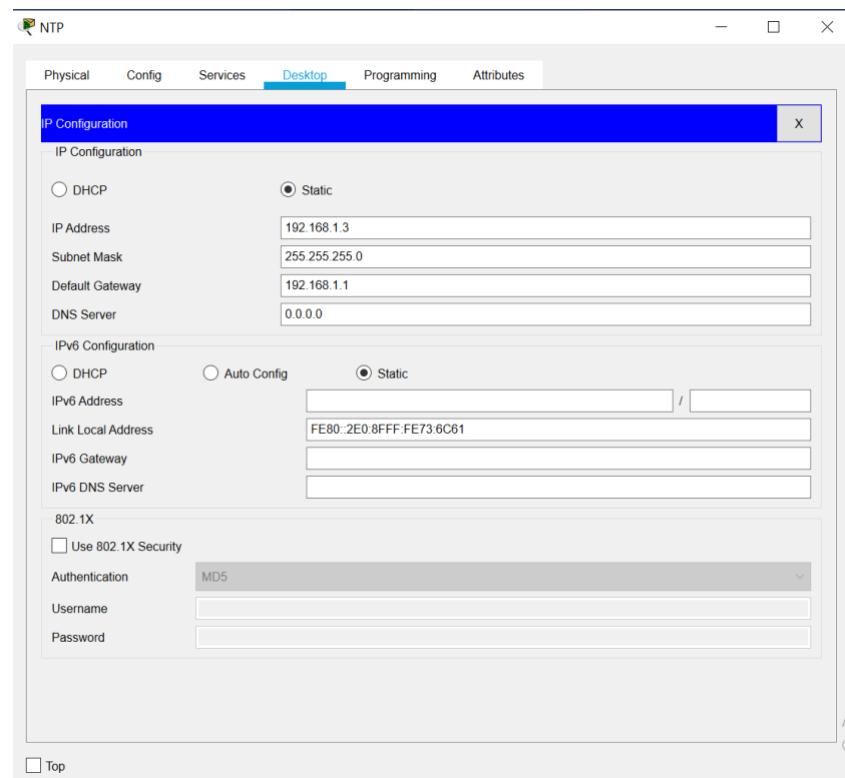
<b>1</b>	<b>Configure Routers</b>
<b>a</b>	OSPF MD5 authentication.
<b>b</b>	NTP.
<b>c</b>	to log messages to the syslog server.
<b>d</b>	to support SSH connections.

**Topology****Addressing Table**

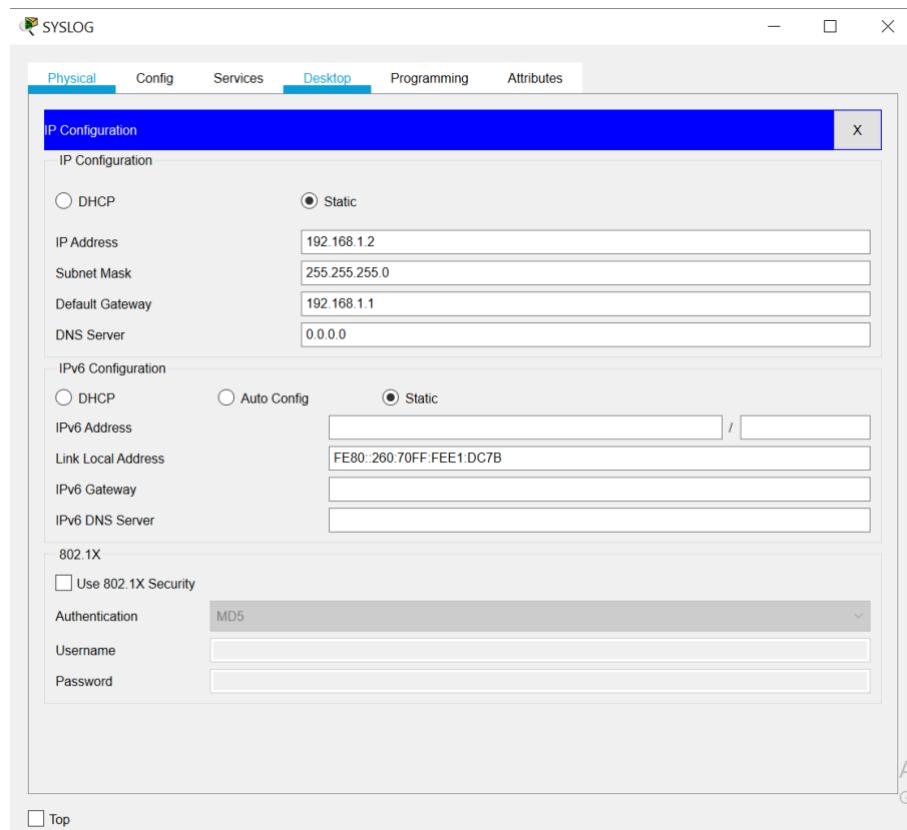
Sr No.	Device Sequences	Name	IP Address	Subnet Mask	Default Gateway
1	Server-PT	NTP	192.168.1.3	255.255.255.0	192.168.1.1
2	Server-PT	SYSLOG	192.168.1.2	255.255.255.0	192.168.1.1
3	Switch	Switch0	-	-	-
4	1941 Router	Router0	Gig0/0- 192.168.1.1 Gig0/1- 192.168.2.1 (Port ON)	Gig0/0- 255.255.255.0 Gig0/1- 255.255.255.0 (Port ON)	-
5	1941 Router	Router1	Gig0/0- 192.168.3.1 Gig0/1- 192.168.2.2	Gig0/0- 255.255.255.0 Gig0/1- 255.255.255.0	-
6	Switch	Switch1	-	-	-
7	PC-PT	PC0	192.168.3.3	255.255.255.0	192.168.3.1
8	PC-PT	PC1	192.168.3.2	255.255.255.0	192.168.3.1

## Two Servers Name and to Configure Details

### 1. NTP

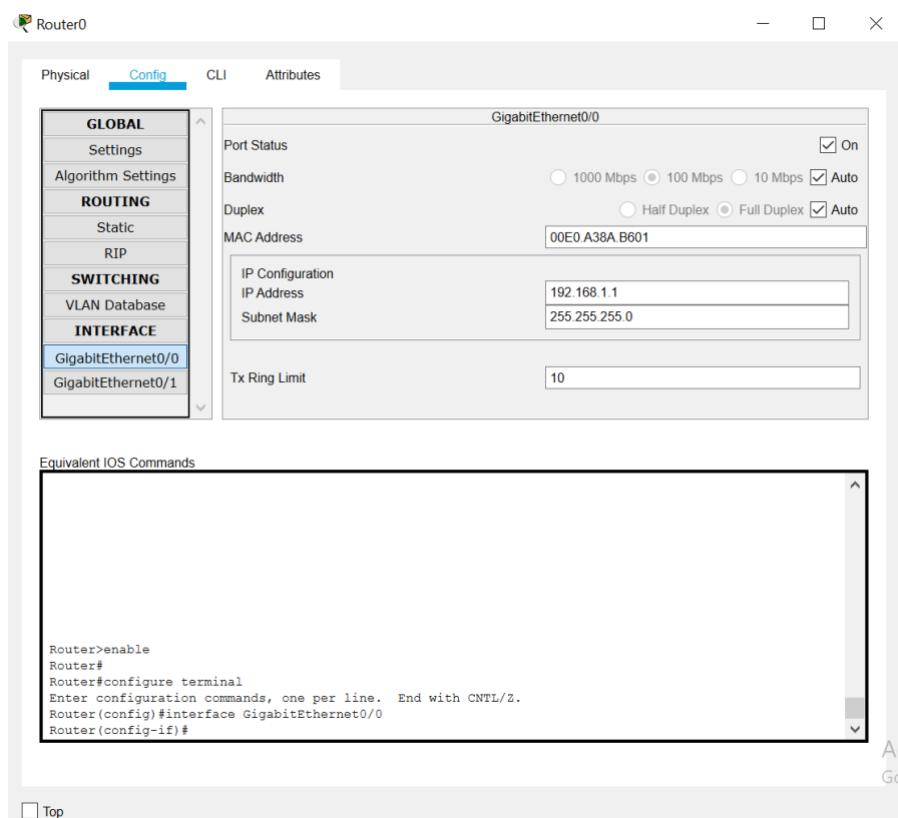


### 2. SYSLOG

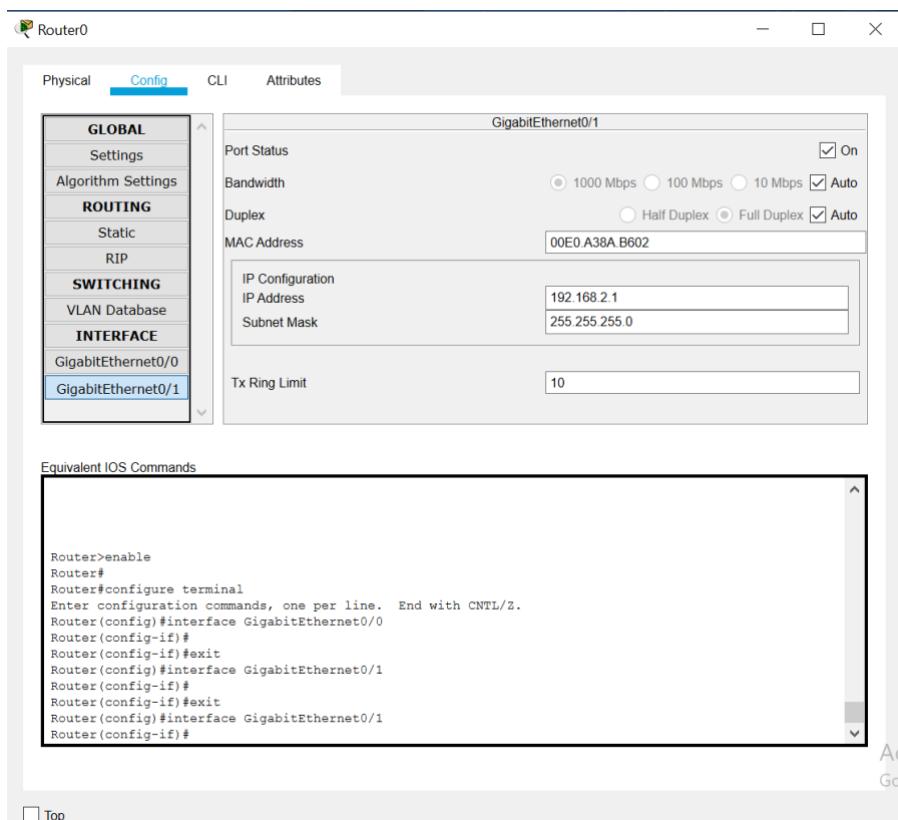


**Router 0 – Configure its GigabitEthernet 0/0 & 0/1 - IP address & Subnet mask & Port Status ON**

**GigabitEthernet 0/0**

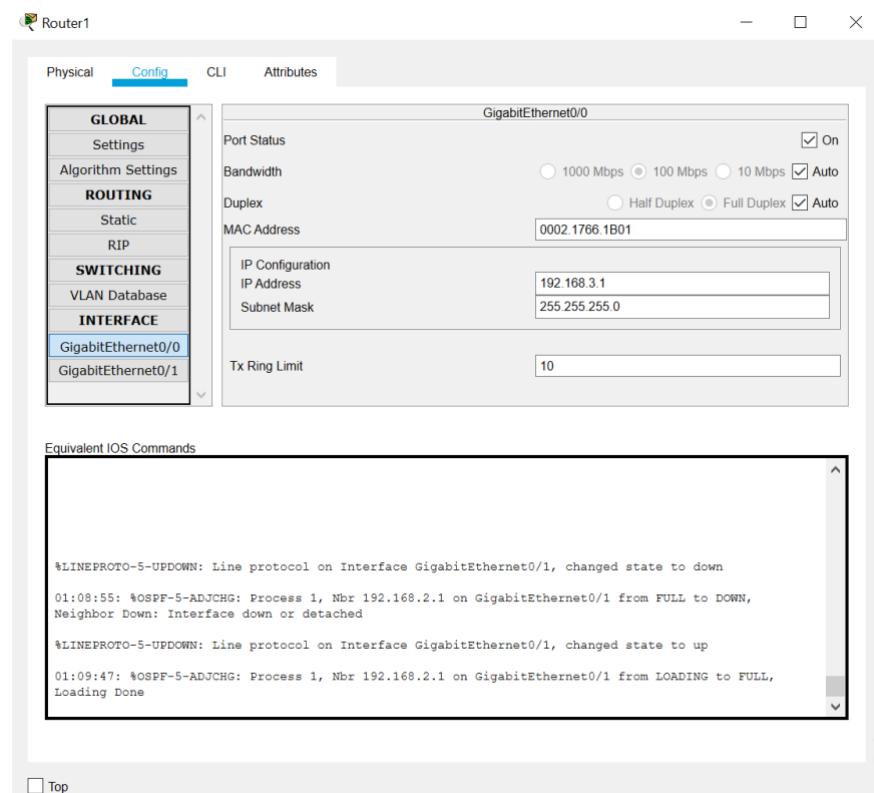


**GigabitEthernet 0/1**

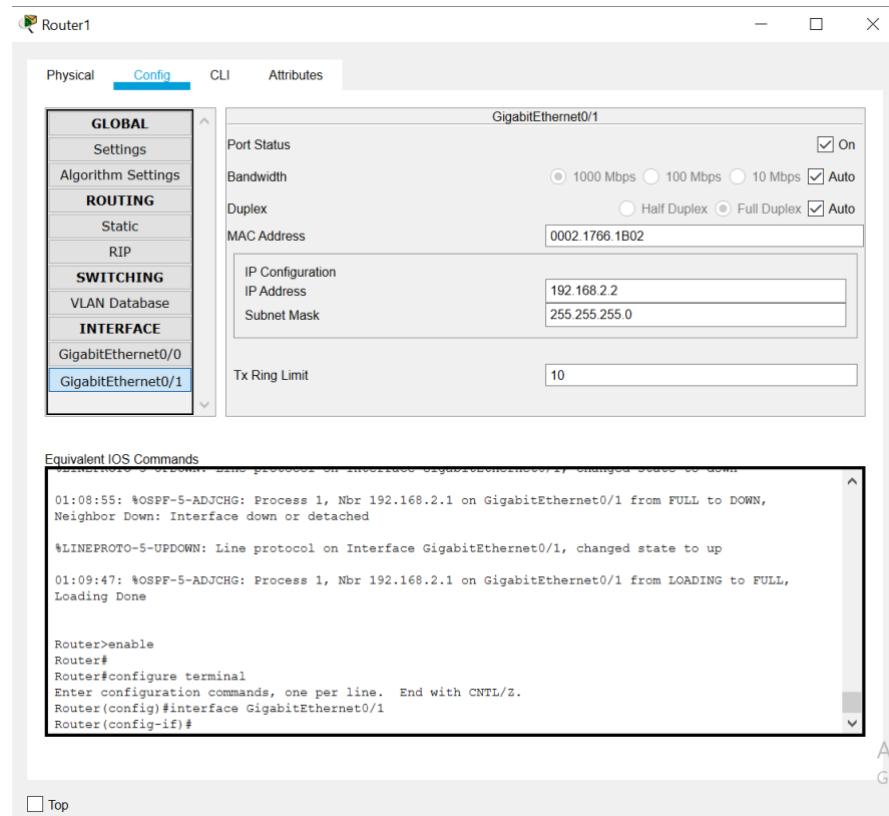


## Router 1 – Configure its GigabitEthernet 0/0 & 0/1 - IP address & Subnet mask & Port Status ON

### GigabitEthernet 0/0

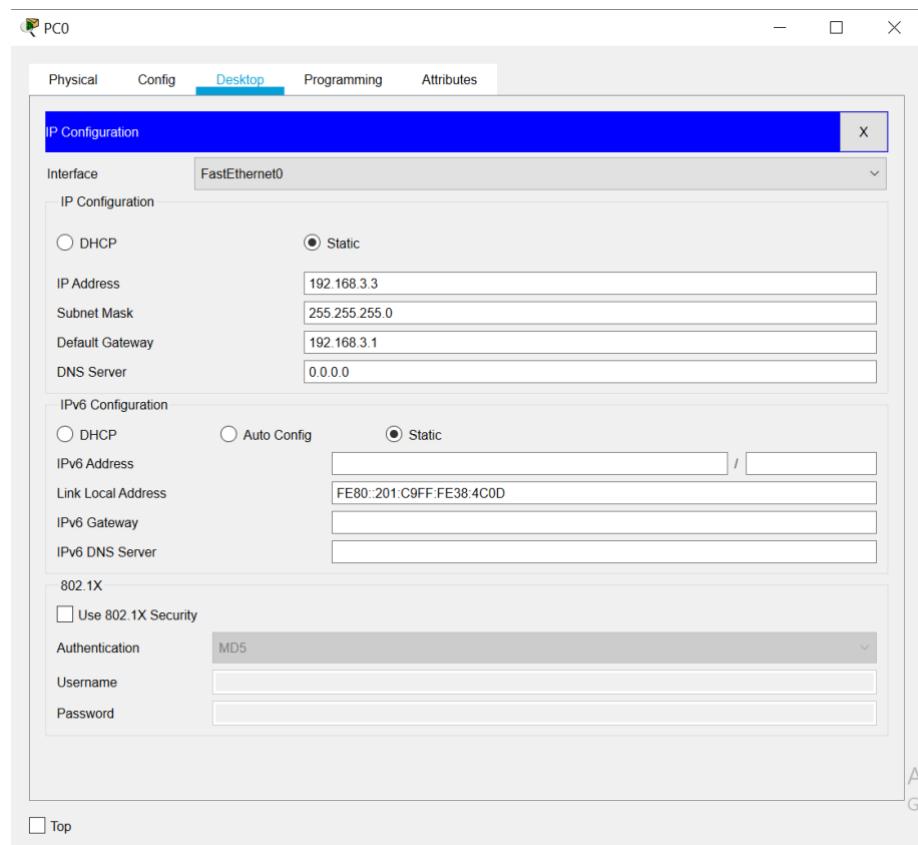


### GigabitEthernet 0/1

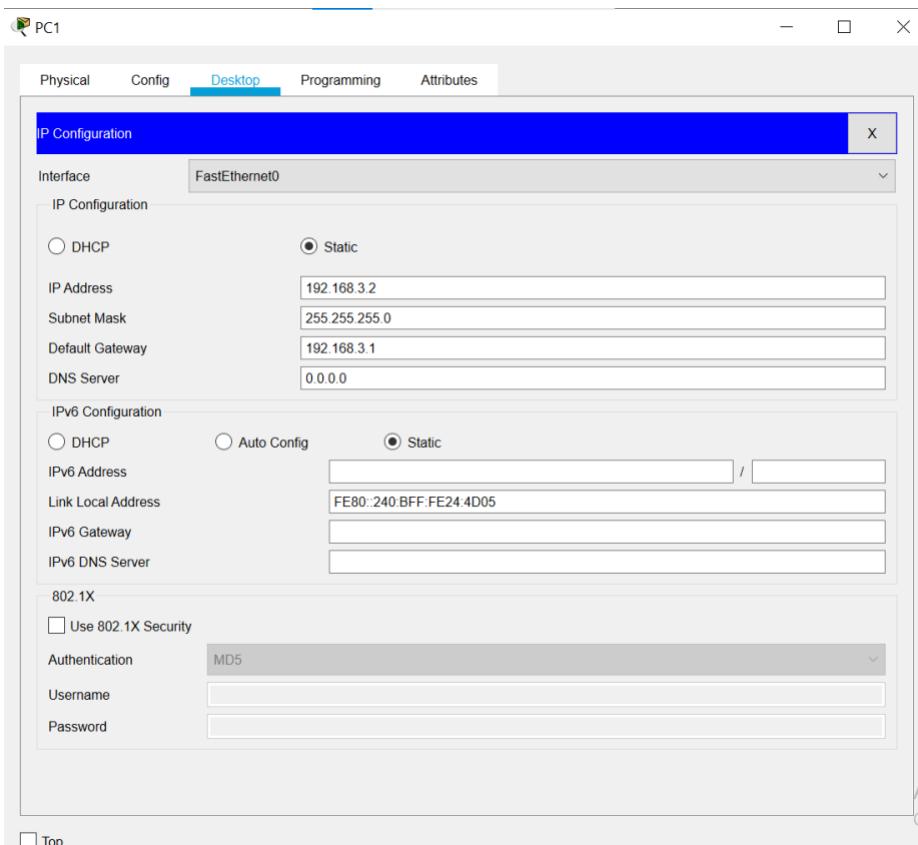


**Two PC-PT - Configure IP address, Subnet Mask and its Default Gateway**

PC0



PC1



**Router 0 and Router 1 CLI Commands to Configure Network over both Routers****Router0 CLI**

Router0 con0 is now available  
Press RETURN to get started.

```
Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.255.255.255 area 1
Router(config-router)#network 192.168.2.0 0.255.255.255 area 1
Router(config-router)#[
```

Ctrl+F6 to exit CLI focus     

Top

**Router1 CLI**

Router1 con0 is now available  
Press RETURN to get started.

```
Router1>en
Router1#enable
Router1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router1(config)#router ospf 1
Router1(config-router)#network 192.168.2.0 0.255.255.255 area 1
Router1(config-router)#network 192.168.3.0 0.255.255.255 area 1
Router1(config-router)#exit
Router1(config)#exit
Router1#
%SYS-5-CONFIG_I: Configured from console by console
```

Ctrl+F6 to exit CLI focus     

Top

**To ping PC1 to NTP to PC1 with its IP address to get reply**

PC1 with NTP

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.3: bytes=32 time<1ms TTL=126
Reply from 192.168.1.3: bytes=32 time<1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

NTP with PC1

```
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time<1ms TTL=126
Reply from 192.168.3.2: bytes=32 time=5ms TTL=126
Reply from 192.168.3.2: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>
```

## To Configure MD5 Authentication to check Gigabit Ethernet working in CLI

**Router0**

The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router0. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. The main window title is 'IOS Command Line Interface'. The command history and output area contains the following text:

```

Press RETURN to get started.

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet 0/1
Router(config-if)#ip ospf authentication message-digest
Router(config-if)#ip ospf message-digest-key 1 md5 smile
01:30:16: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on GigabitEthernet0/1 from FULL to DOWN,
Neighbor Down: Dead timer expired

01:30:16: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on GigabitEthernet0/1 from FULL to DOWN,
Neighbor Down: Interface down or detached

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a checkbox labeled 'Top'.

**Router1**

The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router1. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. The main window title is 'IOS Command Line Interface'. The command history and output area contains the following text:

```

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#network 192.168.2.0 0.255.255.255 area 1
^
% Invalid input detected at '^' marker.

Router(config)#router ospf 1
Router(config-router)#network 192.168.2.0 0.255.255.255 area 1
Router(config-router)#network 192.168.3.0 0.255.255.255 area 1
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

00:07:38: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/1 from LOADING to FULL,
Loading Done

00:10:53: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/1 from FULL to DOWN,
Neighbor Down: Dead timer expired

00:10:53: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/1 from FULL to DOWN,
Neighbor Down: Interface down or detached

Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet 0/1
Router(config-if)#ip ospf authentication message-digest
Router(config-if)#ip ospf message-digest-key 1 md5 smile
Router(config-if)#exit
00:12:08: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on GigabitEthernet0/1 from LOADING to FULL,
Loading Done

```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a checkbox labeled 'Top'.

## Details of MD5 Authentication

The screenshot shows the Cisco IOS Command Line Interface (CLI) for a router named 'Router0'. The 'CLI' tab is selected in the top navigation bar. The main window displays the output of several commands:

```
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
Area 1
  Number of interfaces in this area is 2
  Area has no authentication
  SPF algorithm executed 9 times
  Area ranges are
    Number of LSA 3. Checksum Sum 0x0104f4
    Number of opaque link LSA 0. Checksum Sum 0x000000
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0

Router#show ip ospf interface gigabitEthernet 0/1

GigabitEthernet0/1 is up, line protocol is up
  Internet address is 192.168.2.1/24, Area 1
  Process ID 1, Router ID 192.168.2.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State BDR, Priority 1
  Designated Router (ID) 192.168.3.1, Interface address 192.168.2.2
  Backup Designated Router (ID) 192.168.2.1, Interface address 192.168.2.1
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:01
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 192.168.3.1 (Designated Router)
  Suppress hello for 0 neighbor(s)
  Message digest authentication enabled
    Youngest key id is 1
Router#
```

At the bottom left, there is a note: "Ctrl+F6 to exit CLI focus". On the right side, there are "Copy" and "Paste" buttons. At the very bottom left, there is a "Top" button.

## Practical 1B- NTP

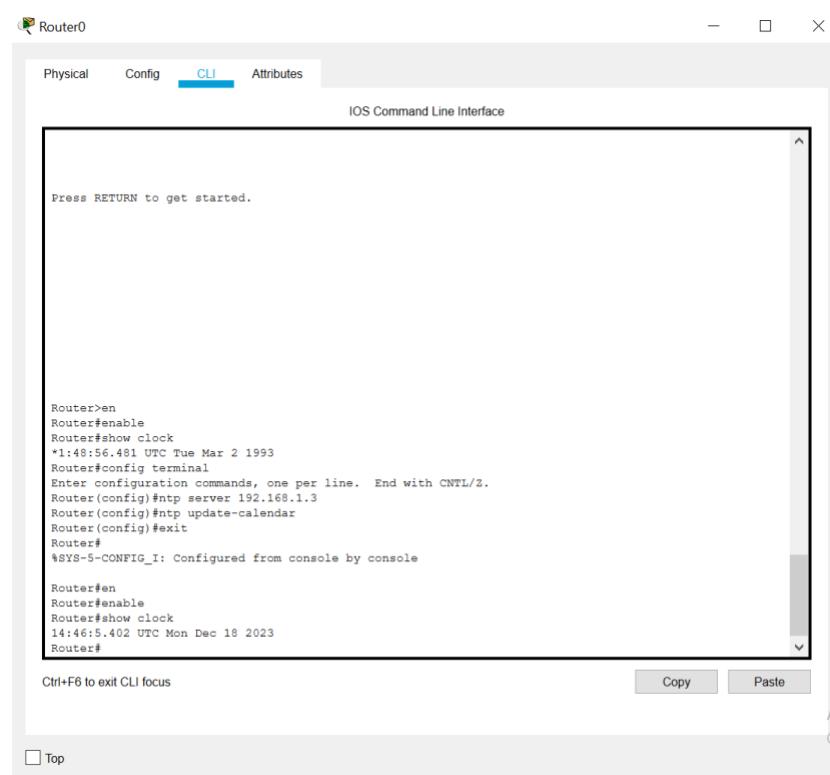
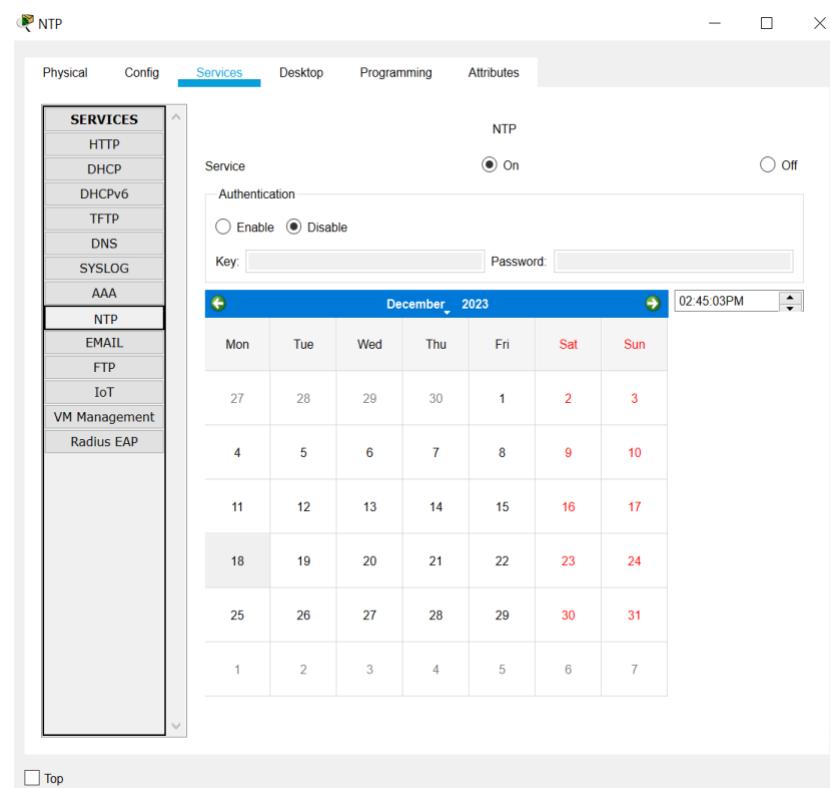
To check calendar we get old date so we update-calendar in Router0 CLI

```
Router>en
Router#enable
Router#show clock
*1:48:56.481 UTC Tue Mar 2 1993
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ntp server 192.168.1.3
Router(config)#ntp update-calendar
Router(config)#exit
```

To check calendar we get old date so we update-calendar in Router1 CLI

```
Router>en
Router#enable
Router#show clock
*1:56:50.905 UTC Tue Mar 2 1993
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ntp server 192.168.1.3
Router(config)#ntp update-calendar
Router(config)#exit
```

## We go to NTP Server in Services to On NTP



The screenshot shows a window titled "Router1" with tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". It displays the following configuration commands:

```
Press RETURN to get started.

Router>en
Router#enable
Router#show clock
*1:56:50.905 UTC Tue Mar 2 1993
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ntp server 192.168.1.3
Router(config)#ntp update-calendar
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#enable
Router#show clock
14:48:21.500 UTC Mon Dec 18 2023
Router#
```

At the bottom left, it says "Ctrl+F6 to exit CLI focus". At the bottom right, there are "Copy" and "Paste" buttons.

## Practical 1C- SYSLOG

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router con0 is now available

Press RETURN to get started.

Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging 192.168.1.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 192.168.1.2 port 514 started - CLI initiated
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router con0 is now available

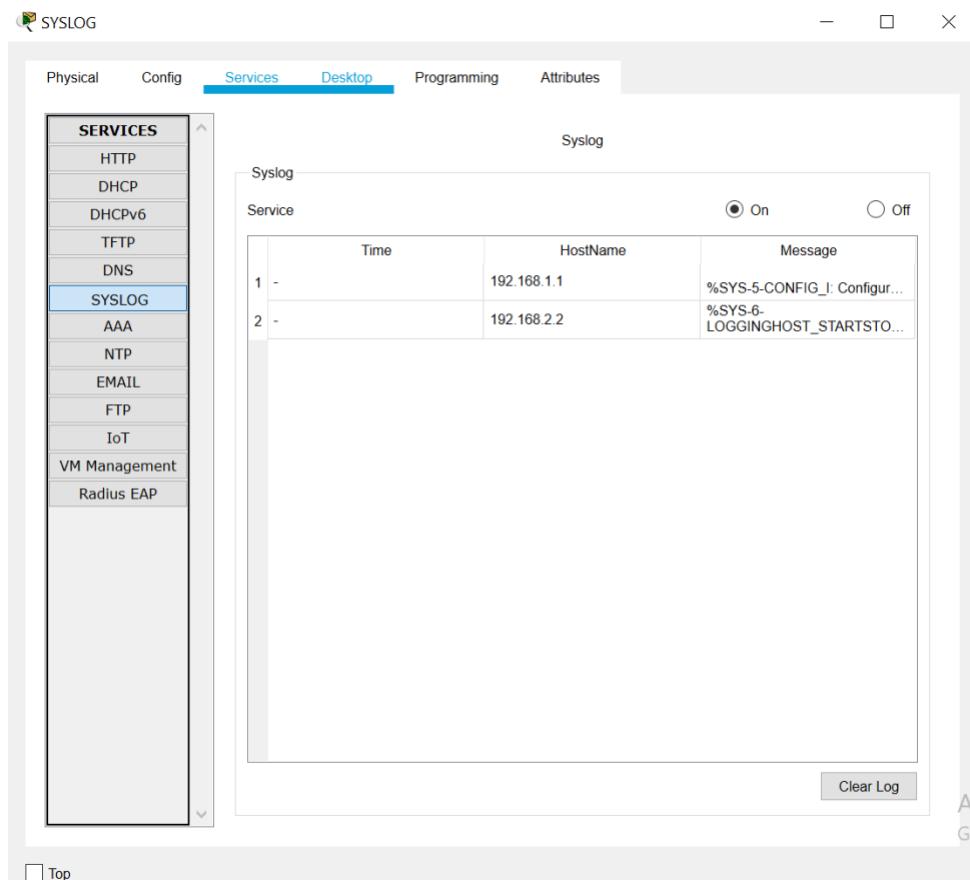
Press RETURN to get started.

Router>en
Translating "em"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging 192.168.1.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 192.168.1.2 port 514 started - CLI initiated
```

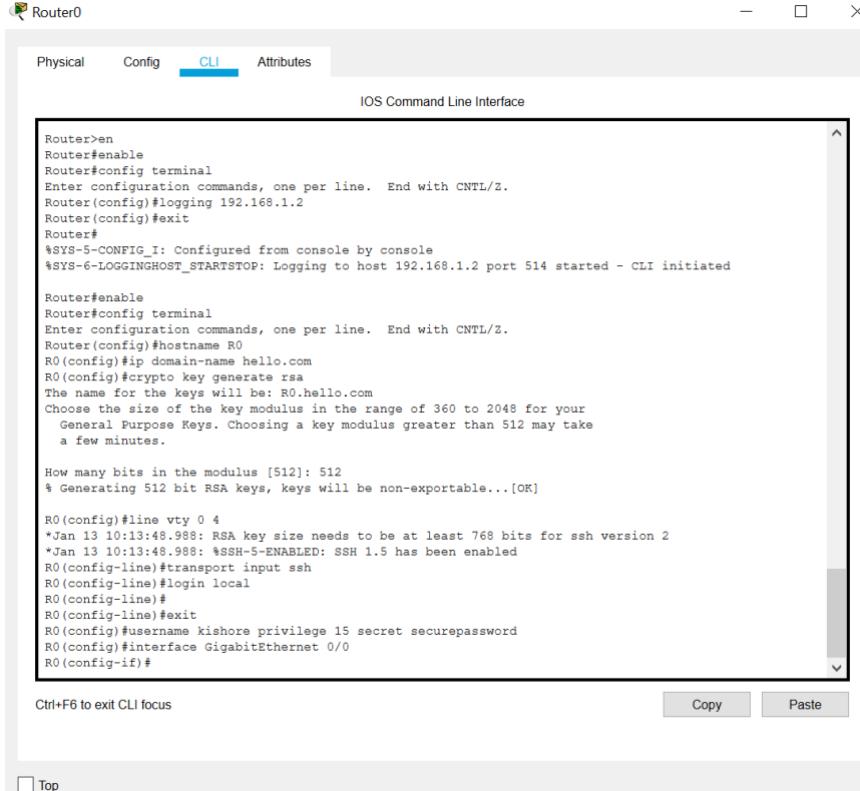
Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top



## Practical 1D- SSH

To give credentials to any PC to access Router we use commands in CLI



```

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging 192.168.1.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 192.168.1.2 port 514 started - CLI initiated

Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R0
R0(config)#ip domain-name hello.com
R0(config)#crypto key generate rsa
The name for the keys will be: R0.hello.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

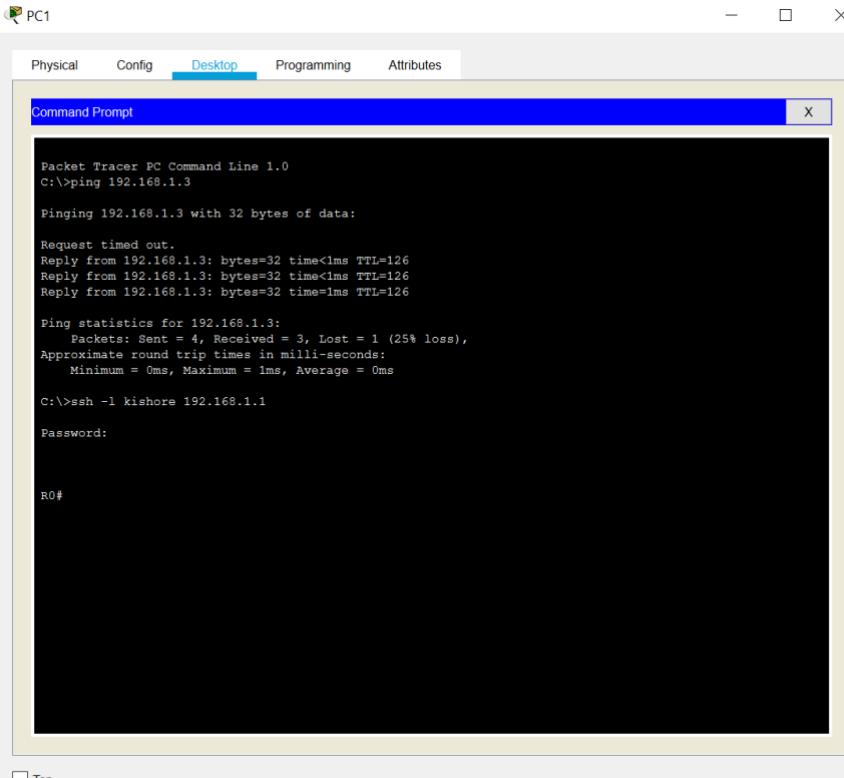
How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

R0(config)#line vty 0 4
*Jan 13 10:13:48.988: RSA key size needs to be at least 768 bits for ssh version 2
*Jan 13 10:13:48.988: %SSH-5-ENABLED: SSH 1.5 has been enabled
R0(config-line)#transport input ssh
R0(config-line)#login local
R0(config-line)#
R0(config-line)#exit
R0(config)#username kishore privilege 15 secret securepassword
R0(config)#interface GigabitEthernet 0/0
R0(config-if)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Top



```

Command Prompt

Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.3: bytes=32 time<1ms TTL=126
Reply from 192.168.1.3: bytes=32 time<1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ssh -l kishore 192.168.1.1
Password:

R0#

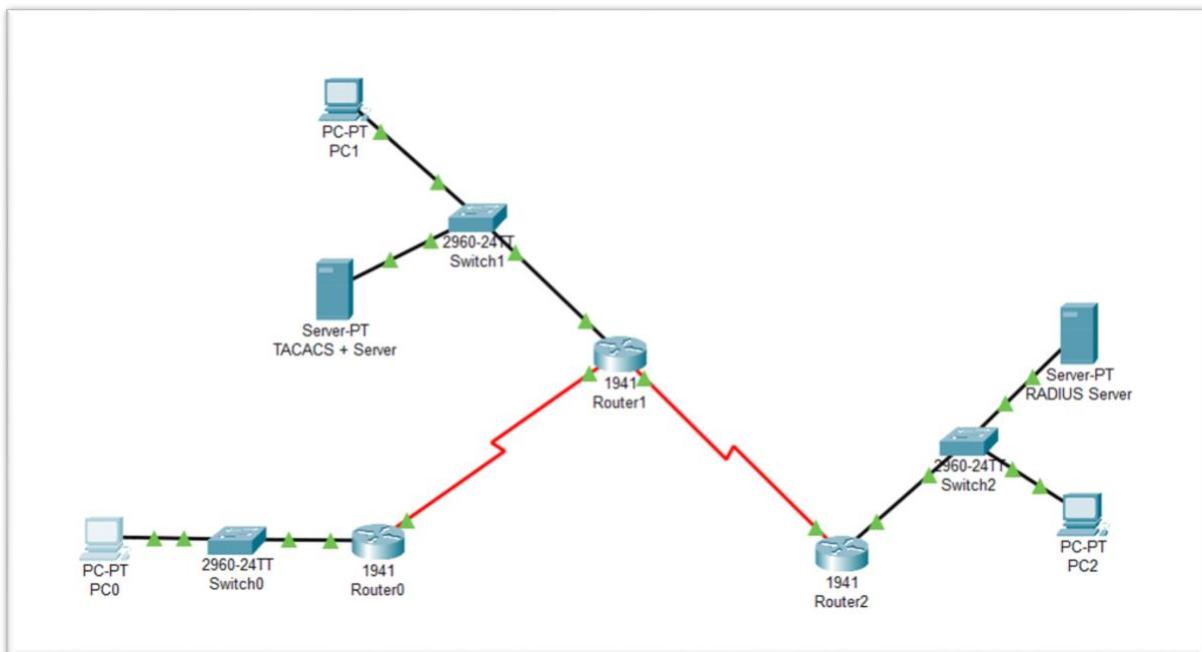
```

Top

## Practical 2

**Aim:** Packet Tracer - Configure AAA Authentication on Cisco Routers

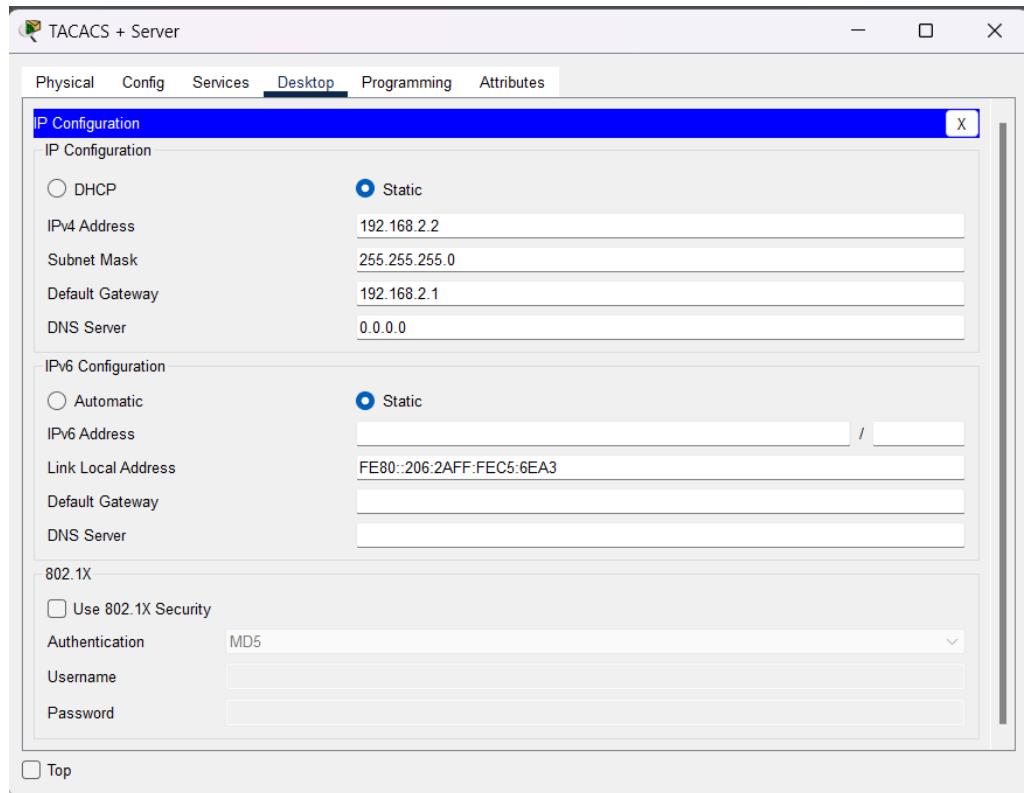
**Topology:**



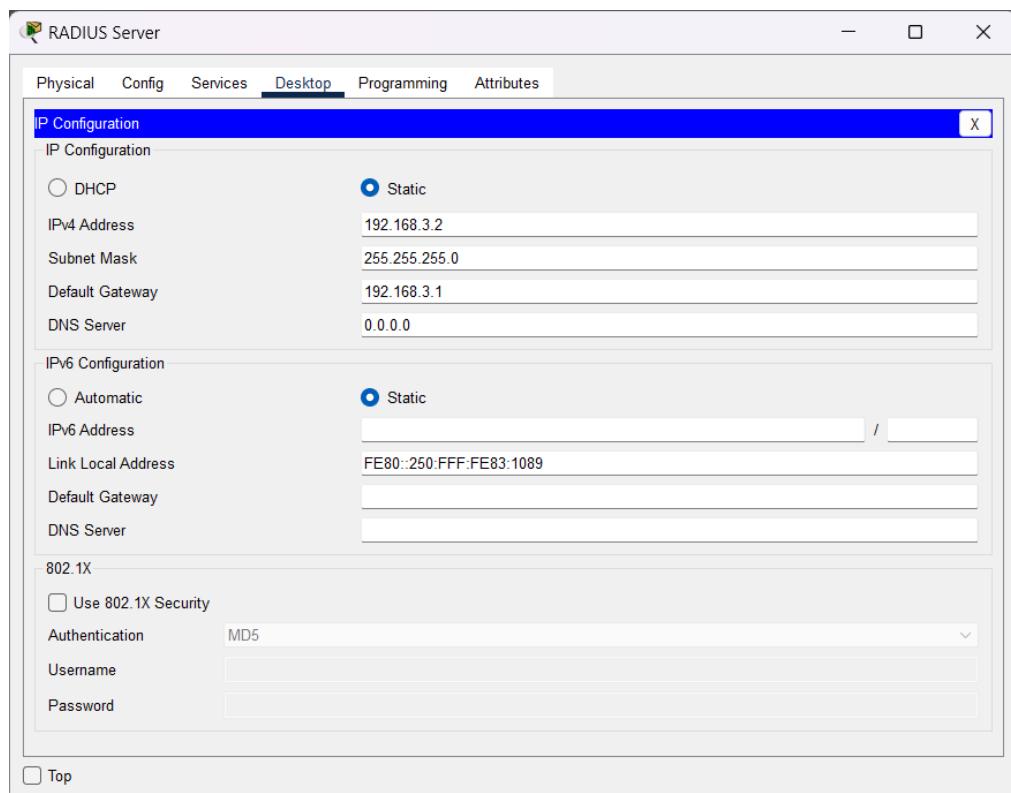
### Addressing Table:

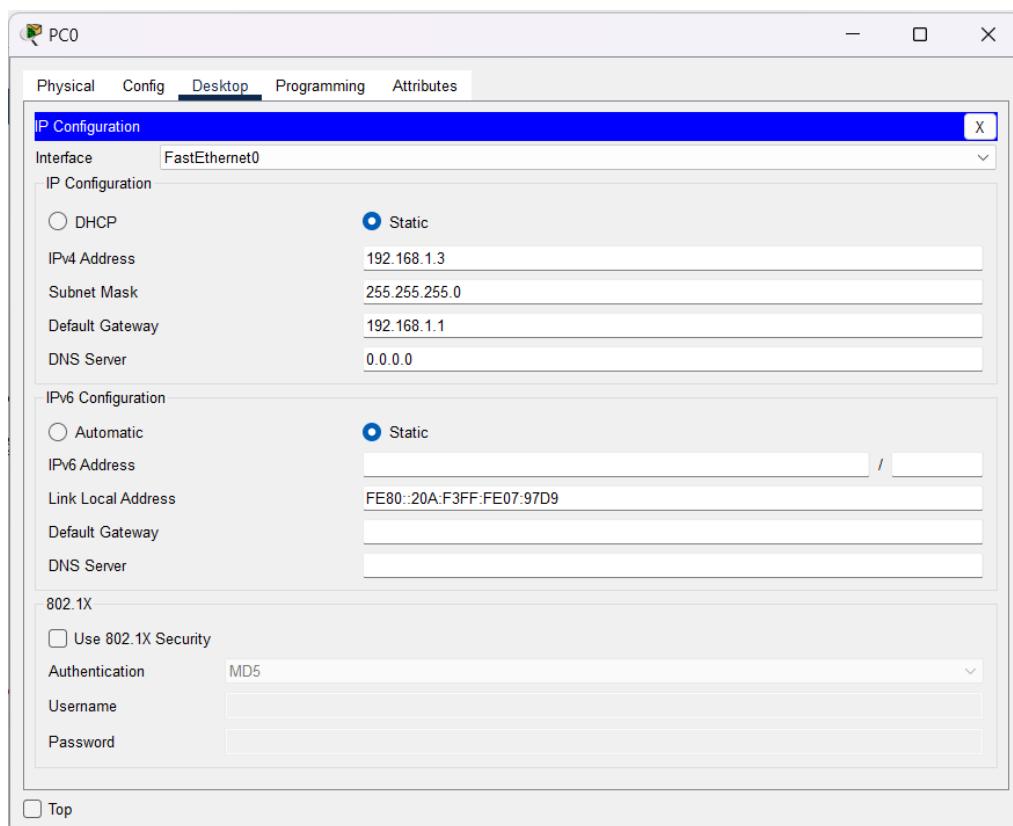
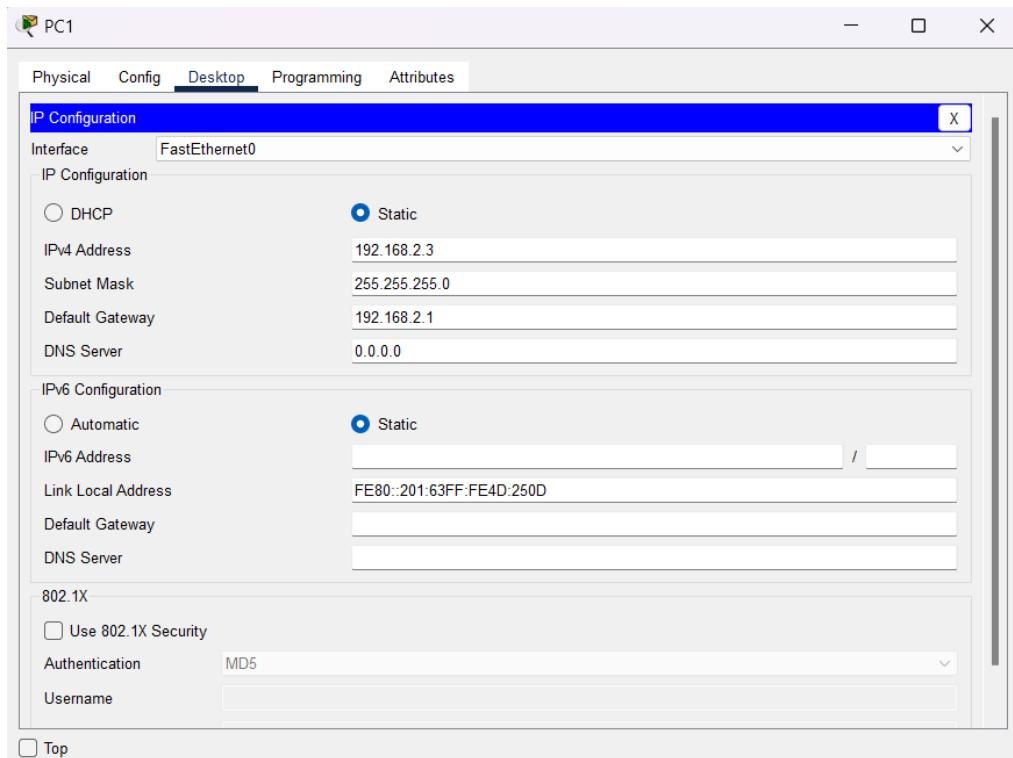
Device	Interface	IP Address	Subnet Mask	Default Gateway
<b>R0</b>	G0/1	192.168.1.1	255.255.255.0	N/A
	S0/0/0 (DCE)	10.1.1.2	255.255.255.252	N/A
<b>R1</b>	G0/0	192.168.2.1	255.255.255.0	N/A
	S0/0/0	10.1.1.1	255.255.255.252	N/A
<b>R2</b>	S0/0/1 (DCE)	10.2.2.1	255.255.255.252	N/A
	G0/1	192.168.3.1	255.255.255.0	N/A
<b>TACACS+ Server</b>	NIC	192.168.2.2	255.255.255.0	192.168.2.1
<b>RADIUS Server</b>	NIC	192.168.3.2	255.255.255.0	192.168.3.1
<b>PC-0</b>	NIC	192.168.1.3	255.255.255.0	192.168.1.1
<b>PC-1</b>	NIC	192.168.2.3	255.255.255.0	192.168.2.1
<b>PC-2</b>	NIC	192.168.3.3	255.255.255.0	192.168.3.1

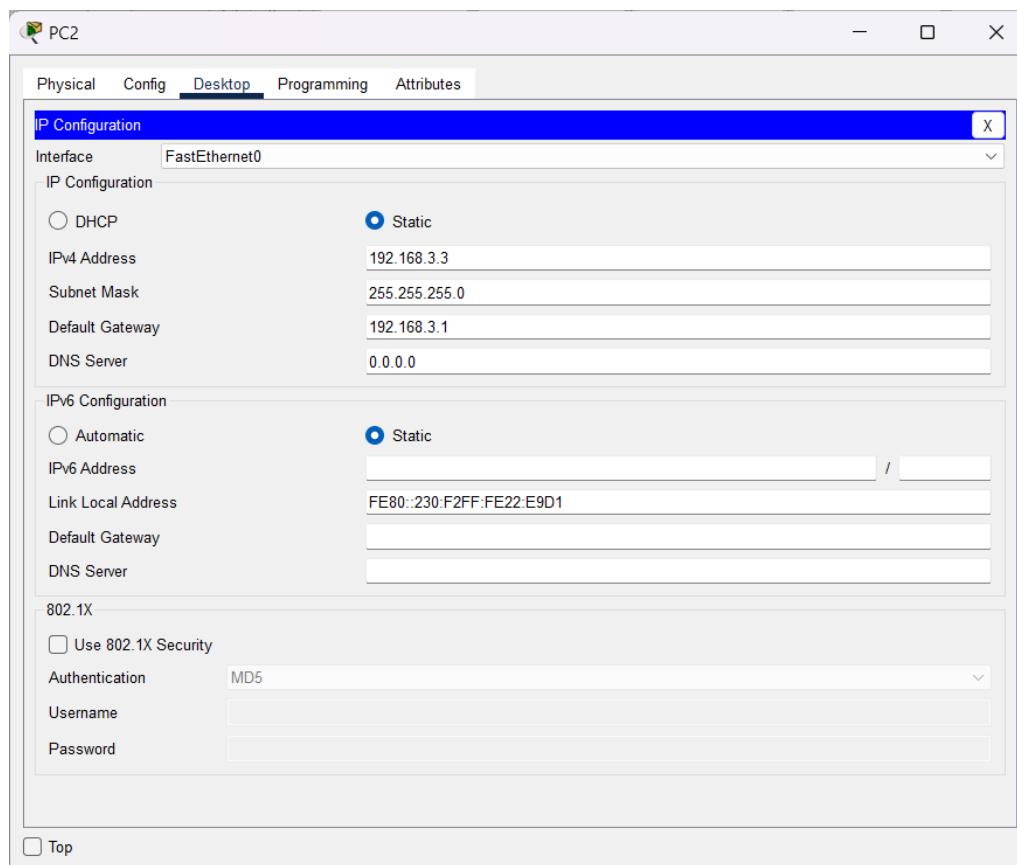
## TACACS + Server

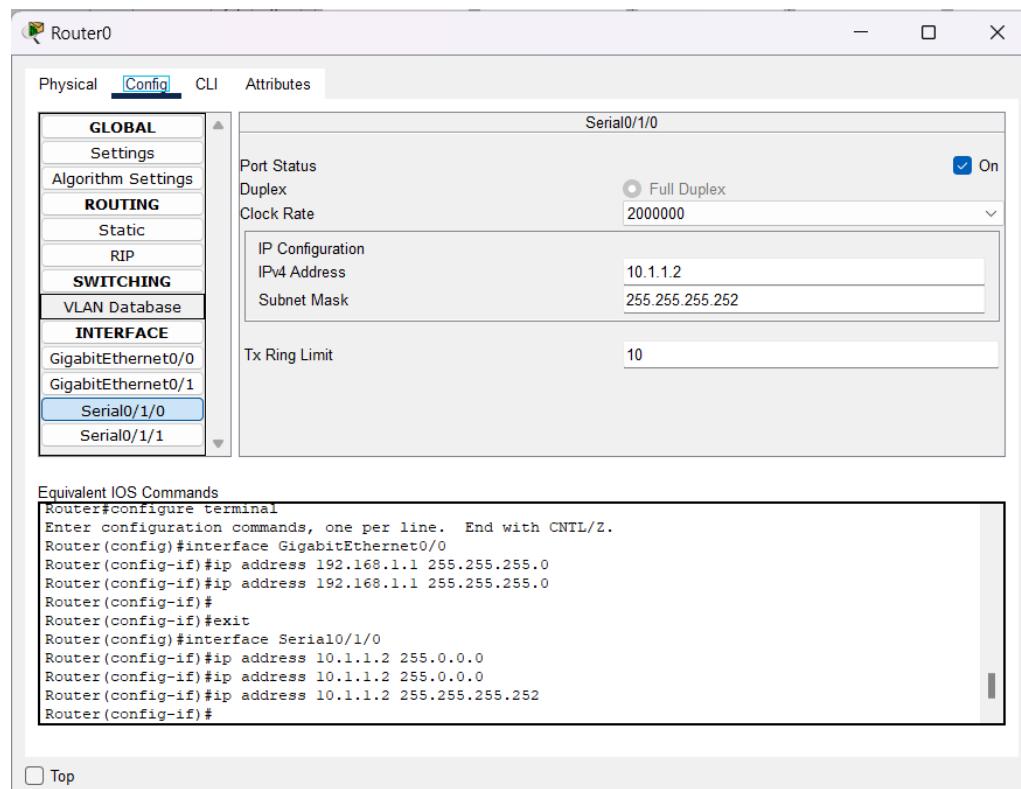
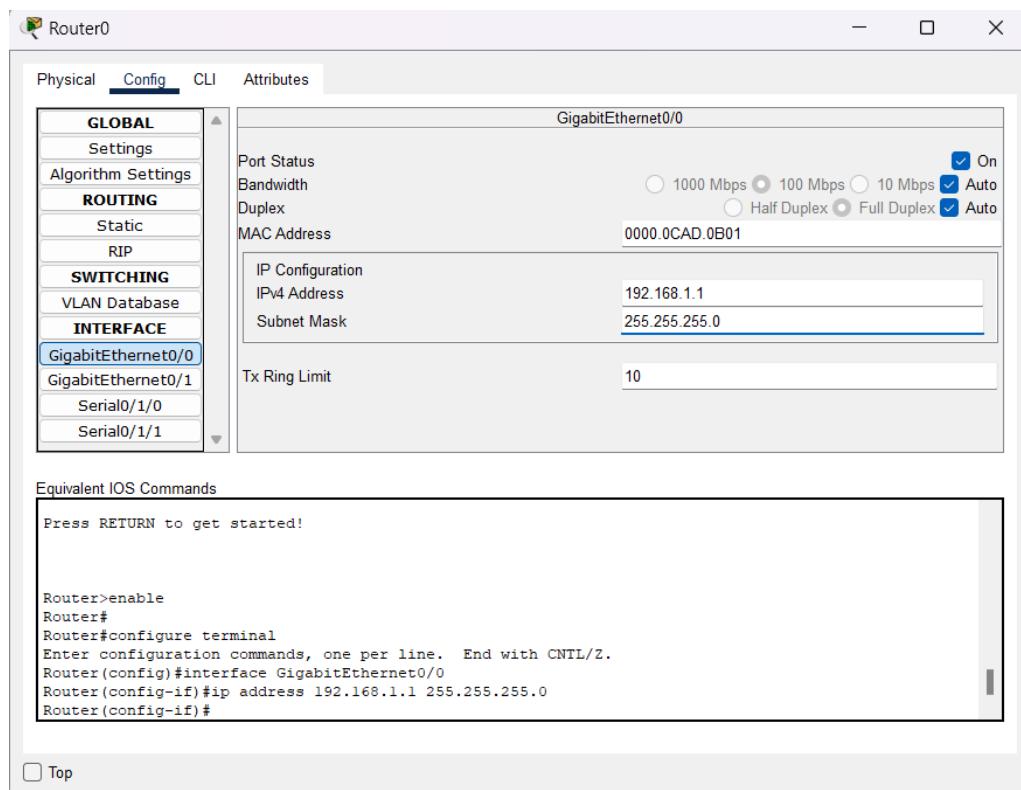


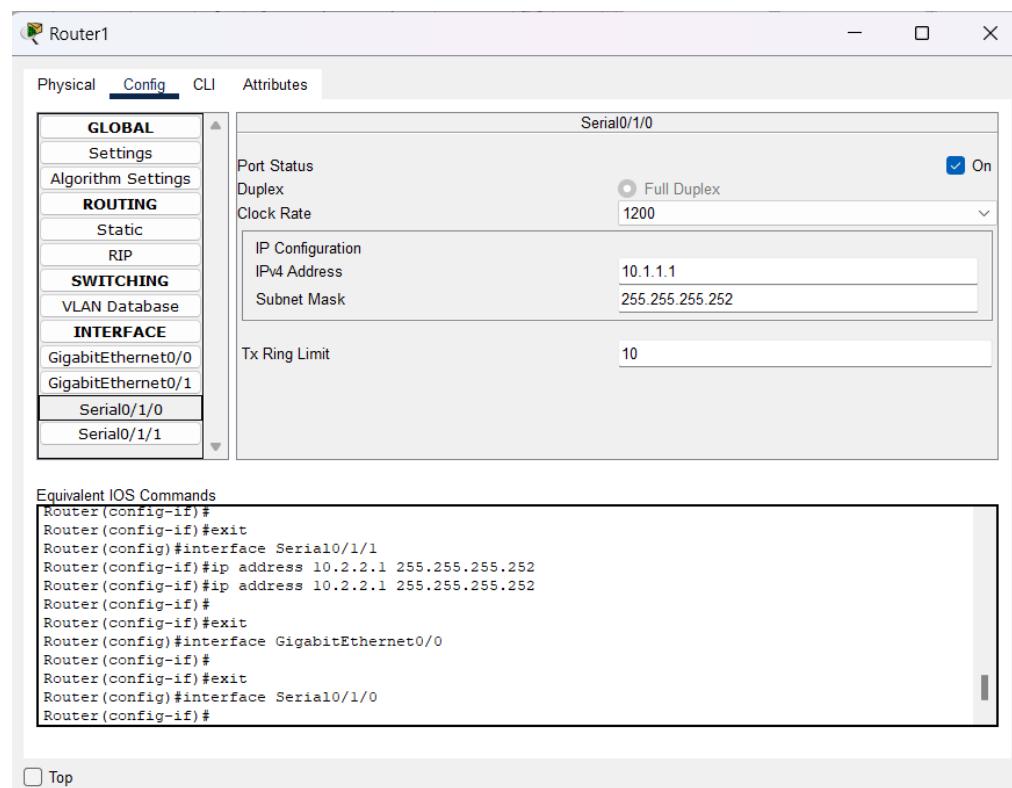
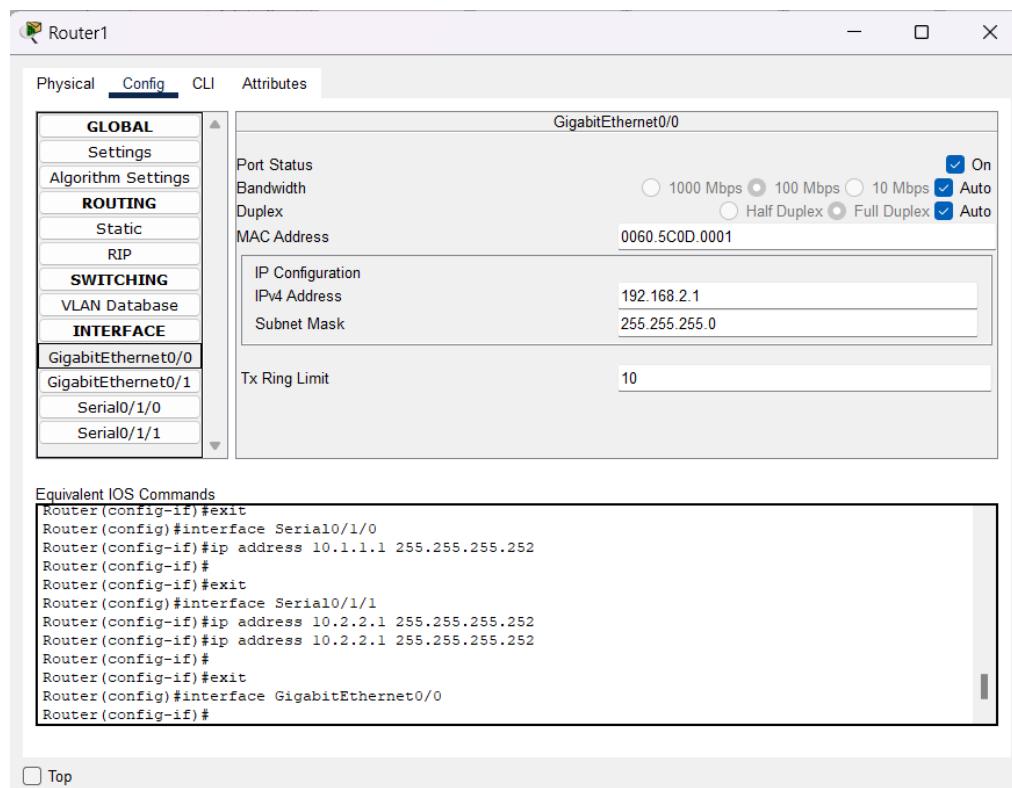
## RADIUS SERVER



**PC0****PC1**

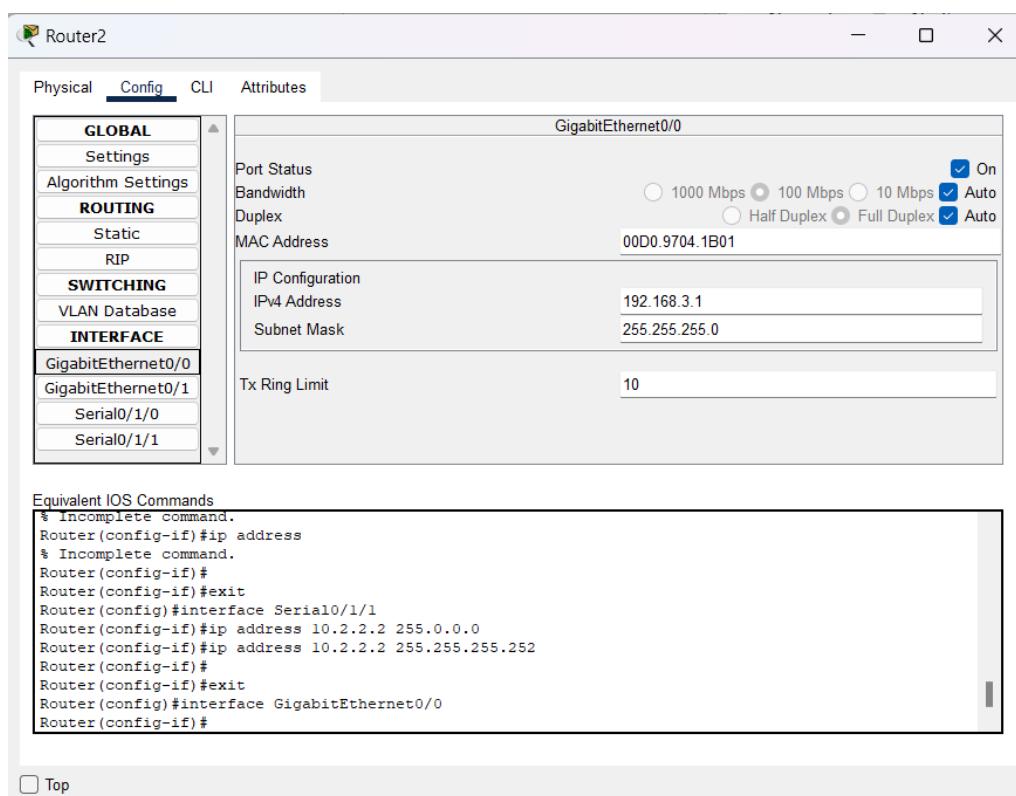
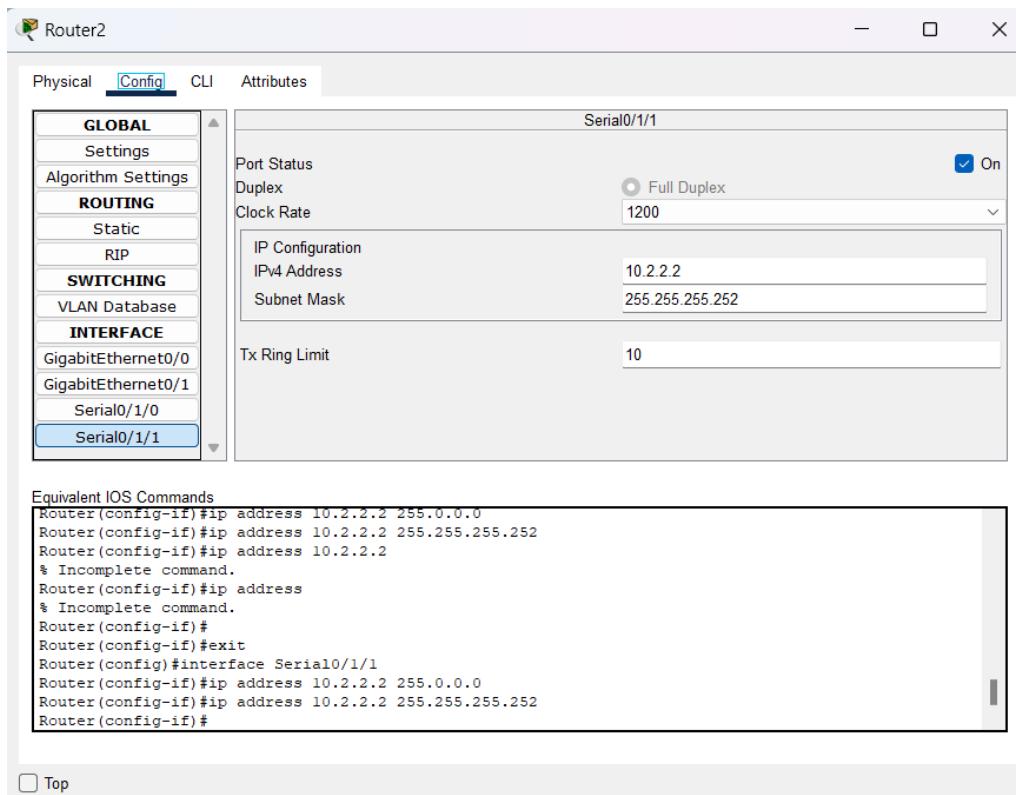
**PC2**

**Router0**

**Router1**



## Router 2



**Commands:****Router0**

Router>en  
Router#config t  
% Unknown command or computer name, or unable to find computer address  
  
Router#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#line vty 0 4  
Router(config-line)#password admin  
Router(config-line)#login  
Router(config-line)#exit  
Router(config)#router ospf 1  
Router(config-router)#network 192.168.1.0 0 0.0.0.255 area 0  
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0  
Router(config-router)## Invalid input detected at '^' marker.  
  
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0  
Router(config-router)#network 10.1.1.0 0.0.0.255 area 0  
Router(config-router)##

Top

**Router1**

Press RETURN to get started!  
  
Router>en  
Router#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#line vty 0 4  
Router(config-line)#password admin  
Router(config-line)#login  
Router(config-line)#exit  
Router(config)#router ospf 2  
Router(config-router)#network 192.168.2.0 0 0.0.0.255 area 0  
Router(config-router)#network 10.2.2.0 0 0.0.0.255 area 0  
Router(config-router)#network 10.1.1.0 0 0.0.0.255 area 0  
Router(config-router)## 02:36:54: %OSPF-5-ADJCHG: Process 2, Nbr 192.168.1.1 on Serial0/1/0 from LOADING to FULL, Loading Done  
Done

Top

**Router2**

The screenshot shows the Router2 CLI interface. The title bar says "Router2". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is the text "IOS Command Line Interface". The main window contains the following text:

```
Press RETURN to get started!

Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line vty 0 4
Router(config-line)#password admin
Router(config-line)#login
Router(config-line)#exit
Router(config)#router ospf 3
Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#network 10.2.2.0 0.0.0.255 area 0
Router(config-router)#
02:40:09: %OSPF-5-ADJCHG: Process 3, Nbr 192.168.2.1 on Serial0/1/1 from LOADING to FULL, Loading
Done
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

**PC0**

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=14ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=20ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 20ms, Average = 9ms

C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time=19ms TTL=126
Reply from 192.168.2.3: bytes=32 time=8ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
Reply from 192.168.2.3: bytes=32 time=8ms TTL=126

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 19ms, Average = 9ms
```

Top

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=17ms TTL=125
Reply from 192.168.3.2: bytes=32 time=17ms TTL=125
Reply from 192.168.3.2: bytes=32 time=16ms TTL=125
Reply from 192.168.3.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 17ms, Average = 13ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Reply from 192.168.3.3: bytes=32 time=21ms TTL=125
Reply from 192.168.3.3: bytes=32 time=3ms TTL=125
Reply from 192.168.3.3: bytes=32 time=25ms TTL=125
Reply from 192.168.3.3: bytes=32 time=32ms TTL=125

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 32ms, Average = 20ms

C:\>
```

Top

**PC1**

The screenshot shows a window titled "Command Prompt" from "Cisco Packet Tracer PC Command Line 1.0". The window displays the results of three ping operations:

- Ping to 192.168.1.3: 4 packets sent, 4 received, 0% loss, round trip times 1ms-17ms.
- Ping to 192.168.3.2: 4 packets sent, 4 received, 0% loss, round trip times 1ms-17ms.
- Ping to 192.168.3.3: 4 packets sent, 4 received, 0% loss, round trip times 1ms-22ms.

The command prompt shows the user's input: C:\>ping 192.168.1.3, C:\>ping 192.168.3.2, and C:\>ping 192.168.3.3.

**PC2**

Cisco Packet Tracer PC Command Line 1.0

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time=31ms TTL=125  
Reply from 192.168.1.3: bytes=32 time=2ms TTL=125  
Reply from 192.168.1.3: bytes=32 time=2ms TTL=125  
Reply from 192.168.1.3: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.3:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 2ms, Maximum = 31ms, Average = 9ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=14ms TTL=126  
Reply from 192.168.2.2: bytes=32 time=13ms TTL=126  
Reply from 192.168.2.2: bytes=32 time=14ms TTL=126  
Reply from 192.168.2.2: bytes=32 time=15ms TTL=126

Ping statistics for 192.168.2.2:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 13ms, Maximum = 15ms, Average = 14ms

C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Reply from 192.168.2.3: bytes=32 time=15ms TTL=126  
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126  
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126  
Reply from 192.168.2.3: bytes=32 time=24ms TTL=126

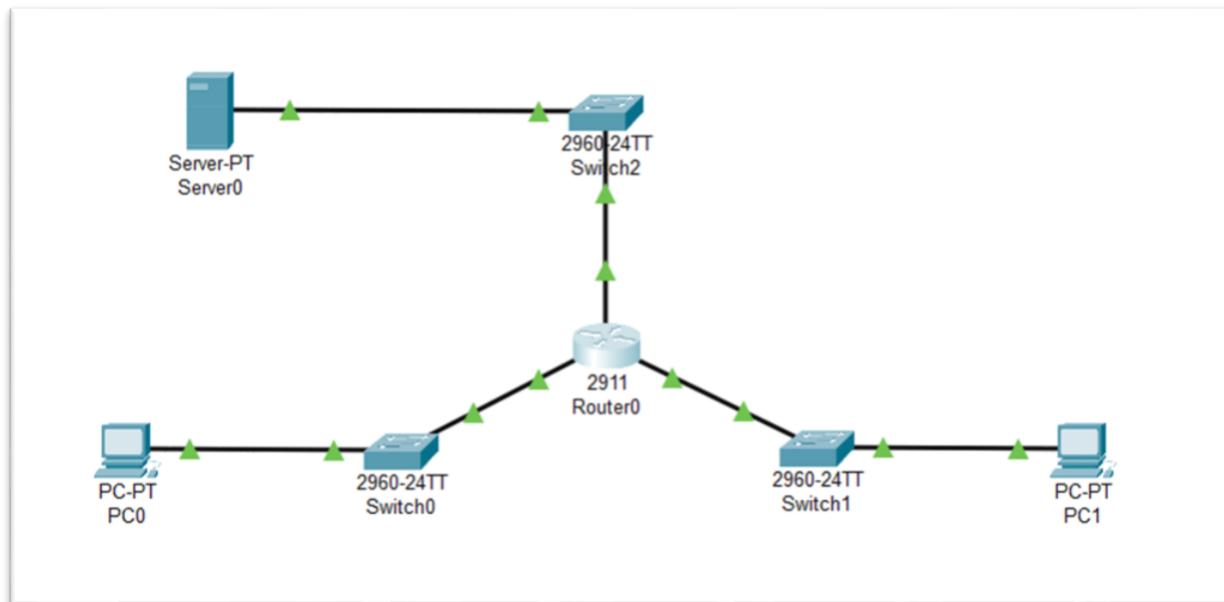
Ping statistics for 192.168.2.3:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 1ms, Maximum = 24ms, Average = 10ms

C:\>

### Practical 3A

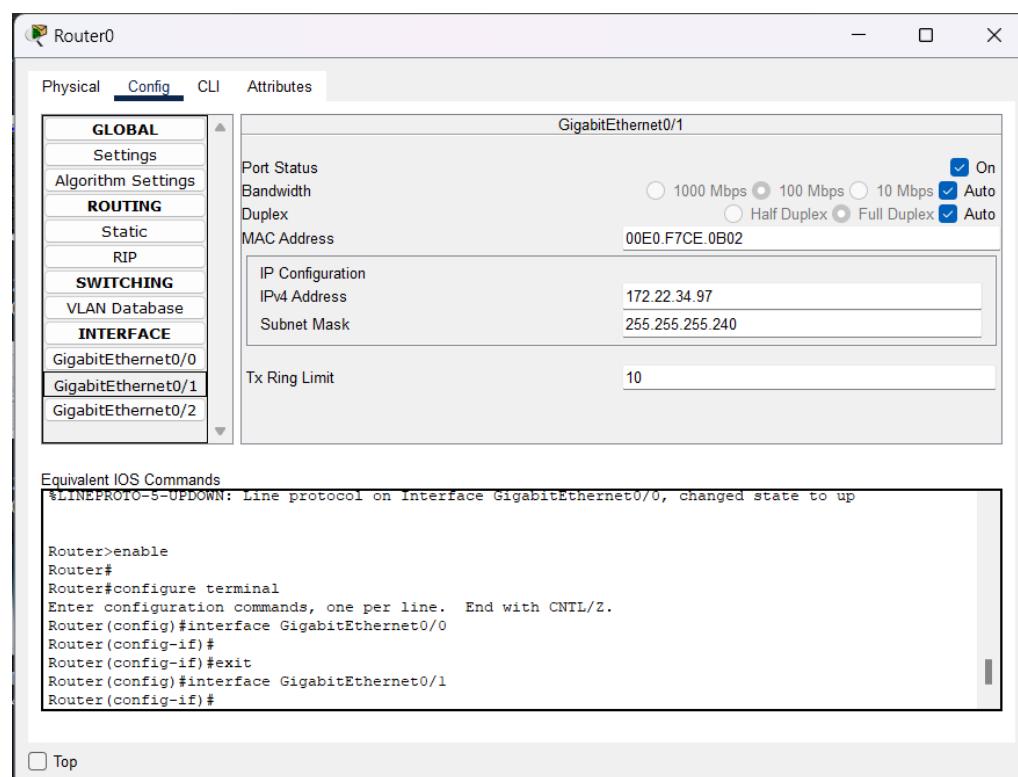
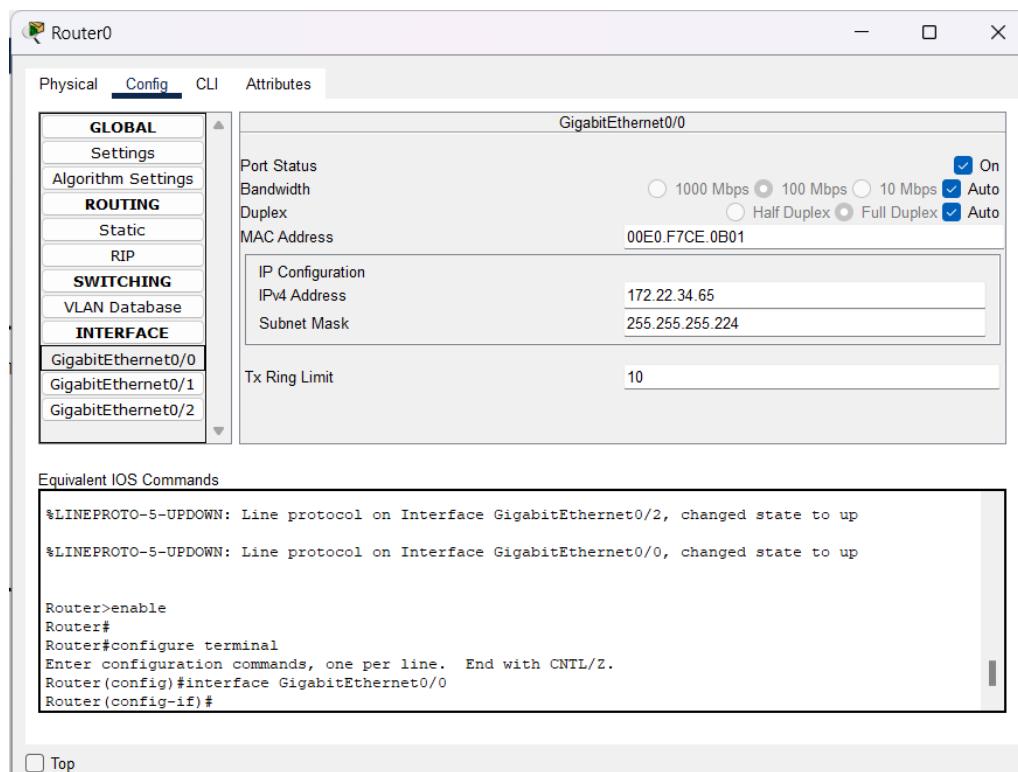
**Aim:** Configuring Extended ACLs - Scenario 1

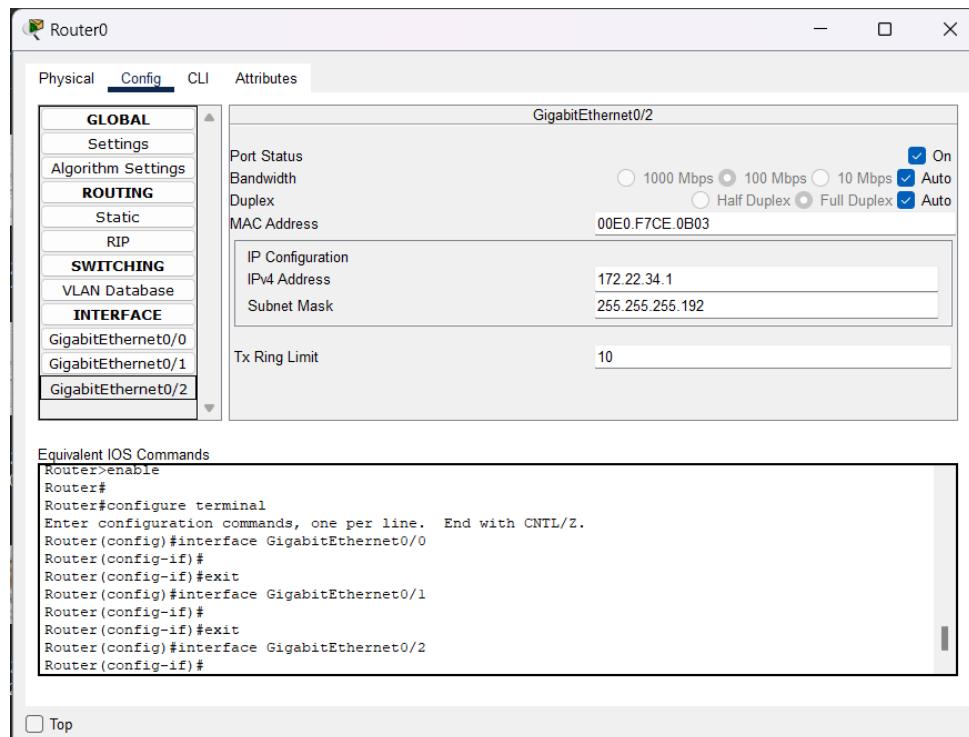
**Topology:**

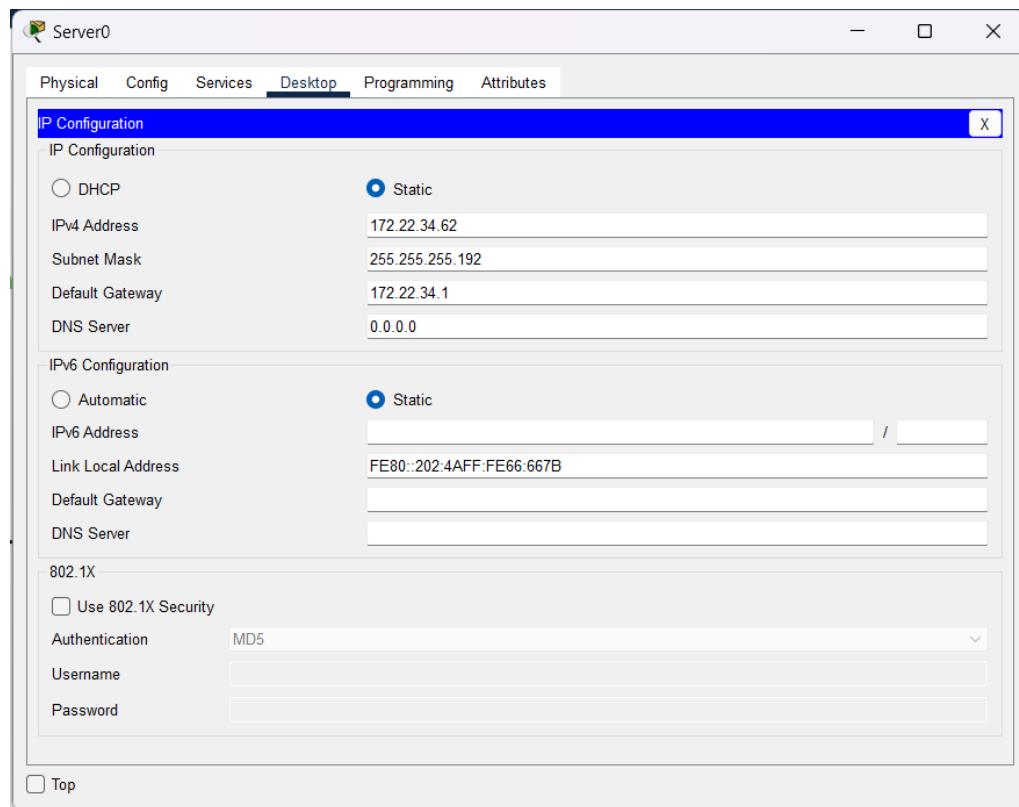
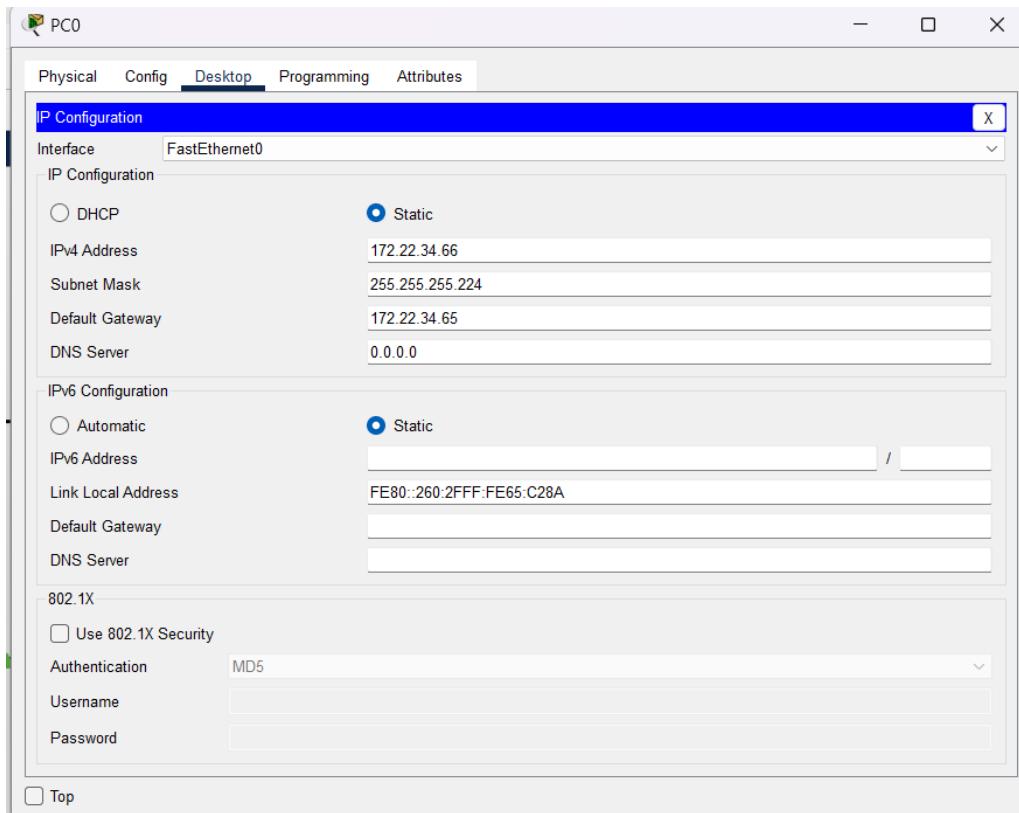


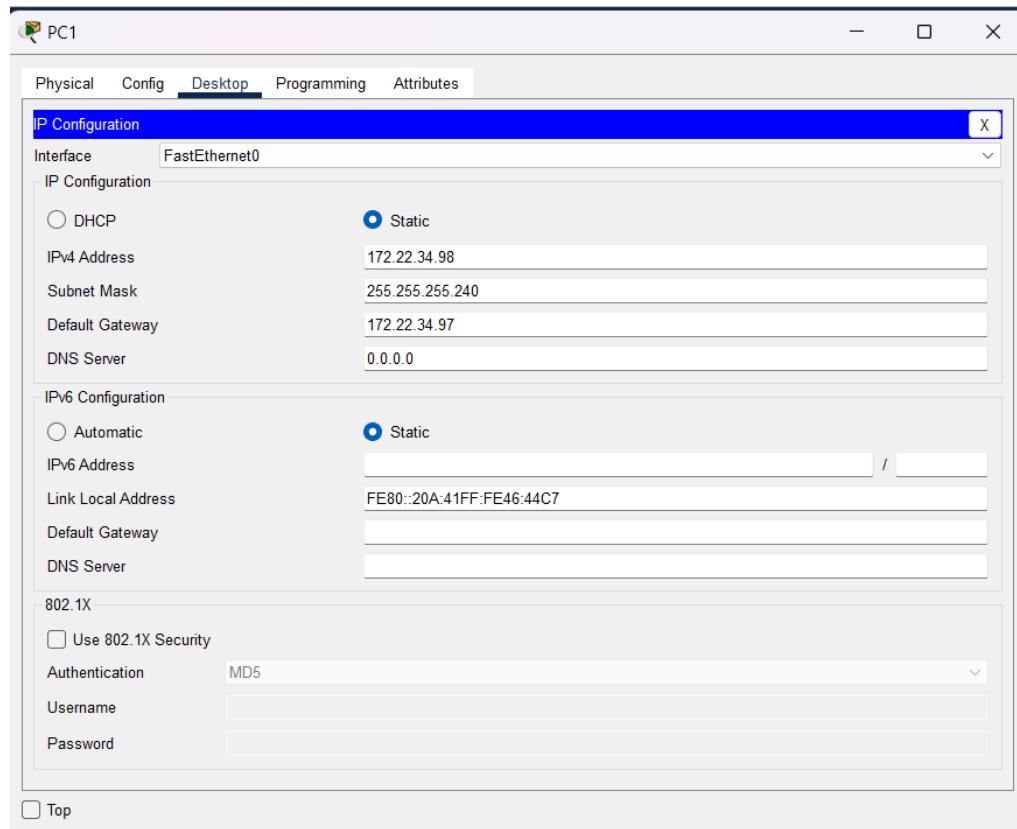
**Addressing Table:**

Device	Interface	IP Address	Subnet Mask	Default Gateway
<b>Router0</b>	Gig0/0	172.22.34.65	255.255.255.224	-
	Gig0/1	172.22.34.97	255.255.255.240	-
	Gig0/2	192.22.34.1	255.255.255.192	-
<b>Server0</b>		172.22.34.62	255.255.255.192	192.22.34.1
<b>PC0</b>		172.22.34.66	255.255.255.224	172.22.34.65
<b>PC1</b>		172.22.34.98	255.255.255.240	172.22.34.97

**Router0**



**Server0****PC0**

**PC1**

**Commands:****Router0**

The screenshot shows a Windows-style application window titled "Router0". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". The terminal window displays the following CLI session:

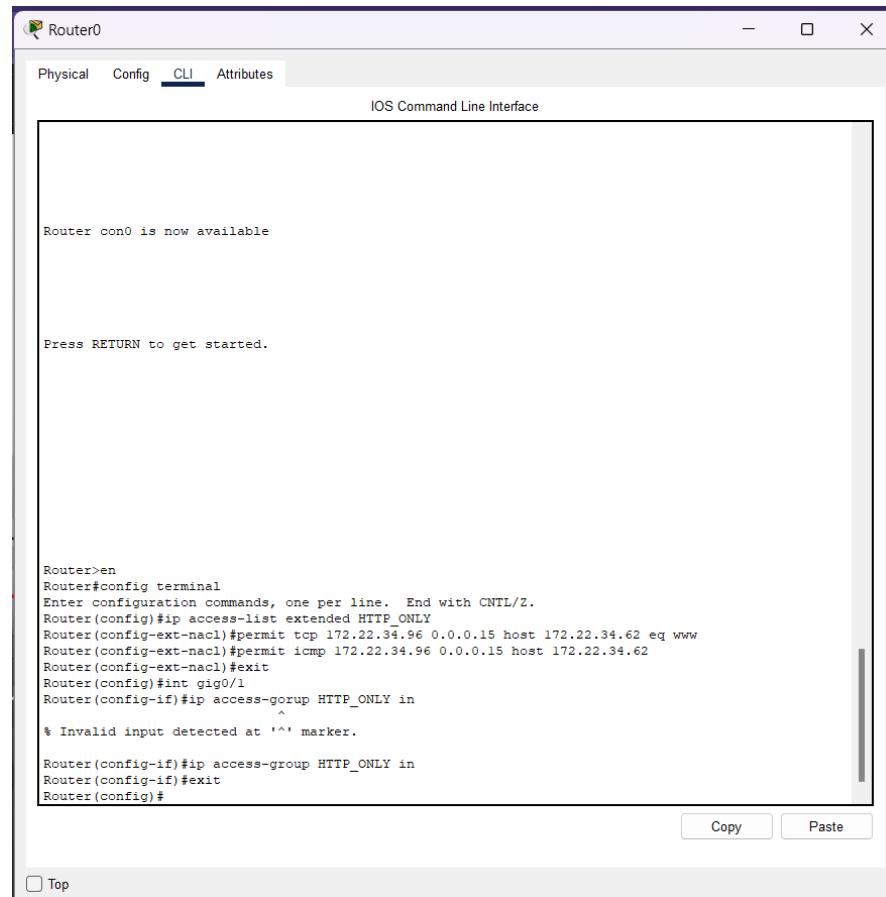
```
Router#
%SYS-5-CONFIG_I: Configured from console by console
exit

Router con0 is now available

Press RETURN to get started.

Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#access-list 100 permit tcp 172.22.34.64 0.0.0.31 host 172.22.34.62 eq ftp
Router(config)#access-list 100 permit icmp 172.22.34.64 0.0.0.31 host 172.22.34.62
Router(config)#int gig0/0
Router(config-if)#ip access-group 100 in
Router(config-if)#exit
Router(config)#
```

At the bottom right of the terminal window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".



## PING and FTP (PC0 to Server0)

The screenshot shows the Cisco Packet Tracer Command Line interface on PC0. The window title is "PC0". The tabs at the top are Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is selected. A sub-menu window titled "Command Prompt" is open, showing the following command history and output:

```

Cisco Packet Tracer PC Command Line 1.0
C:>ping 172.22.34.62

Pinging 172.22.34.62 with 32 bytes of data:

Request timed out.
Reply from 172.22.34.62: bytes=32 time<1ms TTL=127
Reply from 172.22.34.62: bytes=32 time<1ms TTL=127
Reply from 172.22.34.62: bytes=32 time<1ms TTL=127

Ping statistics for 172.22.34.62:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>ping 172.22.34.62

Pinging 172.22.34.62 with 32 bytes of data:

Reply from 172.22.34.62: bytes=32 time<1ms TTL=127

Ping statistics for 172.22.34.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>ftp 172.22.34.62
Trying to connect...172.22.34.62
Connected to 172.22.34.62
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
ftp>
ftp>
ftp>quit
221 8045 bytes sent to host.


```

## PING, FTP and Web Browser (PC1 to Server0)

The screenshot shows the Cisco Packet Tracer Command Line interface on PC1. The window title is "PC1". The tabs at the top are Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is selected. A sub-menu window titled "Command Prompt" is open, showing the following command history and output:

```

Cisco Packet Tracer PC Command Line 1.0
C:>ping 172.22.34.62

Pinging 172.22.34.62 with 32 bytes of data:

Reply from 172.22.34.62: bytes=32 time<1ms TTL=127

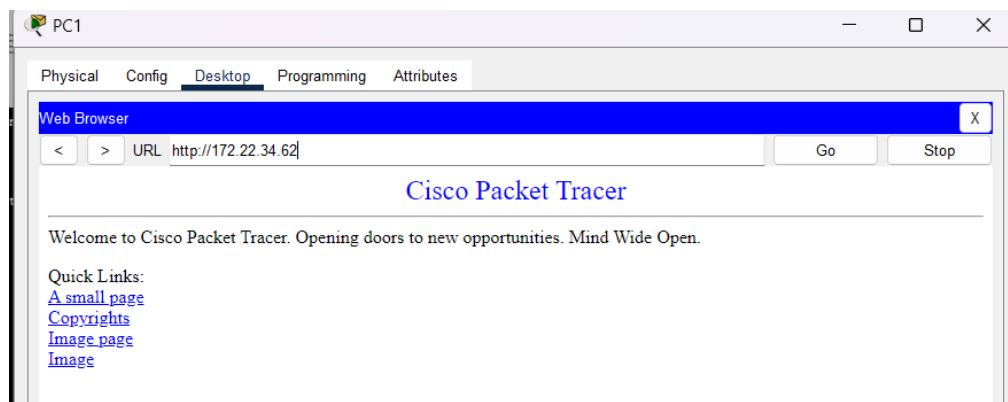
Ping statistics for 172.22.34.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>ftp 172.22.34.62
Trying to connect...172.22.34.62
*Error opening ftp://172.22.34.62/ (Timed out)

.

(Disconnecting from ftp server)

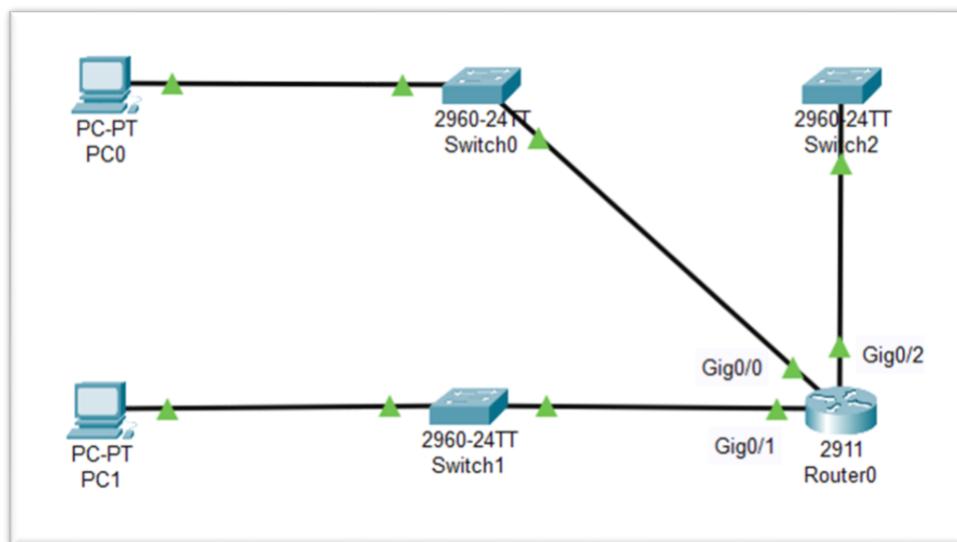

```



## Practical 3B

**Aim:** Configuring extended ACLS - scenario 2

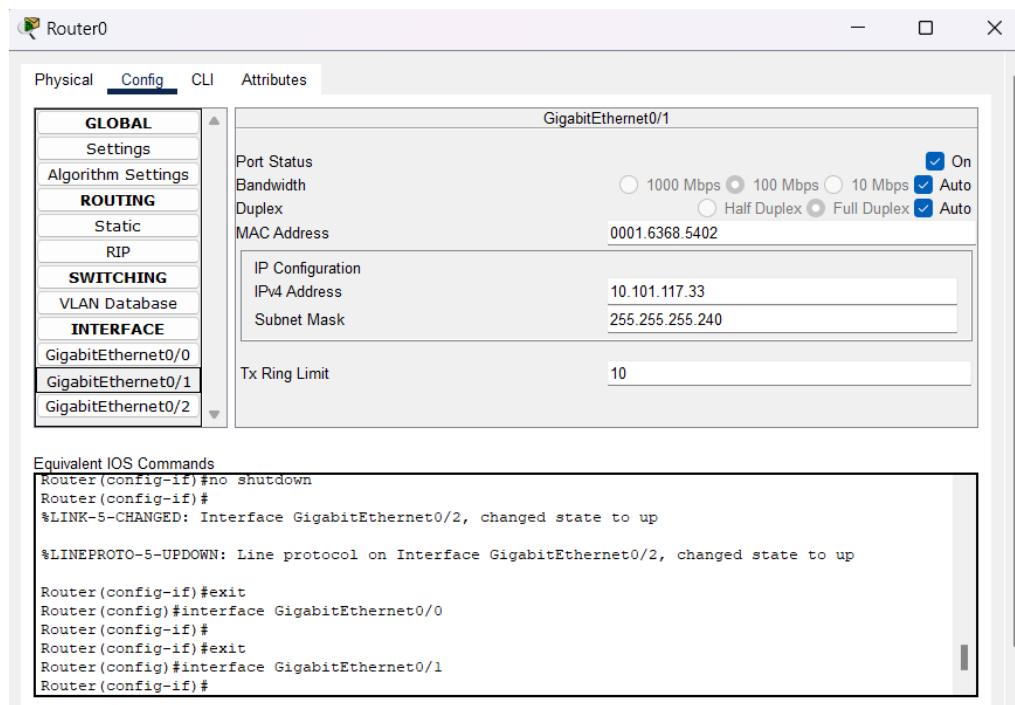
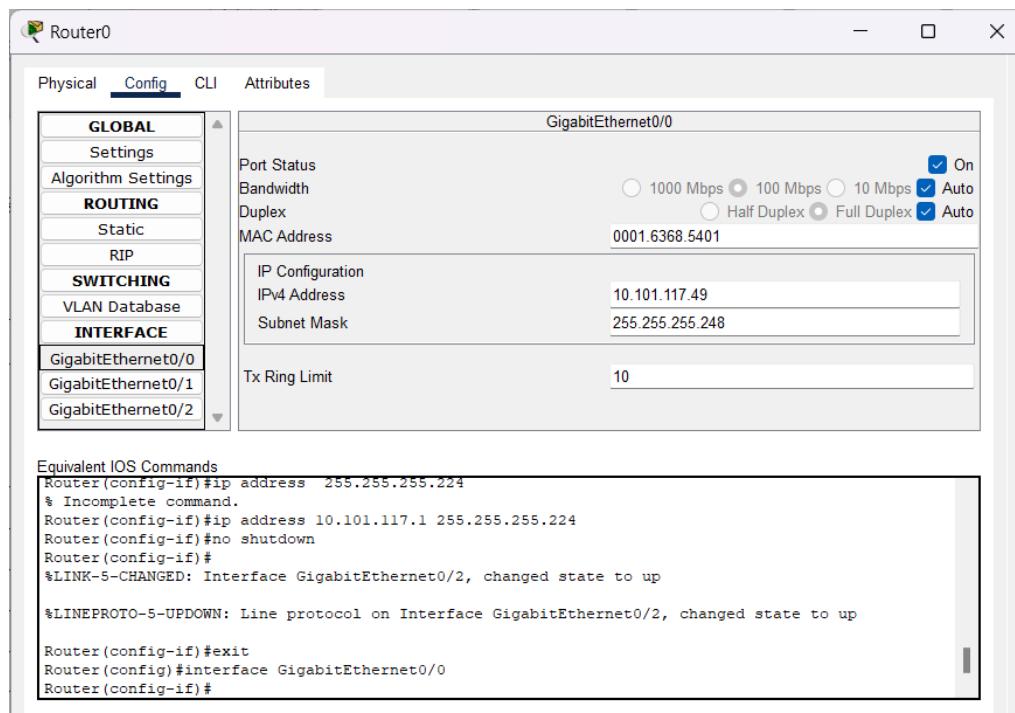
**Topology:**

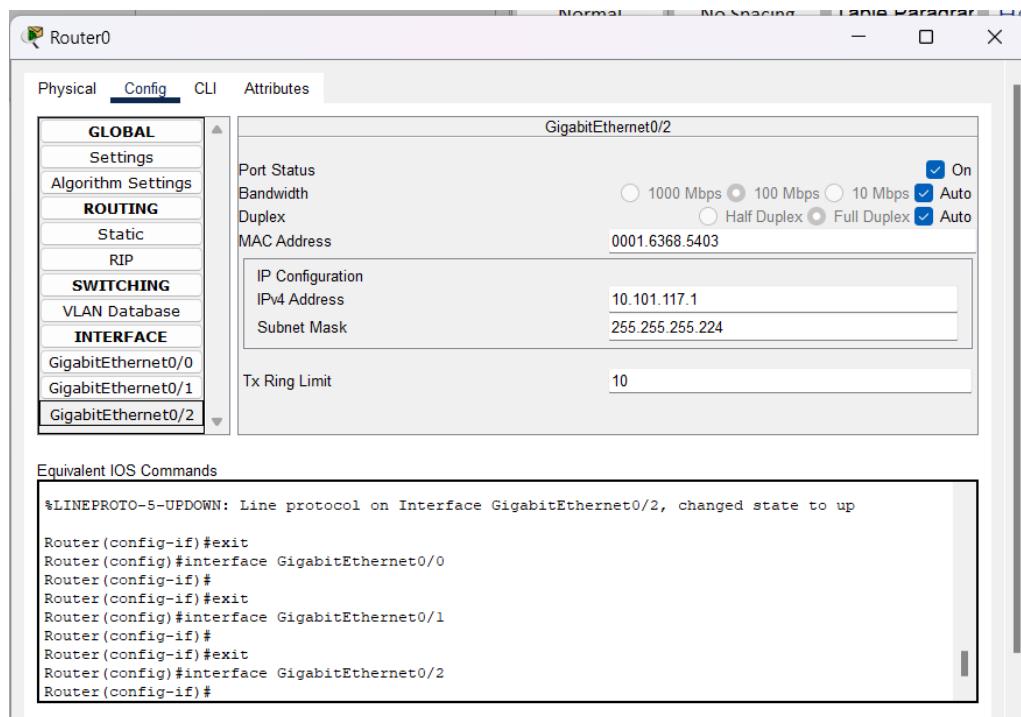


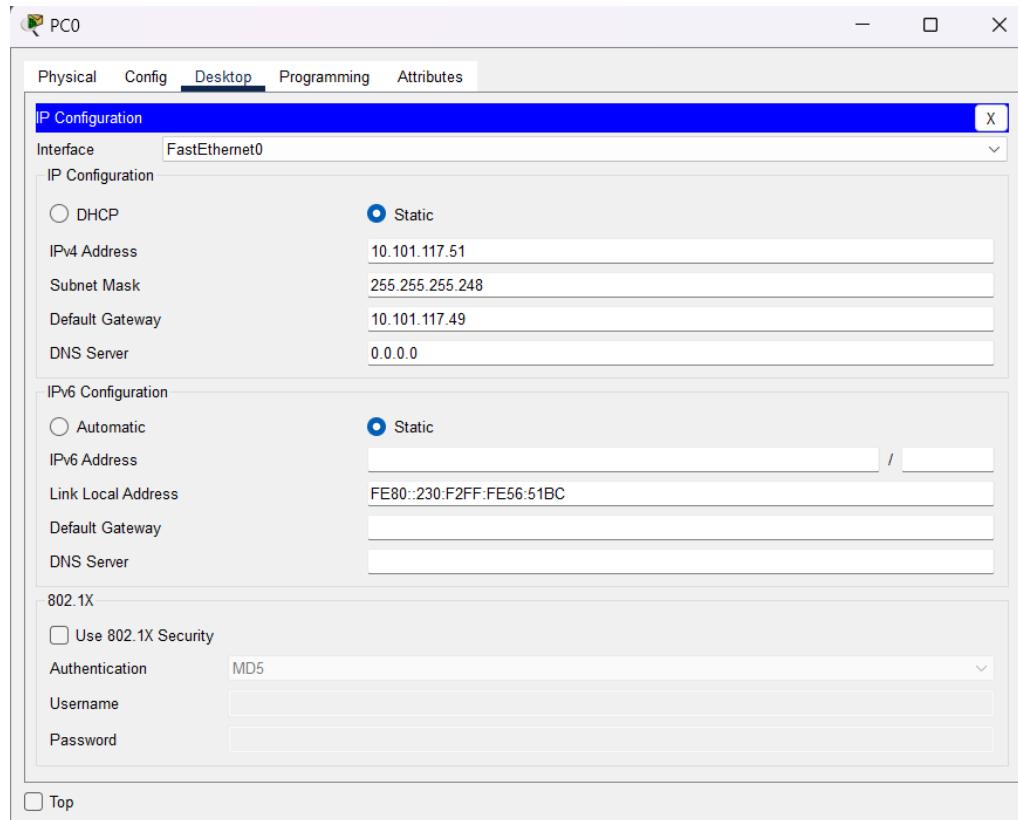
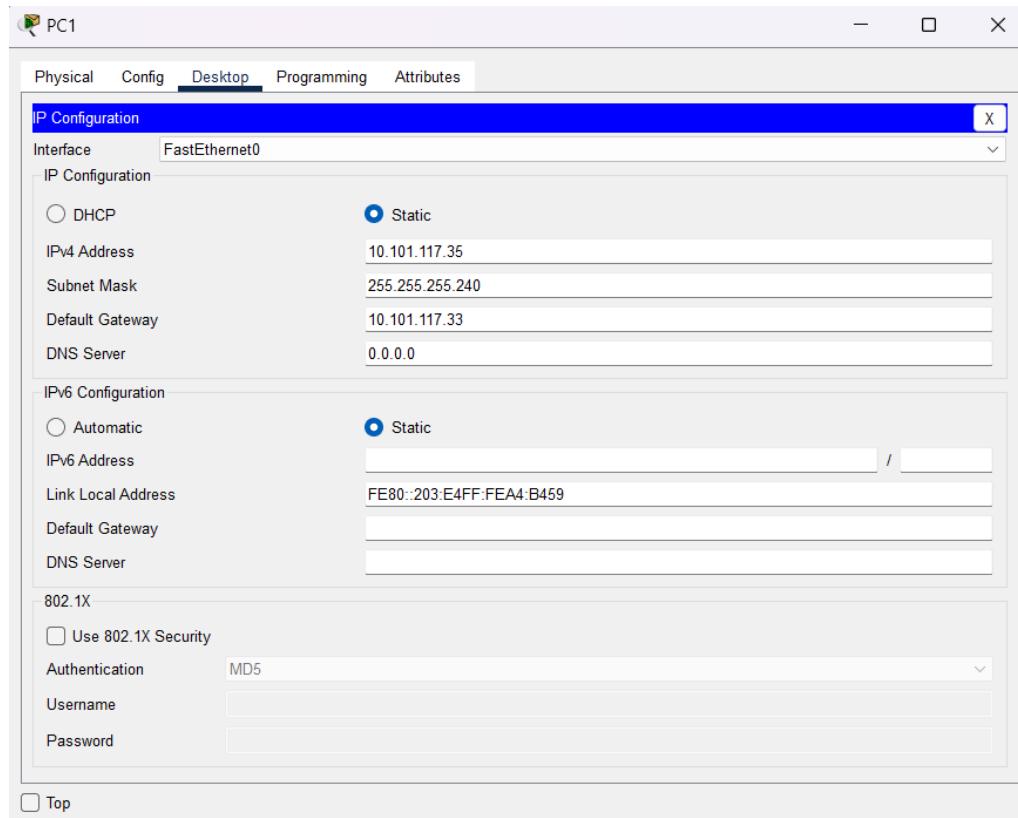
**Addressing Table:**

Device	Interface	IP Address	Subnet Mask	Default Gateway
<b>R0</b>	G0/0	10.101.117.49	255.255.255.248	N/A
	G0/1	10.101.117.33	255.255.255.240	N/A
	G0/2	10.101.117.1	255.255.255.224	N/A
<b>PC0</b>	NIC	10.101.117.51	255.255.255.248	10.101.117.49
<b>PC1</b>	NIC	10.101.117.35	255.255.255.240	10.101.117.33
<b>SW0</b>	VLAN 1	10.101.117.50	255.255.255.248	10.101.117.49
<b>SW1</b>	VLAN 1	10.101.117.34	255.255.255.240	10.101.117.33
<b>SW2</b>	VLAN 1	10.101.117.2	255.255.255.224	10.101.117.1

## Router0





**PC0****PC1**

**Switch0**

Switch>en  
Switch#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#int vlan 1  
Switch(config-if)#ip address 10.101.117.50 255.255.255.248  
Switch(config-if)#no shut  
Switch(config-if)#  
%LINK-5-CHANGED: Interface Vlan1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up  
Switch(config-if)#ip default-gateway 10.101.117.49  
Switch(config)#

Copy      Paste

**Switch1**

Press RETURN to get started.

Switch>en  
Switch#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#int lan 1  
^  
% Invalid input detected at '^' marker.  
Switch(config)#int vlan 1  
Switch(config-if)#ip address 10.101.117.34 255.255.255.240  
Switch(config-if)#no shut  
Switch(config-if)#  
%LINK-5-CHANGED: Interface Vlan1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up  
Switch(config-if)#ip default-gateway 10.101.117.33  
Switch(config)#

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## Switch2

Switch2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch con0 is now available

Press RETURN to get started.

Switch>en
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int vlan 1
Switch(config-if)#ip address 10.101.117.2 255.255.255.224
Switch(config-if)#no shut

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
Switch(config-if)#ip default-gateway 10.101.117.1
Switch(config)#

 Top
```

Copy Paste

## Ping PC0 to PC1 & Switch2

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.101.117.35

Pinging 10.101.117.35 with 32 bytes of data:

Request timed out.
Reply from 10.101.117.35: bytes=32 time<1ms TTL=127
Reply from 10.101.117.35: bytes=32 time<1ms TTL=127
Reply from 10.101.117.35: bytes=32 time<1ms TTL=127

Ping statistics for 10.101.117.35:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.101.117.2

Pinging 10.101.117.2 with 32 bytes of data:

Reply from 10.101.117.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.101.117.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

## Ping PC1 to PC0 & Switch2

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.101.117.49

Pinging 10.101.117.49 with 32 bytes of data:

Reply from 10.101.117.49: bytes=32 time<1ms TTL=255

Ping statistics for 10.101.117.49:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.101.117.2

Pinging 10.101.117.2 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 10.101.117.2: bytes=32 time<1ms TTL=254
Reply from 10.101.117.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.101.117.2:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.101.117.2

Pinging 10.101.117.2 with 32 bytes of data:

Reply from 10.101.117.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.101.117.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>

```

## Enable Secret and Console Password on Router and all Switches

**Switch0**

Switch0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable secret enpa55
Switch(config)#line console 0
Switch(config-line)#password tyit
Switch(config-line)#login
Switch(config-line)#+
```

Top

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**Switch1**

Switch1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable secret enpa55
Switch(config)#line console 0
Switch(config-line)#password tyit
Switch(config-line)#login
Switch(config-line)#+
```

Top

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**Switch2**

Switch2

```
Copyright (C) 1986-2013 by Cisco Systems, Inc.  
Compiled Wed 26-Jun-13 02:49 by mnguyen  
  
Press RETURN to get started!  
  
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up  
  
Switch>en  
Switch#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#enable secret enpa55  
Switch(config)#  
Switch(config)#line console 0  
Switch(config-line)#password tyit  
Switch(config-line)#login  
Switch(config-line)#  
Switch(config-line)#
```

Top

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**Router0**

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en  
Router#config t  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#enable secret enpa55  
Router(config)#  
Router(config)#line console 0  
Router(config-line)#password tyit  
Router(config-line)^  
* Invalid input detected at '^' marker.  
  
Router(config-line)#password tyit  
Router(config-line)#login  
Router(config-line)#  
Router(config-line)#
```

Top

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## Config Domian name, username, vty line & crypto key

### Switch0

```

Switch>en
Password:
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW0
SW0(config)#ip domain-name ccnasecurity.com
SW0(config)#line vty 04
SW0(config-line)#login local
SW0(config-line)#crypto key generate rsa
The name for the keys will be: SW0.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SW0(config)#
*Mar 1 0:40:34.894: %SSH-5-ENABLED: SSH 1.99 has been enabled
SW0(config)#

```

Top

### Switch 1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

Switch>en
Password:
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW1
SW1(config)#ip domain-name ccnasecurity.com
SW1(config)#username admin security adminpa55
^
* Invalid input detected at '^' marker.

SW1(config)#username admin secret adminpa55
SW1(config)#line vty 04
SW1(config-line)#login local
SW1(config-line)#crypto key generate rsa
The name for the keys will be: SW1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SW1(config)#
*Mar 1 0:55:49.371: %SSH-5-ENABLED: SSH 1.99 has been enabled
SW1(config)#

```

Top

## Switch 2

```
User Access Verification

Password:
Switch>en
Password:
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname SW2
SW2(config)#ip domain-name ccnasecurity.com
SW2(config)#username admin secret adminpa55
SW2(config)#line vty 04
SW2(config-line)#login local
SW2(config-line)#crypto key generate rsa
The name for the keys will be: SW2.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 4096 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SW2(config)#
*Mar 1 1:0:6.700: %SSH-5-ENABLED: SSH 1.99 has been enabled
SW2(config)#

```

Top

Copy      Paste

**Verify SSH****PC0**

```
C:\>ssh -l Admin 10.101.117.34
Password:
Password:
Password:
% Password: timeout expired!
[Connection to 10.101.117.34 closed by foreign host]
C:\>ssh -l Admin 10.101.117.34
Password:
Password:

SW1>
SW1>
SW1>exit

[Connection to 10.101.117.34 closed by foreign host]
C:\>
```

**PC1**

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ssh -l 10.101.117.50
Invalid Command.

C:\>ssh -l Admin 10.101.117.50
Password:
Password:

SW0>
SW0>
SW0>exit

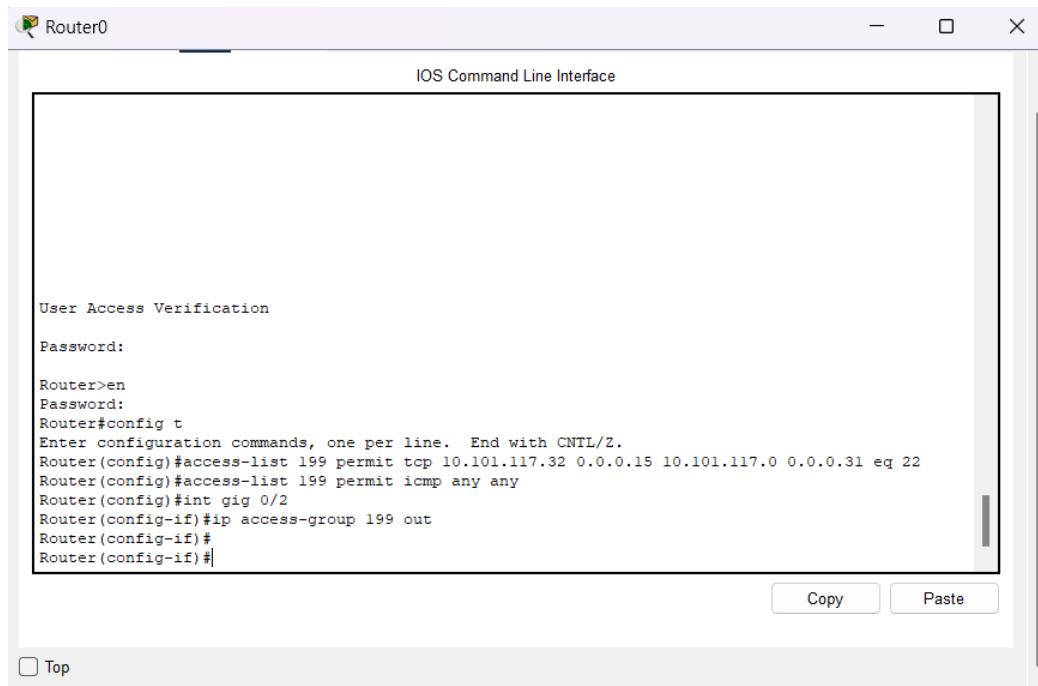
[Connection to 10.101.117.50 closed by foreign host]
C:\>ssh -l Admin 10.101.117.2
Password:
Password:

SW2>
SW2>
SW2>exit

[Connection to 10.101.117.2 closed by foreign host]
C:\>
```

## Configure extended ACL

**Router0**



The image shows a window titled "Router0" with the subtitle "IOS Command Line Interface". Inside the window, there is a text area containing the following configuration commands:

```
User Access Verification
Password:
Router>en
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#access-list 199 permit tcp 10.101.117.32 0.0.0.15 10.101.117.0 0.0.0.31 eq 22
Router(config)#access-list 199 permit icmp any any
Router(config)#int gig 0/2
Router(config-if)#ip access-group 199 out
Router(config-if)#
Router(config-if)#$
```

Below the text area, there are two buttons: "Copy" and "Paste". At the bottom left of the window, there is a checkbox labeled "Top".

## Verify extended ACL

PC0

```
% Connection timed out; remote host not responding
C:\>ping 10.101.117.35

Pinging 10.101.117.35 with 32 bytes of data:
Reply from 10.101.117.35: bytes=32 time<1ms TTL=127

Ping statistics for 10.101.117.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.101.117.2

Pinging 10.101.117.2 with 32 bytes of data:
Reply from 10.101.117.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.101.117.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ssh -l Admin 10.101.117.2

% Connection timed out; remote host not responding
C:\>
C:\>ssh -l Admin 10.101.117.34

Password:
Password:

SW1>en
Password:
SW1#ssh -l Admin 10.101.117.2

Password:
Password:

SW2>
SW2>
```

**PC1**

The screenshot shows a Windows Command Prompt window titled "PC1". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the tabs is a title bar "Command Prompt" with a close button "X". The main area of the window displays command-line output:

```
[Connection to 10.101.117.2 closed by foreign host]
C:\>ping 10.101.117.51

Pinging 10.101.117.51 with 32 bytes of data:

Reply from 10.101.117.51: bytes=32 time<1ms TTL=127

Ping statistics for 10.101.117.51:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 10.101.117.2

Pinging 10.101.117.2 with 32 bytes of data:

Reply from 10.101.117.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.101.117.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ssh -l Admin 10.101.117.2

Password:
Password:

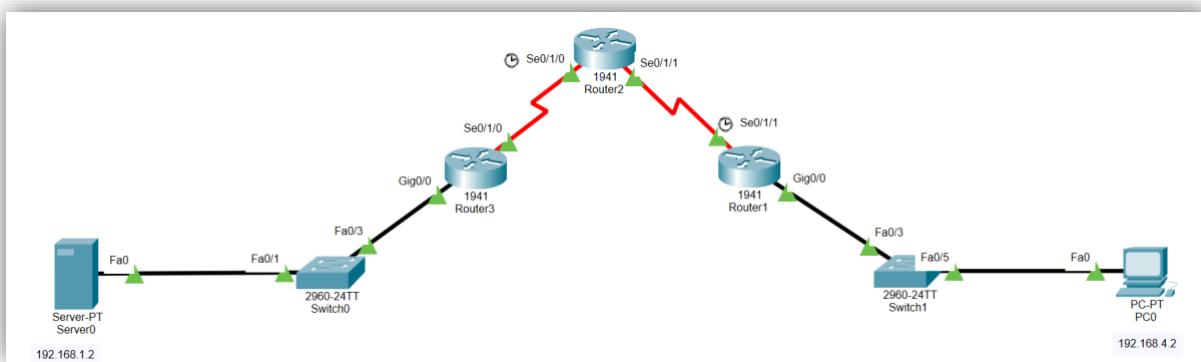
SW2>
SW2>exit

[Connection to 10.101.117.2 closed by foreign host]
C:\>
```

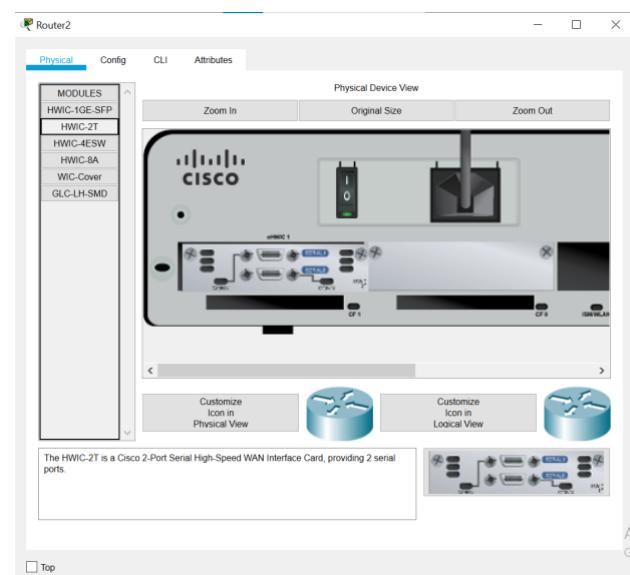
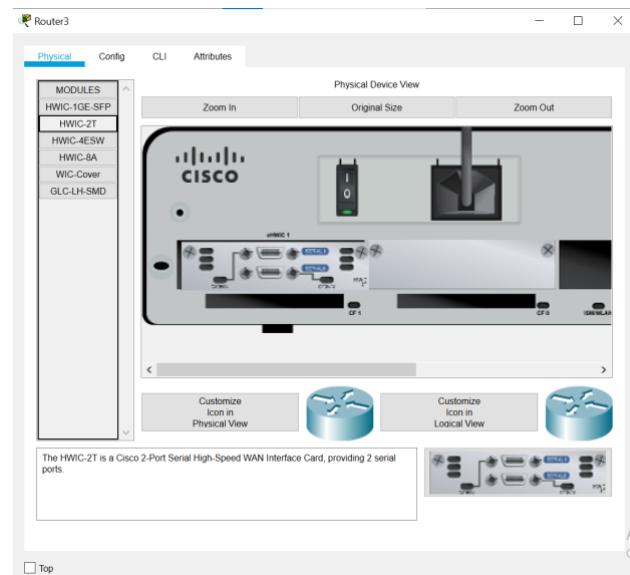
At the bottom left of the window, there is a checkbox labeled "Top".

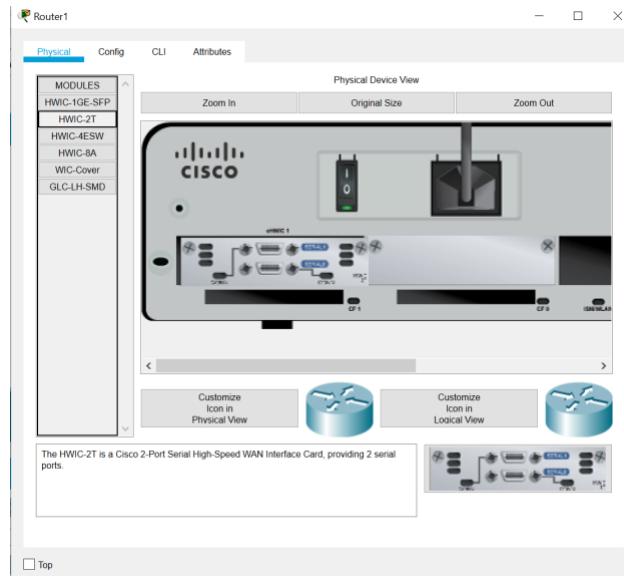
**Practical No. 4**

<b>4</b>	<b>Configure IP ACLs to Mitigate Attacks and IPV6 ACLs</b>
<b>a</b>	Verify connectivity among devices before firewall configuration.
<b>b</b>	Use ACLs to ensure remote access to the routers is available only from management station PC-C.
<b>c</b>	Configure ACLs on to mitigate attacks.

**Topology****Addressing Table**

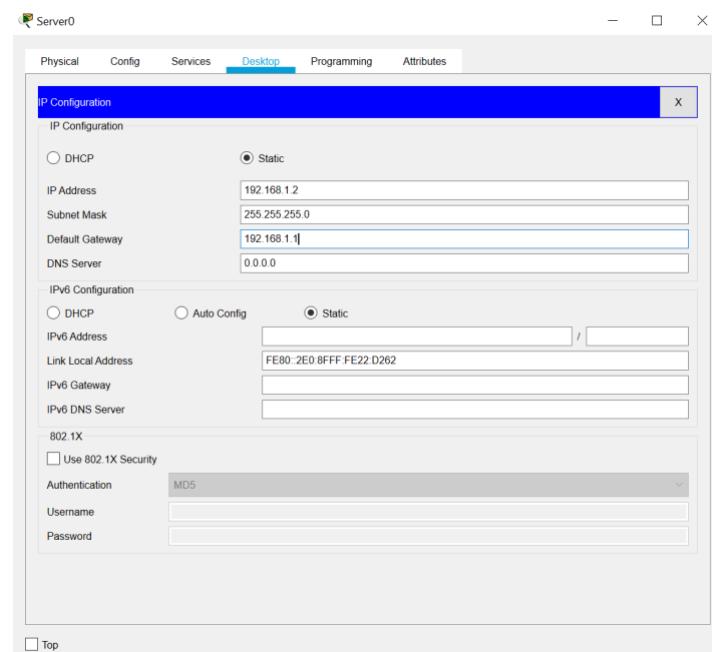
Sr No	Devices Sequences	Name	IP Address	Subnet Mask	Default Gateway	Routing
1	Server PT	Server0	192.168.1.2	255.255.255.0	192.168.1.1	-
2	2940-24TT Switch	Switch0	-	-	-	-
3	1941 Router	Router3	Gig0/0-192.168.1.1 (Port ON) Serial0/1/0-192.168.2.1	Gig0/0-255.255.255.0 (Port ON) Serial0/1/0-255.255.255.0	-	(RIP) 192.168.1.0 192.168.2.0
4	1941 Router	Router2	Serial0/1/0-192.168.2.2 Serial0/1/1-192.168.3.1	Serial0/1/0-255.255.255.0 Serial0/1/1-255.255.255.0	-	(RIP) 192.168.2.0 192.168.3.0
5	1941 Router	Router1	Gig0/0-192.168.4.1 (Port ON) Serial0/1/1-192.168.3.2	Gig0/0-255.255.255.0 (Port ON) Serial0/1/1-255.255.255.0	-	(RIP) 192.168.3.0 192.168.4.0
6	2940-24TT Switch	Switch1	-	-	-	-
7	PC-PT	PC0	192.168.4.2	255.255.255.0	192.168.4.1	-

**Connect Serial Port in all the 3 Routers****HWIC-2T**

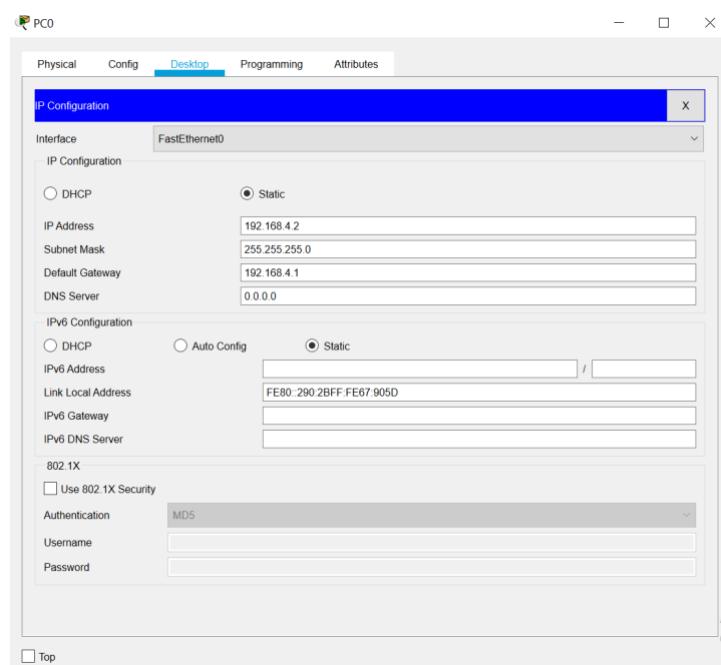


**Configure IP Address, Subnet Mask and Default Gateway in Server0 and PC0**

Server0

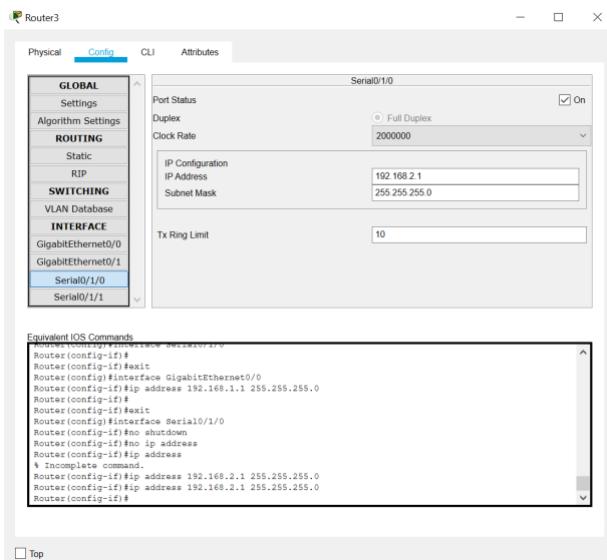
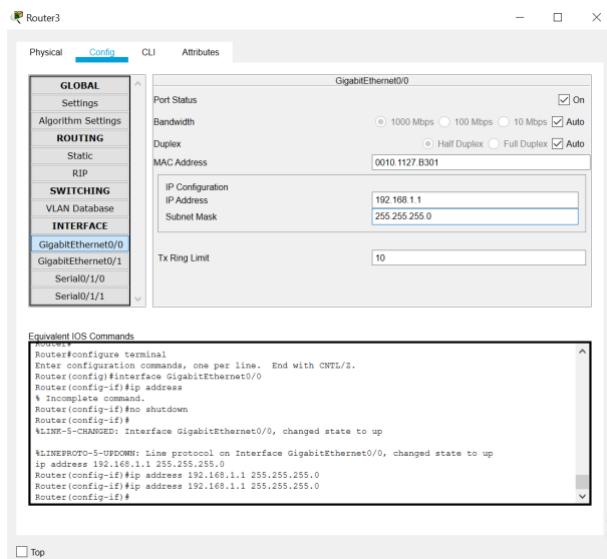


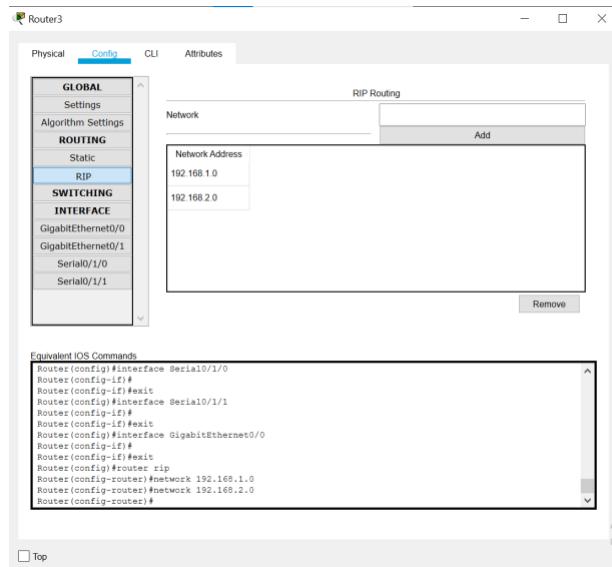
PC0



## Configure IP Address, Subnet Mask in Gig-0/0 then Serial 0/1/0 &

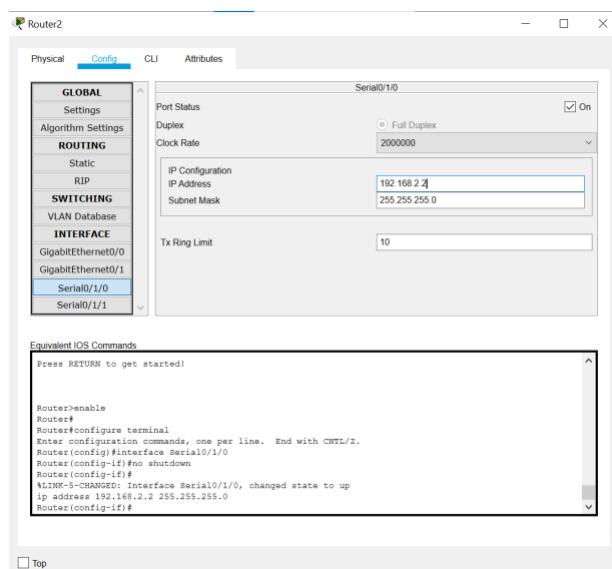
### Add Network Address in RIP of Router3





**Configure IP Address, Subnet Mask in Serial0/1/0 then Serial 0/1/1 &**

### Add Network Address in RIP of Router2



Router2

**Config**

Serial0/1/1	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	
IP Address	192.168.3.1
Subnet Mask	255.255.255.0
Tx Ring Limit	10

```

Equivalent IOS Commands:
ip address 192.168.2.2 255.255.255.0
Router(config-if)#ip address 192.168.2.2 255.255.255.0
Router(config-if)#
Interface Serial0/1/1: Line protocol on Interface Serial0/1/1, changed state to up
ip address 192.168.2.2 255.255.255.0
Router(config-if)#ip address 192.168.2.2 255.255.255.0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#

```

Top

Router2

**Config**

RIP Routing	
Network	
192.168.2.0	Add
192.168.3.0	

```

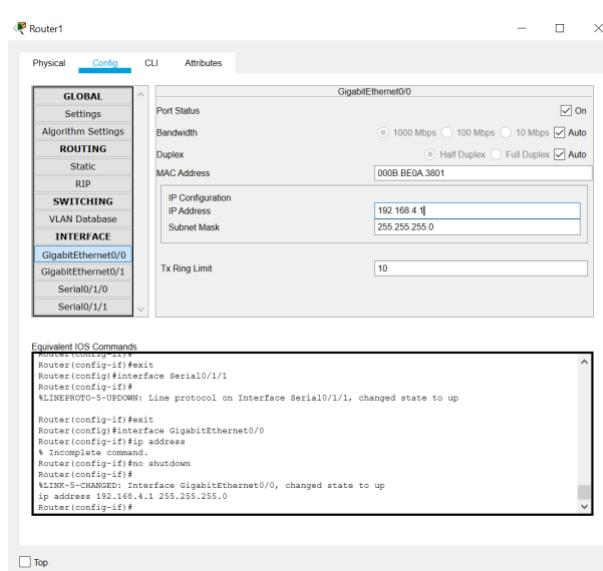
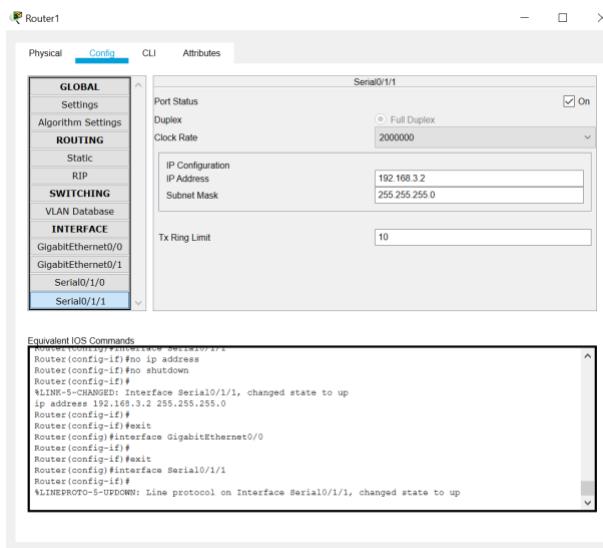
Equivalent IOS Commands:
Router(config)#interface Serial0/1/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#
Router(config-if)#exit
Router(config-if)#
Router(config-if)#rip
Router(config-if)#version 1
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.3.0
Router(config-router)#

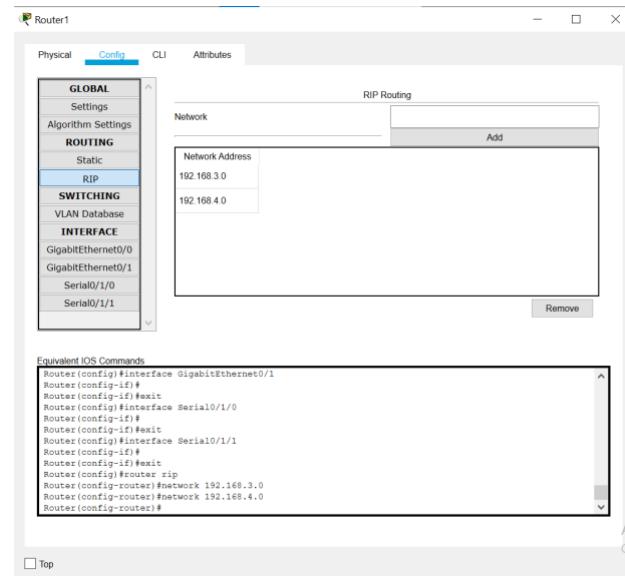
```

Top

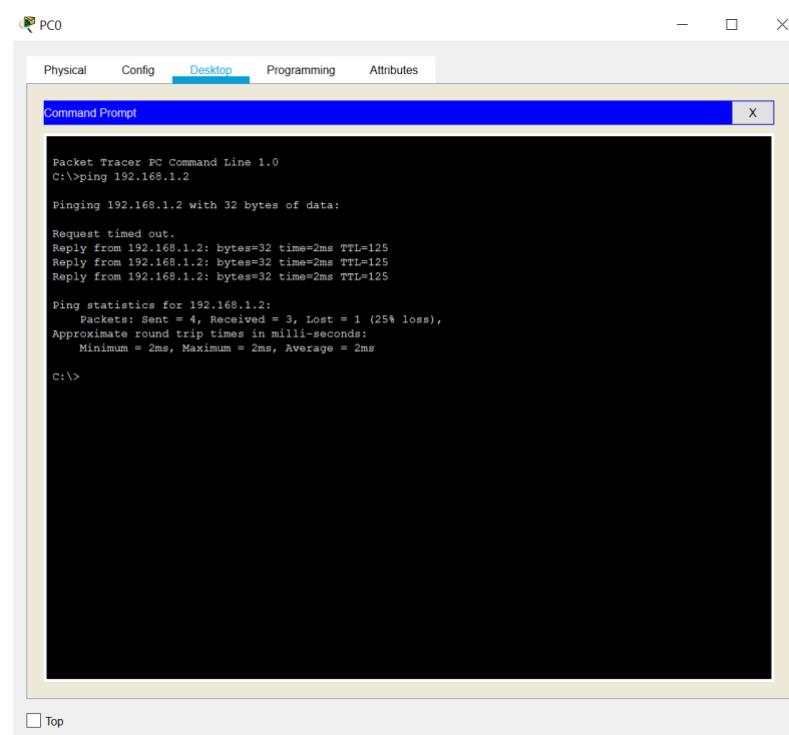
## Configure IP Address, Subnet Mask in Gig-0/0 then Serial 0/1/1 &

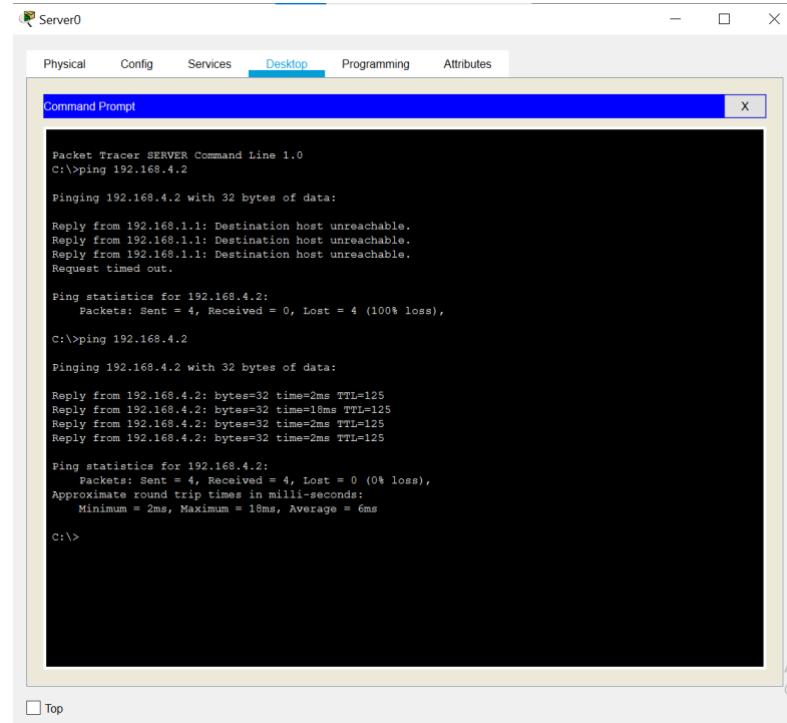
### Add Network Address in RIP of Router1





## Ping PC0 and Server0





### CLI Code in Router3 to configure domain name and access control list

Router>en  
Router#enable  
Router#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#ip domain-name smile.com  
Router(config)#hostname R3  
R3(config)#crypto key generate rsa  
The name for the keys will be: R3.smile.com  
Choose the size of the key modulus in the range of 360 to 2048 for your  
General Purpose Keys. Choosing a key modulus greater than 512 may take  
a few minutes.  
How many bits in the modulus [512]: 512  
Generating 512 bit RSA keys, keys will be non-exportable...[OK]  
R3(config)#line vty 0 4  
\*Mar 1 0:58:53.1: RSA key size needs to be at least 768 bits for ssh version 2  
\*Mar 1 0:58:53.1: SSH-5-ENABLED: SSH 1.5 has been enabled  
R3(config-line)#transport input ssh  
R3(config-line)#login local  
R3(config-line)#exit  
R3(config)#user  
% Incomplete command.  
R3(config)#username admin privilege 15 password smile  
R3(config)#exit  
R3#  
\$SYS-5-CONFIG\_I: Configured from console by console

Ctrl+F6 to exit CLI focus      [Copy](#)      [Paste](#)

Top      [Activate Windows](#)  
[Go to Settings to activate](#)

R3 con0 is now available  
  
Press RETURN to get started.

R3>en  
R3#enable  
R3#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#access-list 10 permit host 192.168.4.2  
R3(config)#line vty 0 4  
R3(config-line)#access-class 10 in  
R3(config-line)#exit  
R3(config)#[

Ctrl+F6 to exit CLI focus      [Copy](#)      [Paste](#)

Top      [Activate Windows](#)  
[Go to Settings to activate](#)

## CLI Code in Router2 to configure domain name and access control list

The screenshot shows the CLI interface for Router2. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. The main window title is 'IOS Command Line Interface'. The command history and output area contains the following configuration commands:

```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to down
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-name smile.com
Router(config)#hostname R2
R2(config)#crypto key generate rsa
The name for the keys will be: R2.smile.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 512
* Generating 512 bit RSA keys, keys will be non-exportable...[OK]

R2(config)#line vty 0 4
*Mar 1 0:10:56.233: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 0:10:56.233: %SSH-5-ENABLED: SSH 1.5 has been enabled
R2(config-line)#transport input ssh
R2(config-line)#login local
R2(config-line)#exit
R2(config)#username admin privilege 15 password smile
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#

```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a message: 'Activate Windows Go to Settings to activate Wind'. There is also a 'Top' button.

The screenshot shows the CLI interface for Router2. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. The main window title is 'IOS Command Line Interface'. The command history and output area contains the following configuration commands:

```

R2 con0 is now available

Press RETURN to get started.

R2>en
R2#enable
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#access-list 10 permit host 192.168.4.2
R2(config)#line vty 0 4
R2(config-line)#access-class 10 in
R2(config-line)#exit
R2(config)#

```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a message: 'Activ Go to S'. There is also a 'Top' button.

### CLI Code in Router1 to configure domain name and access control list

The screenshot shows the CLI interface for Router1. The tabs at the top are Physical, Config, CLI (which is selected), and Attributes. The main window displays the following configuration commands:

```

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip domain-name smile.com
Router(config)#hostname R1
R1(config)#crypto key generate rsa
The name for the keys will be: R1.smile.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

R1(config)#line vty 0 4
*Mar 1 0:18:4.672: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 0:18:4.672: %SSH-5-ENABLED: SSH 1.5 has been enabled
R1(config-line)#transport input ssh
R1(config-line)#login local
R1(config-line)#exit
R1(config)#username admin privilege 15 password smile
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

```

At the bottom of the window, there are buttons for Copy and Paste, and a message: "Activate Windows Go to Settings to activate Windows". There is also a checkbox labeled "Top".

The screenshot shows the CLI interface for Router1. The tabs at the top are Physical, Config, CLI (selected), and Attributes. The main window displays the following configuration commands:

```

R1 con0 is now available

Press RETURN to get started.

R1>en
R1#enable
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#access-list 10 permit host 192.168.4.2
R1(config)#line vty 0 4
R1(config-line)#access-class 10 in
R1(config-line)#exit
R1(config)#

```

At the bottom of the window, there are buttons for Copy and Paste, and a message: "Activate Windows Go to Settings to activate Windows". There is also a checkbox labeled "Top".

**Configure PC0 and Server0 to ping and access using ssh**

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
Request timed out.  
Ping statistics for 192.168.2.1:  
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
  
C:\>ping 192.168.1.2  
  
Pinging 192.168.1.2 with 32 bytes of data:  
  
Request timed out.  
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125  
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125  
Reply from 192.168.1.2: bytes=32 time=12ms TTL=125  
  
Ping statistics for 192.168.1.2:  
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 2ms, Maximum = 12ms, Average = 5ms  
  
C:\>ssh -l admin 192.168.3.2  
  
[Connection to 192.168.3.2 closed by foreign host]  
C:\>ssh -l admin 192.168.3.2  
  
[Connection to 192.168.3.2 closed by foreign host]  
C:\>ssh -l admin 192.168.4.1  
  
[Connection to 192.168.4.1 closed by foreign host]  
C:\>ssh -l admin 192.168.4.1  
  
Password:  
  
R1#
```

Top

Server0

Physical Config Services Desktop Programming Attributes

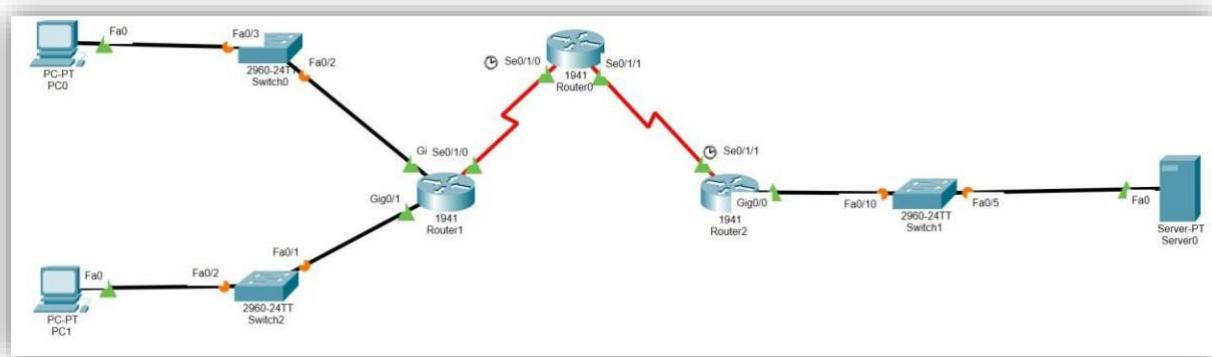
Command Prompt

```
Packet Tracer SERVER Command Line 1.0  
C:\>ssh -l admin 192.168.3.2  
% Connection refused by remote host  
C:\>
```

Top

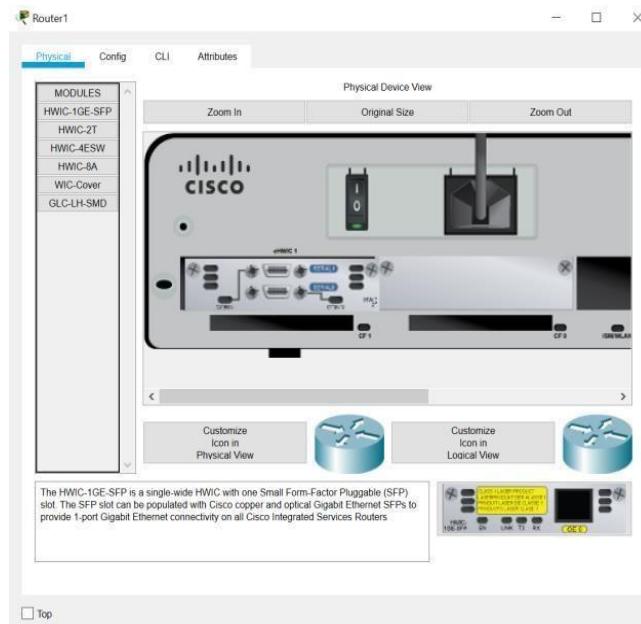
### Practical 5 - Configure IPv6 ACLs

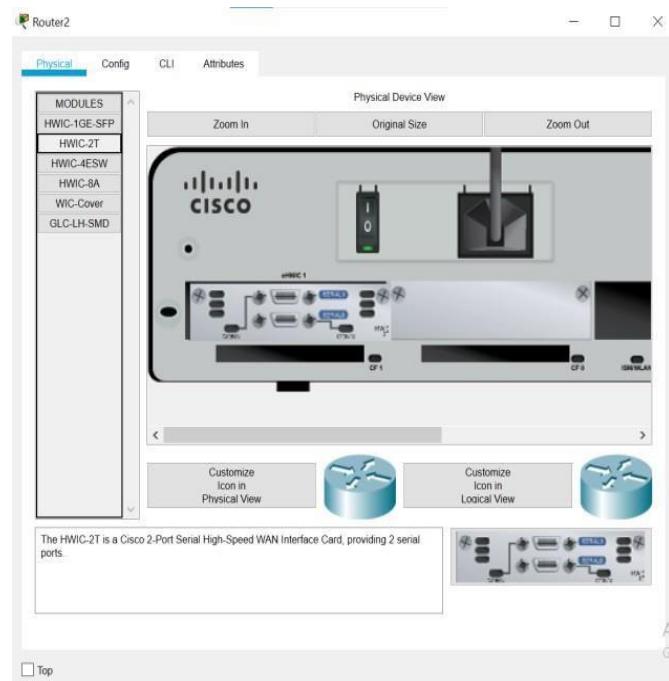
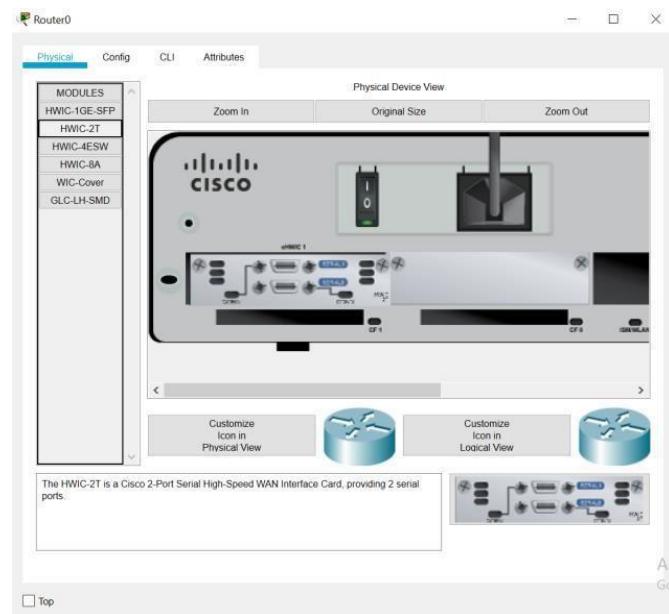
#### Topology

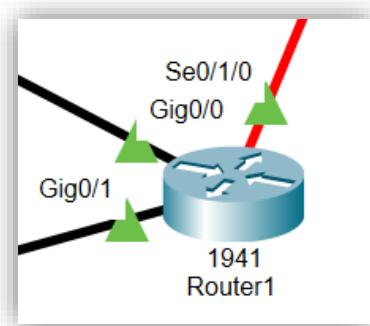


#### Addressing Table

Sr No	Devices Sequences	Names	IPv6 Address	Subnet Mask	IPv6 Gateway
1	PC-PT	PC0	2002::2/64	-	2002::1
2	PC-PT	PC1	2001::2/64	-	2001::1
3	2960-24TT Switch	Switch0	-	-	-
4	2960-24TT Switch	Switch2	-	-	-
5	1941 Router	Router1	-	-	-
6	1941 Router	Router0	-	-	-
7	1941 Router	Router2	-	-	-
8	2960-24TT Switch	Switch1	-	-	-
9	Server-PT	Server0	2005::2/64	-	2005::1

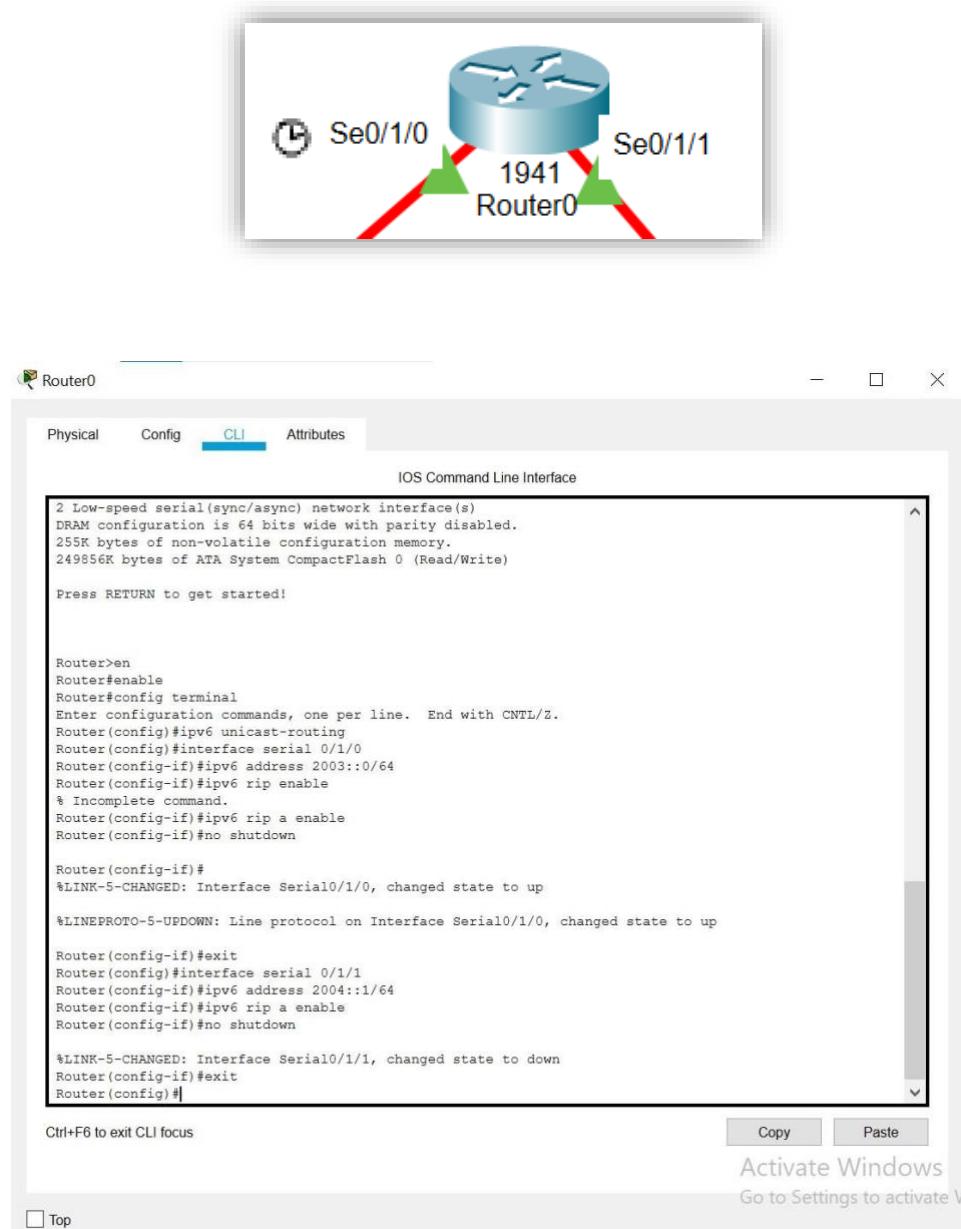
**Connect Serial Port in all the 3 Routers****HWIC-2T**



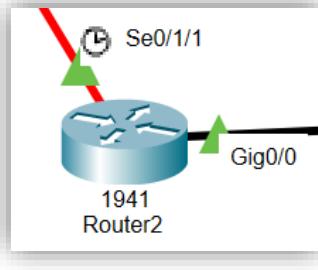
**Configure Gigabit Ethernet 0/0 and 0/1 and Serial 0/1/0 in Router1 CLI**

Router>en  
Router#enable  
Router#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router(config)#ipv6 unicast-routing  
Router(config)#interface gigabitEthernet 0/0  
Router(config-if)#ipv6 address 2002:1/64  
Router(config-if)#ipv6 rip a enable  
Router(config-if)#no shutdown  
  
Router(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  
  
Router(config-if)#exit  
Router(config)#interface gigabitEthernet 0/1  
Router(config-if)#ipv6 address 2001::1/64  
Router(config-if)#ipv6 rip a enable  
Router(config-if)#no shutdown  
  
Router(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  
  
Router(config-if)#exit  
Router(config)#interface serial 0/1/0  
Router(config-if)#ipv6 address 2003::1  
% Incomplete command.  
Router(config-if)#ipv6 address 2003::1/64  
Router(config-if)#ipv6 rip a enable  
Router(config-if)#no shutdown

Ctrl+F6 to exit CLI focus      Copy      Paste      Activat  
Go to Se

**Configure Serial 0/1/0 and Serial 0/1/1 in Router0 CLI**

### Configure Serial 0/1/1 and Gigabit Ethernet 0/0 in Router2 CLI



**Router2**

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

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/wal/export/crypto/tool/stqrg.html

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

Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ipv6 unicast-routing
Router(config)#interface serial 0/1/1
Router(config-if)#ipv6 address 2004::2/64
Router(config-if)#ipv6 rip a enable
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

Router>

```

Ctrl+F6 to exit CLI focus   

Top

**Router2**

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

Router con0 is now available

Press RETURN to get started.

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitethernet 0/0
Router(config-if)#ipv6 address 2005::1/64
Router(config-if)#ipv6 rip a enable
Router(config-if)#no shutdown

Router(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

Router>

```

Ctrl+F6 to exit CLI focus   

Top

**Ping PC1 with Server0**

```
Packet Tracer PC Command Line 1.0
C:\>ping 2006::2

Pinging 2006::2 with 32 bytes of data:

Reply from 2001::1: Destination host unreachable.

Ping statistics for 2006::2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 2005::2

Pinging 2005::2 with 32 bytes of data:

Reply from 2005::2: bytes=32 time=2ms TTL=125
Reply from 2005::2: bytes=32 time=2ms TTL=125
Reply from 2005::2: bytes=32 time=2ms TTL=125
Reply from 2005::2: bytes=32 time=3ms TTL=125

Ping statistics for 2005::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>
```

**Ping Server0 with PC0**

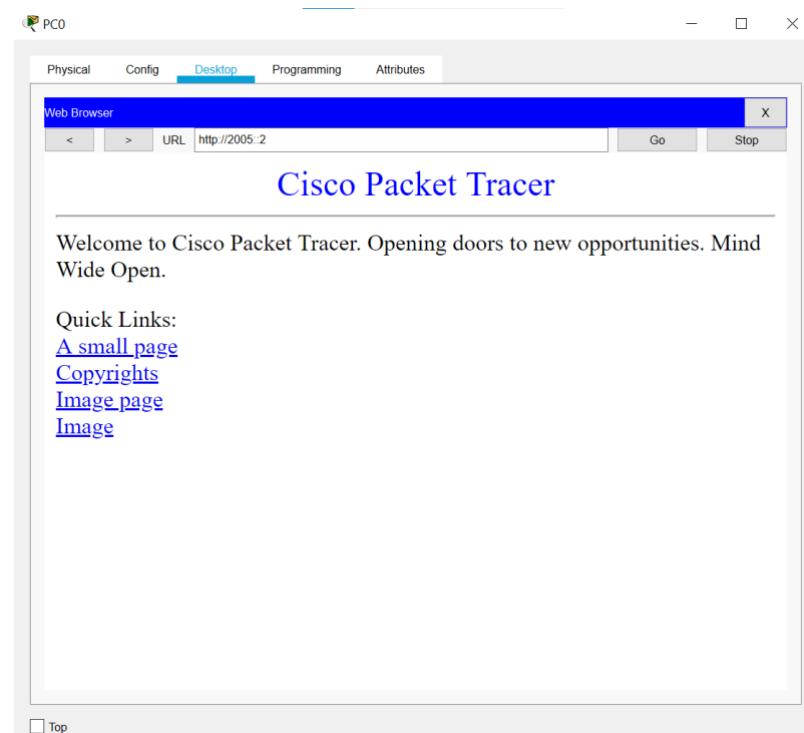
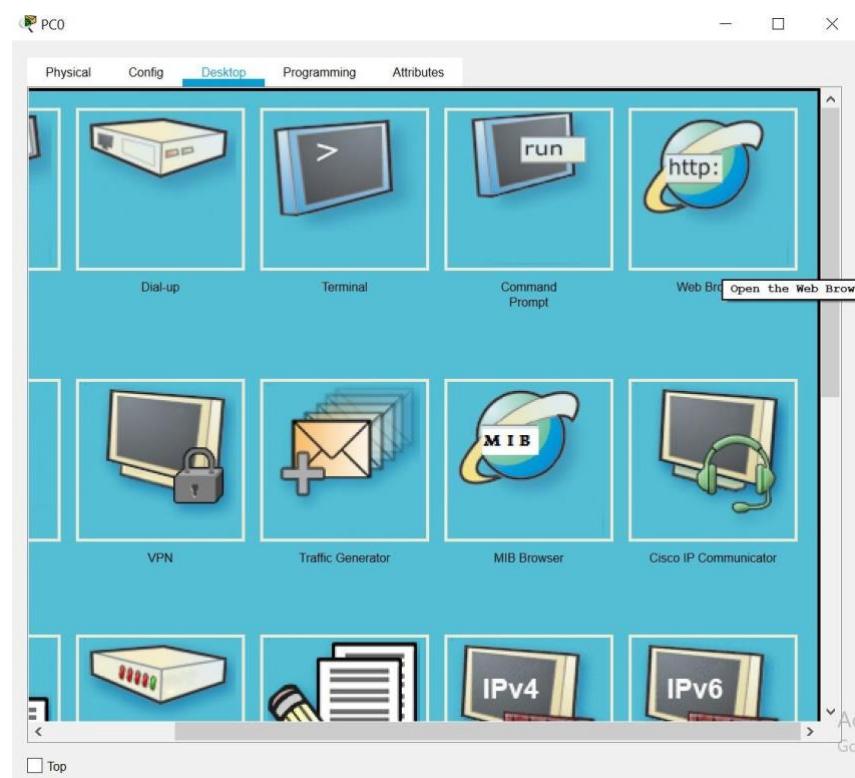
```
Packet Tracer SERVER Command Line 1.0
C:\>ping 2002::2

Pinging 2002::2 with 32 bytes of data:

Reply from 2002::2: bytes=32 time=2ms TTL=125
Reply from 2002::2: bytes=32 time=8ms TTL=125
Reply from 2002::2: bytes=32 time=2ms TTL=125
Reply from 2002::2: bytes=32 time=2ms TTL=125

Ping statistics for 2002::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 8ms, Average = 3ms

C:\>
```

**Check ACL in Browser of PC0**

**Deny ACL from Router0**

The screenshot shows the Router0 CLI interface. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. The main window title is 'IOS Command Line Interface'. It displays the following configuration commands:

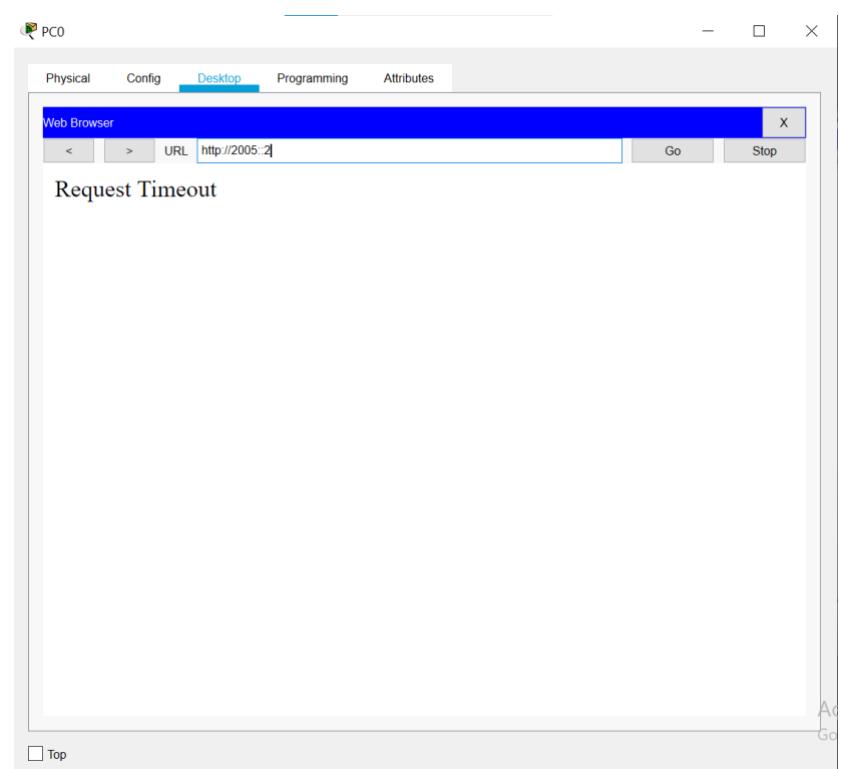
```
Press RETURN to get started.

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

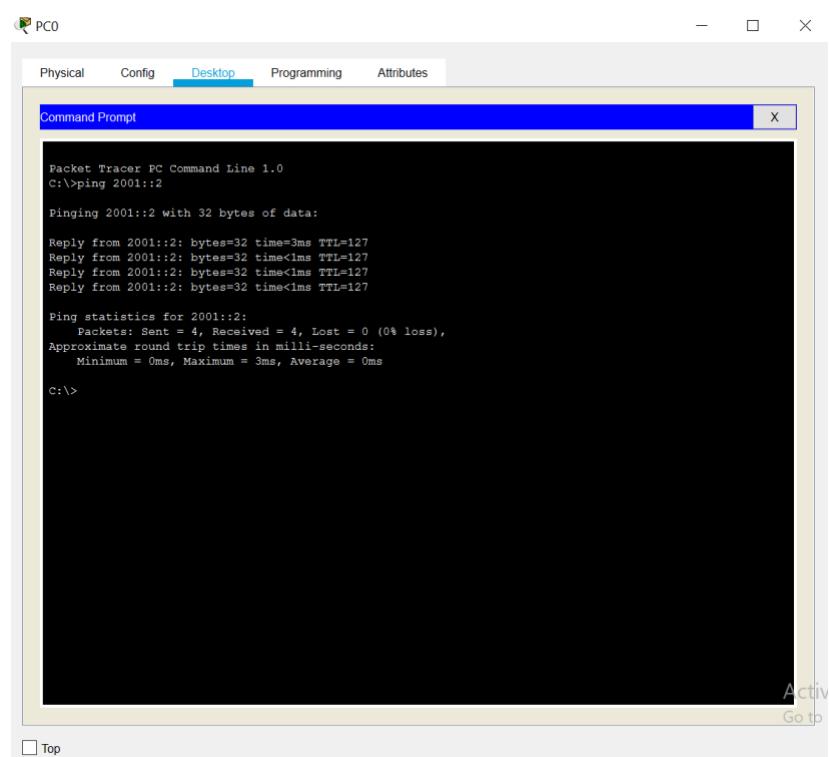
Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ipv6 access-list smile
Router(config-ipv6-acl)#deny tcp any host 2005::2 eq www
Router(config-ipv6-acl)#deny tcp any host 2005::2 eq 443
Router(config-ipv6-acl)#ipv6 permit any any
^
% Invalid input detected at '^' marker.

Router(config-ipv6-acl)#exit
Router(config)#interface serial 0/1/1
Router(config-if)#ipv6 traffic-filter smile out
Router(config-if)#exit
Router(config)#
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons. A status bar at the bottom left says 'Ctrl+F6 to exit CLI focus'.



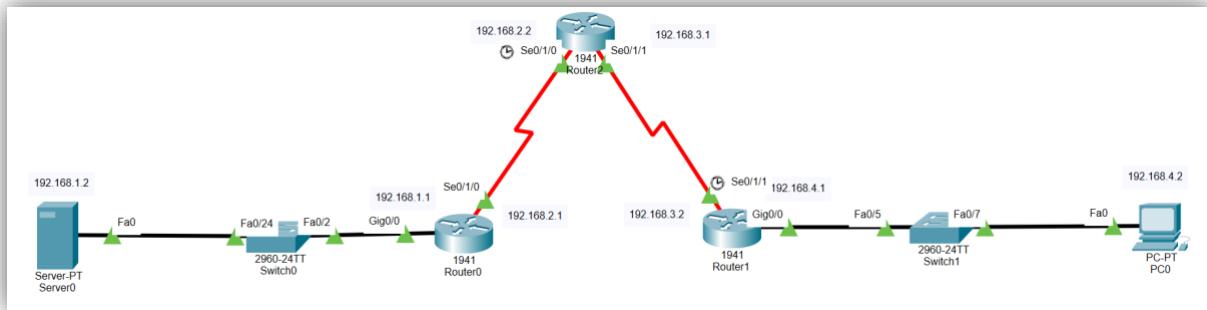
### Ping PC0 with PC1



## Practical 6

### Configuring a Zone Based Policy Firewall

#### Topology

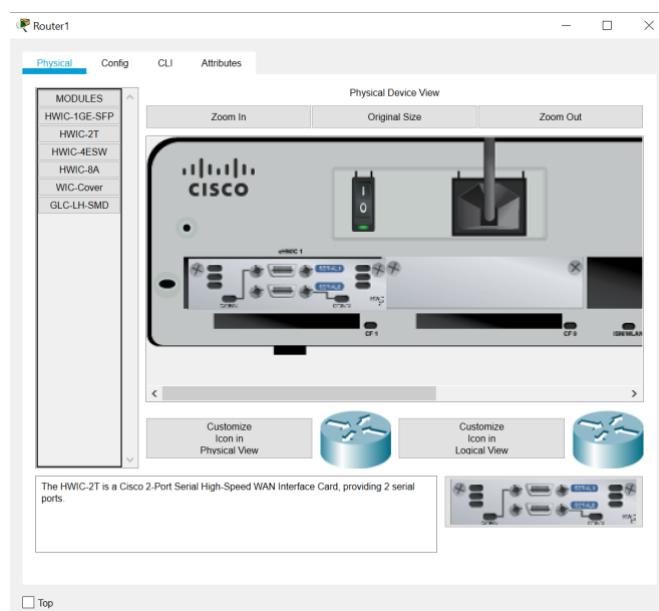
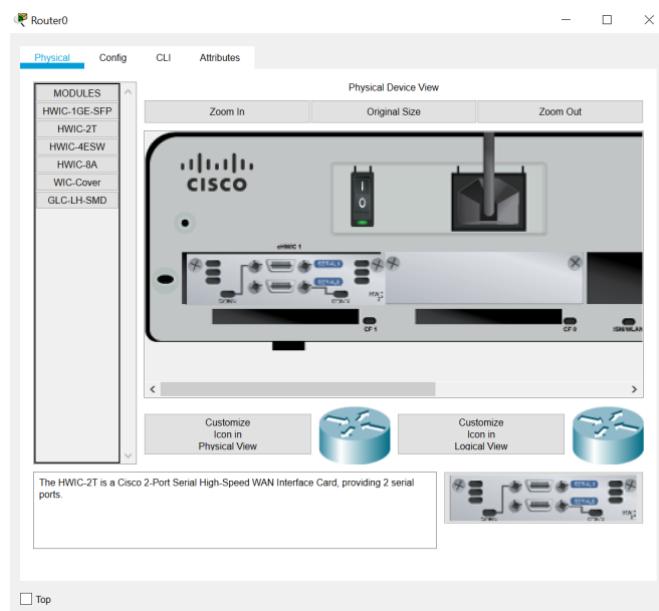


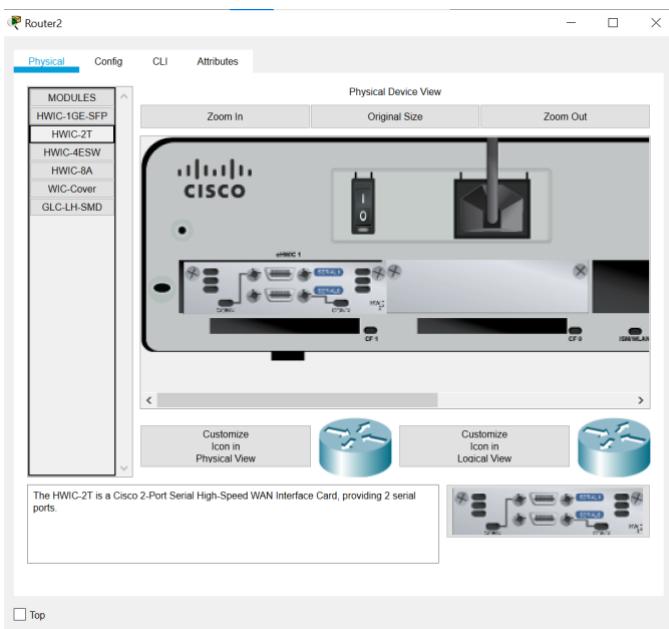
#### Addressing Table

Sr No.	Devices Sequences	Name	IP Address	Subnet Mask	Default Gateway
1	Server-PT	Server0	192.168.1.2	255.255.255.0	192.168.1.1
2	2960-24TT Switch	Switch0	-	-	-
3	1941 Router	Router0	Gig0/0 – 192.168.1.1 Se0/1/0 – 192.168.2.1 (Port Status On)	Gig0/0 – 255.255.255.0 Se0/1/0 – 255.255.255.0	-
4	1941 Router	Router2	Se0/1/0 – 192.168.2.2 Se0/1/1 – 192.168.3.1 (Port Status On)	Se0/1/0 – 255.255.255.0 Se0/1/1 – 255.255.255.0	-
5	1941 Router	Router1	Se0/1/1 – 192.168.3.2 Gig0/0 – 192.168.4.1 (Port Status On)	Se0/1/1 – 255.255.255.0 Gig0/0 – 255.255.255.0	-
6	2960-24TT Switch	Switch1	-	-	-
7	PC-PT	PC0	192.168.4.2	255.255.255.0	192.168.4.1

**Part 1 : Static Routing ✓**  
**Part 2 : Configuring SSH on Router 2**  
**Part 3 : Create Firewall Zones on Router 1**  
**Part 4 : Testing the Functionality of Firewall**

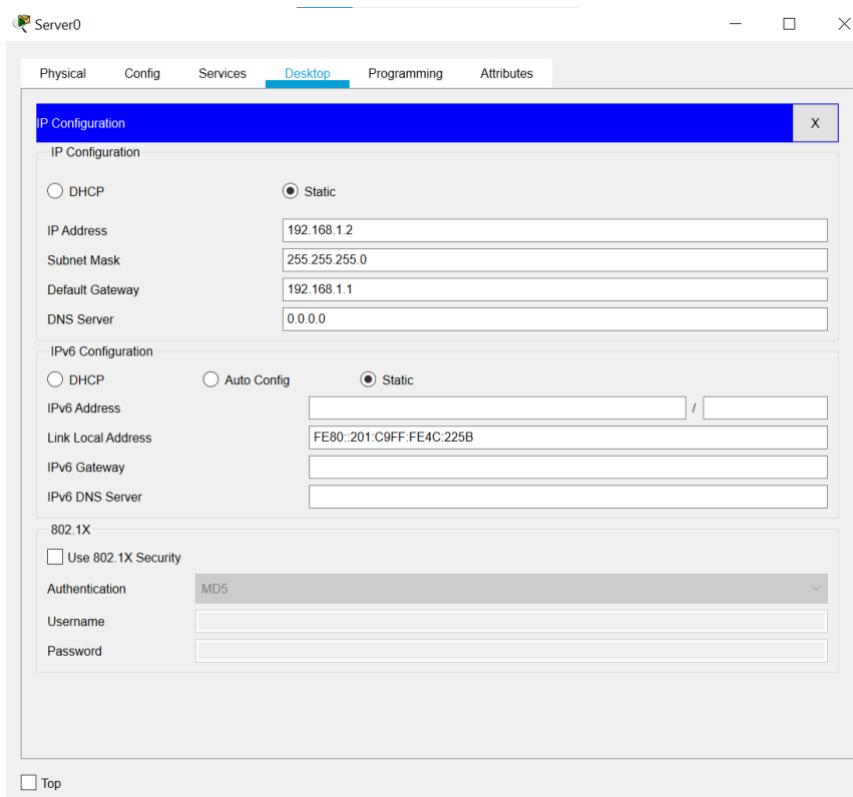
## Serial Port in All 3 Routers HWIC-2T

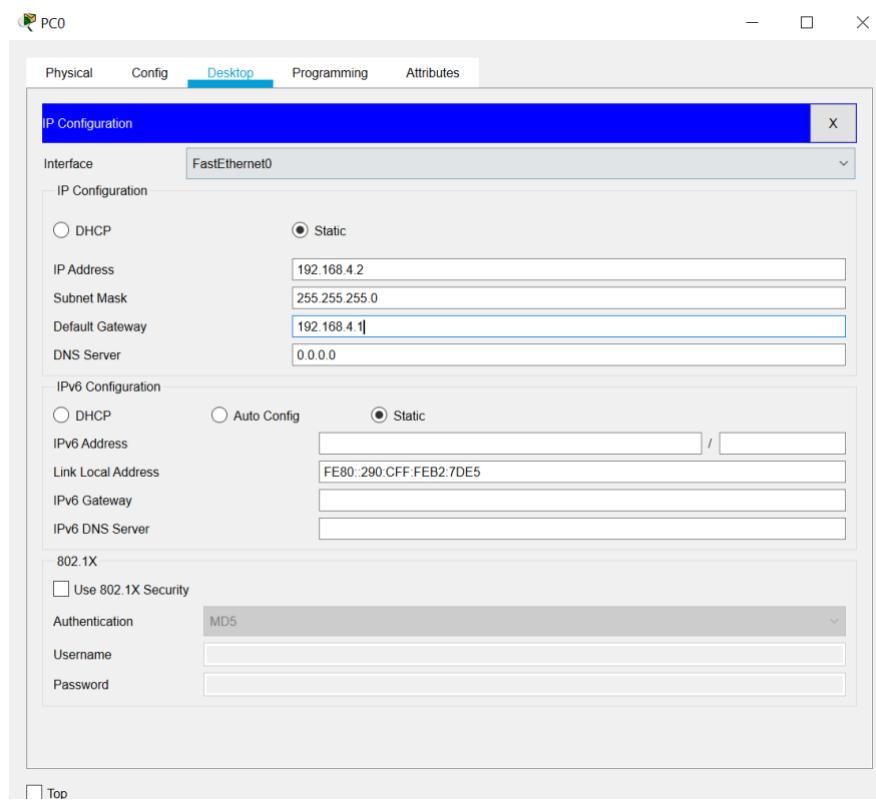




## Configure Server0 and PC0

### Server0



**PC0**

## Router0 Configurations

### Gig0/0

**GigabitEthernet0/0 Configuration:**

- Port Status: On
- Bandwidth: 1000 Mbps
- Duplex: Half Duplex
- MAC Address: 0060.7044.4001
- IP Configuration:
  - IP Address: 192.168.1.1
  - Subnet Mask: 255.255.255.0
- Tx Ring Limit: 10

**Equivalent IOS Commands:**

```

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(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
  
```

Top

### Se0/1/0

**Serial0/1/0 Configuration:**

- Port Status: On
- Duplex: Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IP Address: 192.168.2.1
  - Subnet Mask: 255.255.255.0
- Tx Ring Limit: 10

**Equivalent IOS Commands:**

```

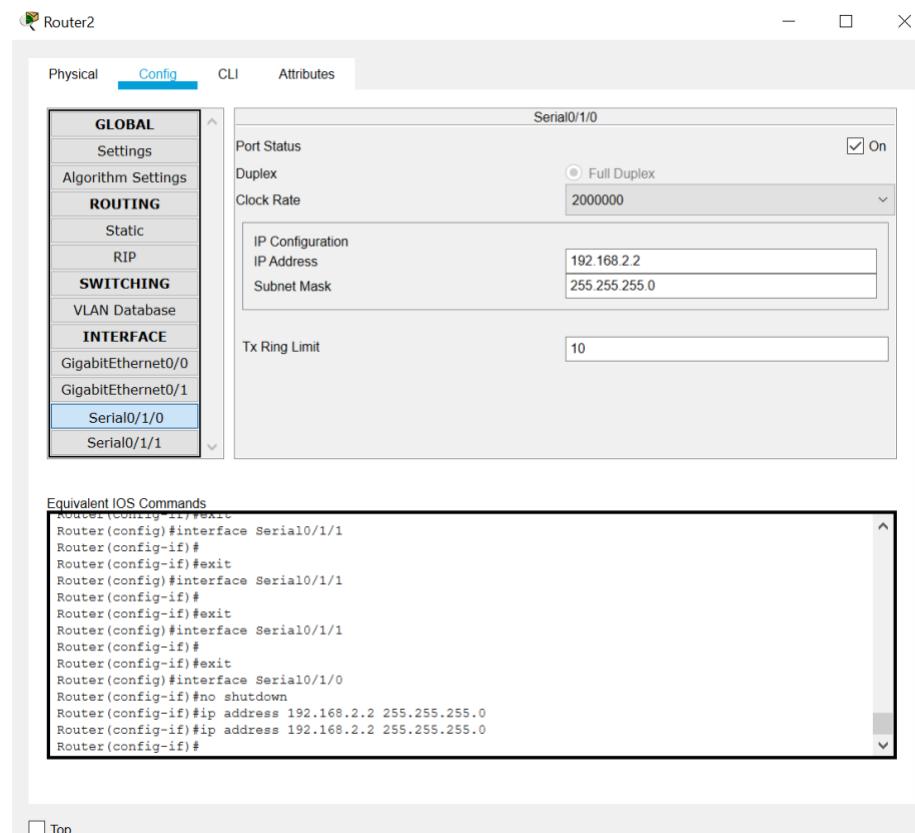
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
ip address 192.168.2.1 255.255.255.0
Router(config-if)#
  
```

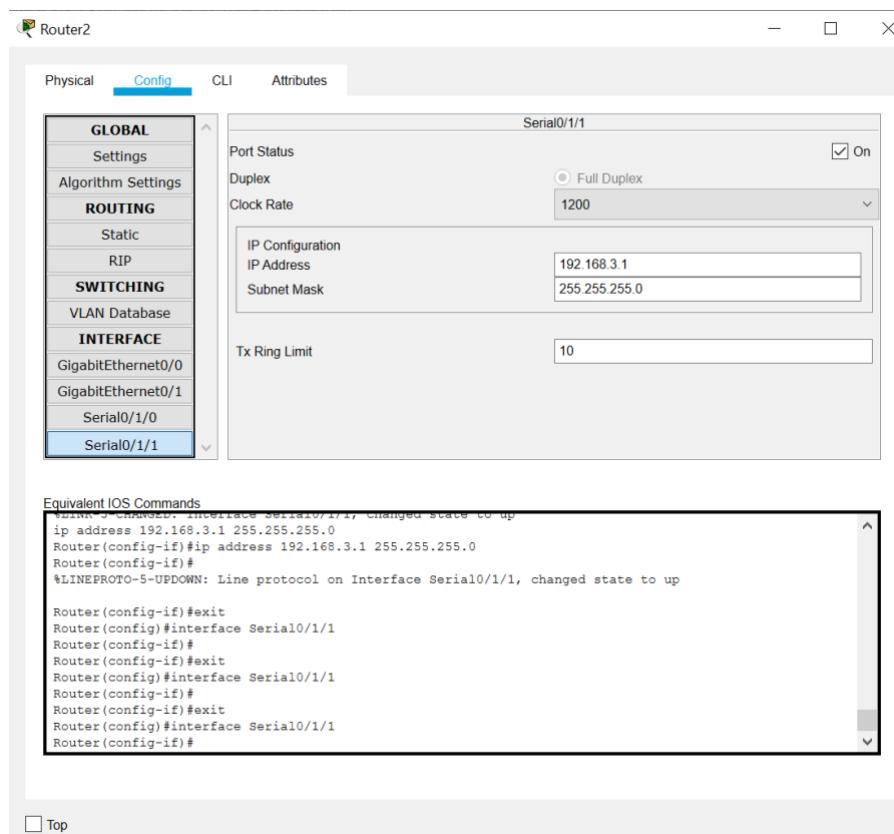
Top

## Router2 Configurations

### Se0/1/0



### Se0/1/1



## Router1 Configurations

### Se0/1/1

**Equivalent IOS Commands**

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ip address 192.168.4.1 255.255.255.0
Router(config-if)#ip address 192.168.4.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown
Router(config-if)#ip address 192.168.3.2 255.255.255.0
Router(config-if)#ip address 192.168.3.2 255.255.255.0
Router(config-if)#

```

### Gig0/0

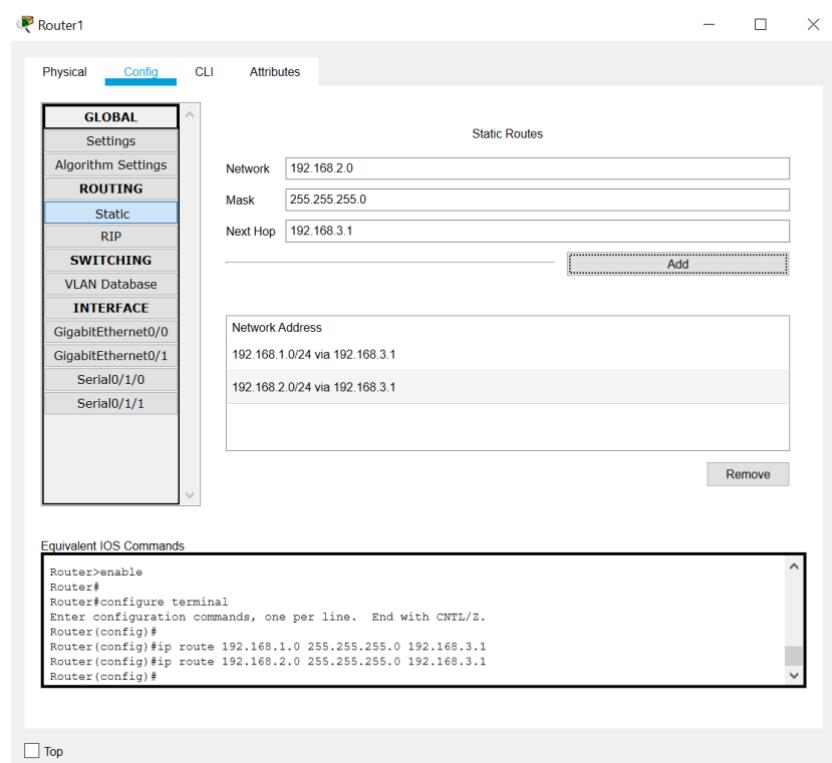
**Equivalent IOS Commands**

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(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
ip address 192.168.4.1 255.255.255.0
Router(config-if)#ip address 192.168.4.1 255.255.255.0
Router(config-if)#

```

## Static Routing



**Router1**

**Config** (selected)

**ROUTING** > **Static**

**Network:** 192.168.2.0  
**Mask:** 255.255.255.0  
**Next Hop:** 192.168.3.1

**Network Address:**  
 192.168.1.0/24 via 192.168.3.1  
 192.168.2.0/24 via 192.168.3.1

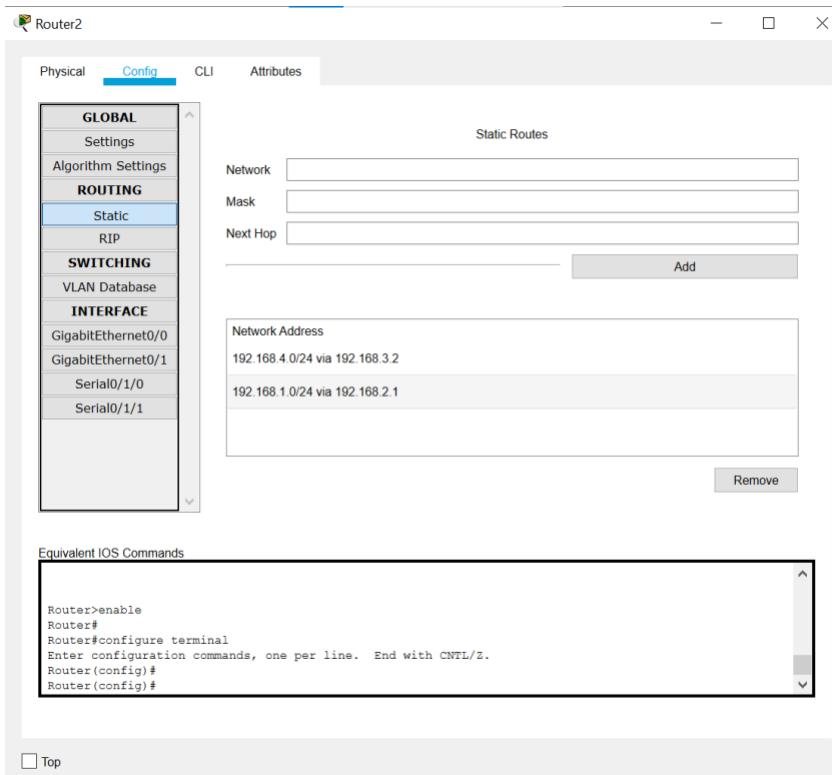
**Add** (button), **Remove** (button)

**Equivalent IOS Commands:**

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ip route 192.168.1.0 255.255.255.0 192.168.3.1
Router(config)#ip route 192.168.2.0 255.255.255.0 192.168.3.1
Router(config)#

```

Top



**Router2**

**Config** (selected)

**ROUTING** > **Static**

**Network:** \_\_\_\_\_  
**Mask:** \_\_\_\_\_  
**Next Hop:** \_\_\_\_\_

**Network Address:**  
 192.168.4.0/24 via 192.168.3.2  
 192.168.1.0/24 via 192.168.2.1

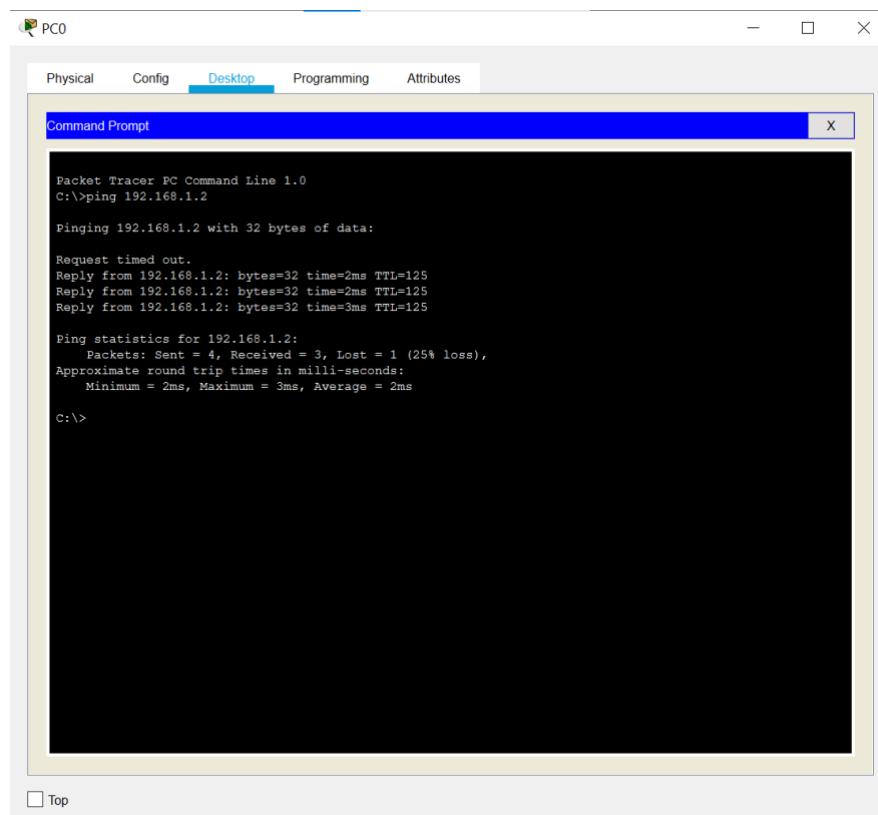
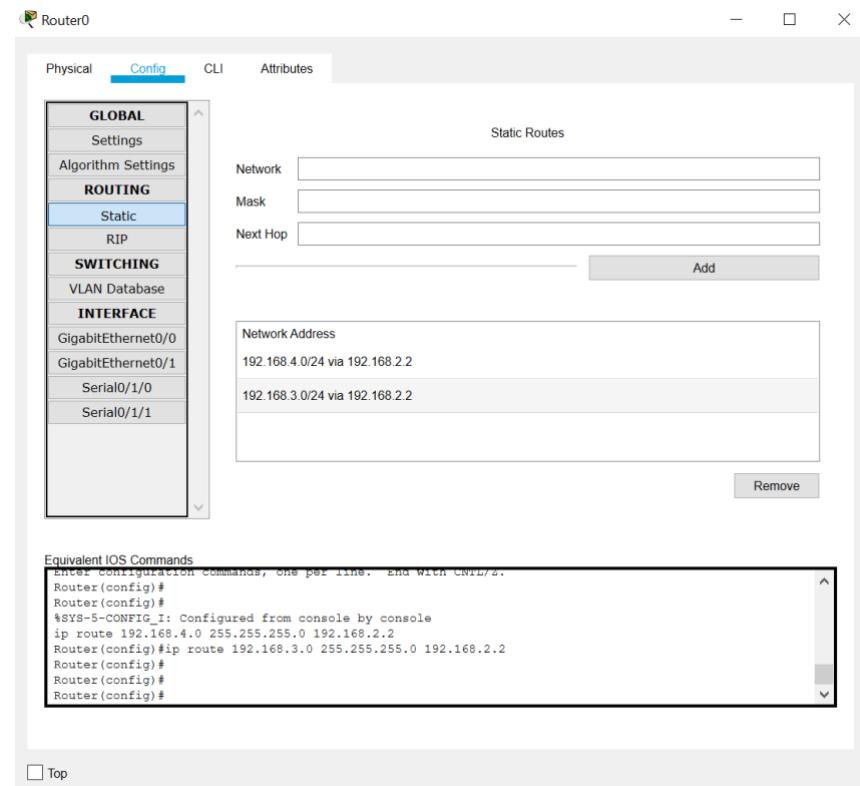
**Add** (button), **Remove** (button)

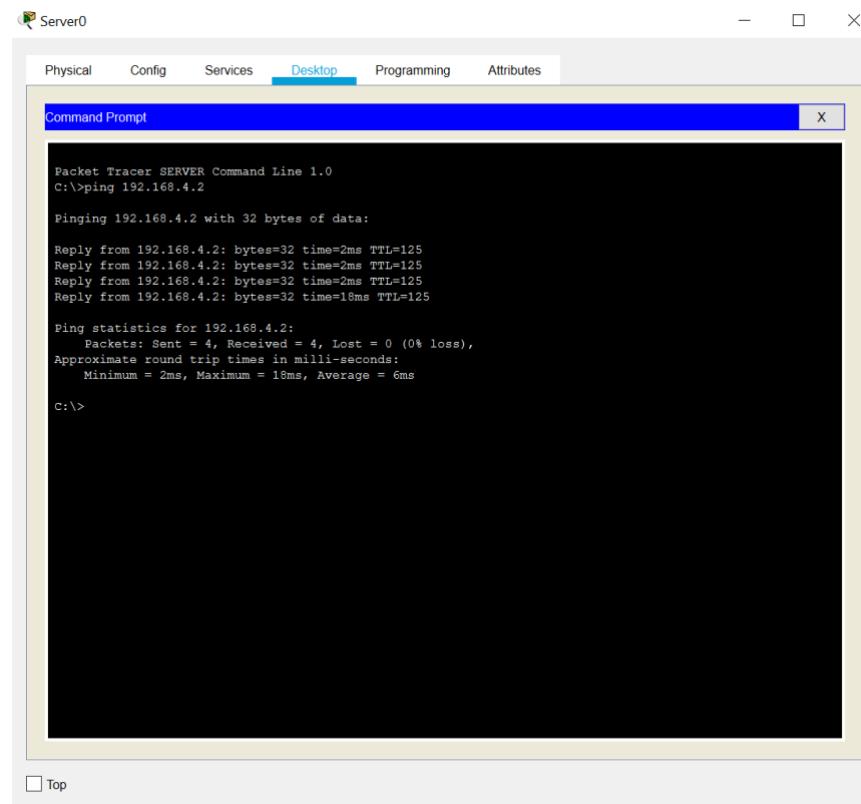
**Equivalent IOS Commands:**

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/z.
Router(config)#
Router(config)#

```

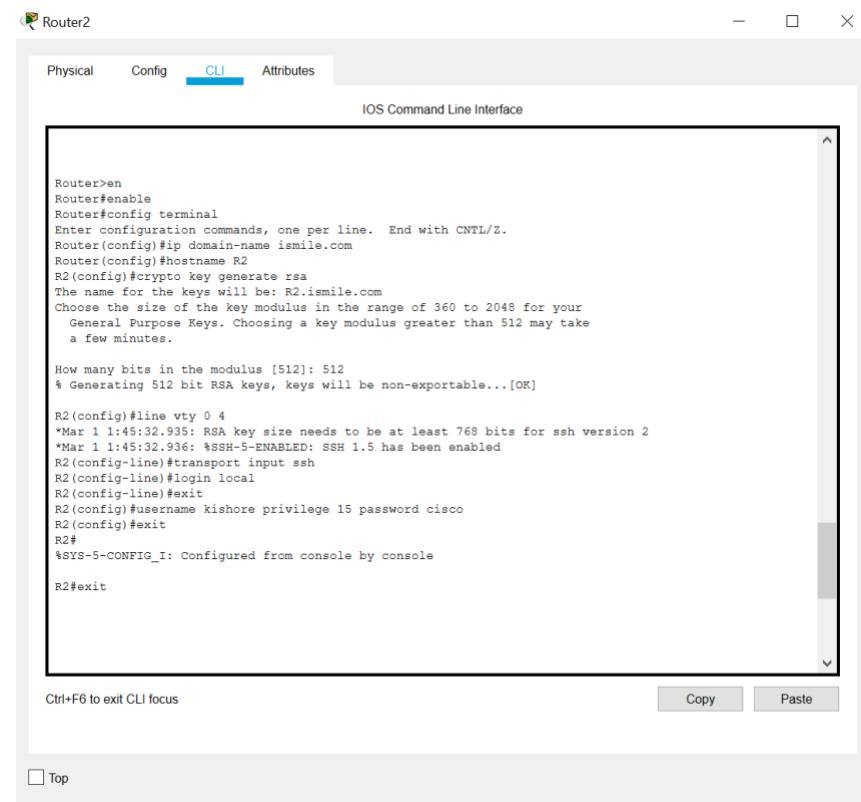
Top





Packet Tracer SERVER Command Line 1.0  
C:\>ping 192.168.4.2  
Pinging 192.168.4.2 with 32 bytes of data:  
Reply from 192.168.4.2: bytes=32 time=2ms TTL=125  
Reply from 192.168.4.2: bytes=32 time=2ms TTL=125  
Reply from 192.168.4.2: bytes=32 time=2ms TTL=125  
Reply from 192.168.4.2: bytes=32 time=18ms TTL=125  
Ping statistics for 192.168.4.2:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 2ms, Maximum = 18ms, Average = 6ms  
C:\>

## Configuring SSH on Routing 2



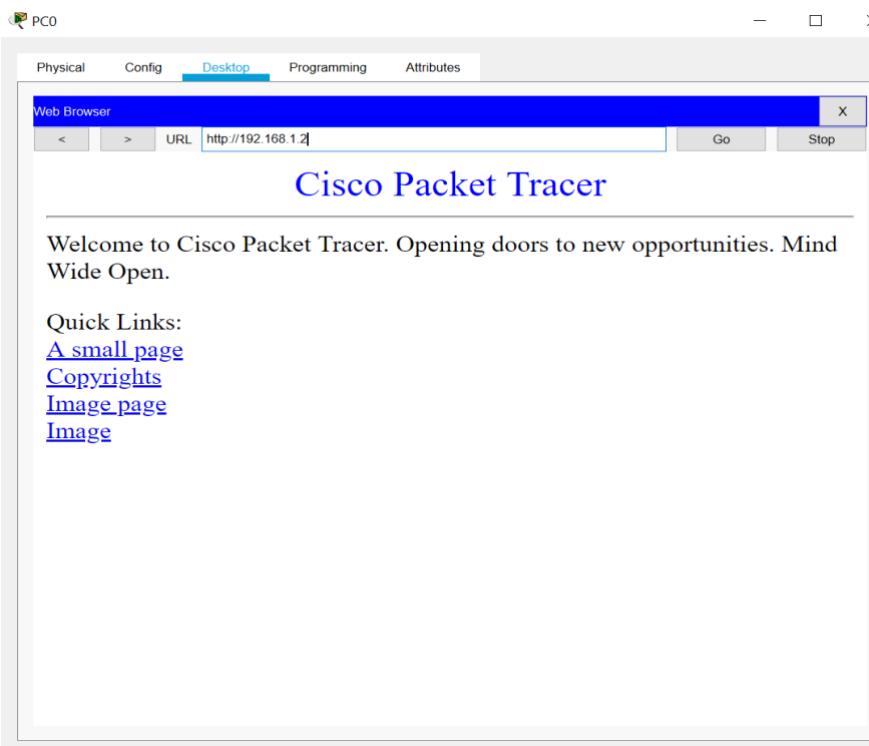
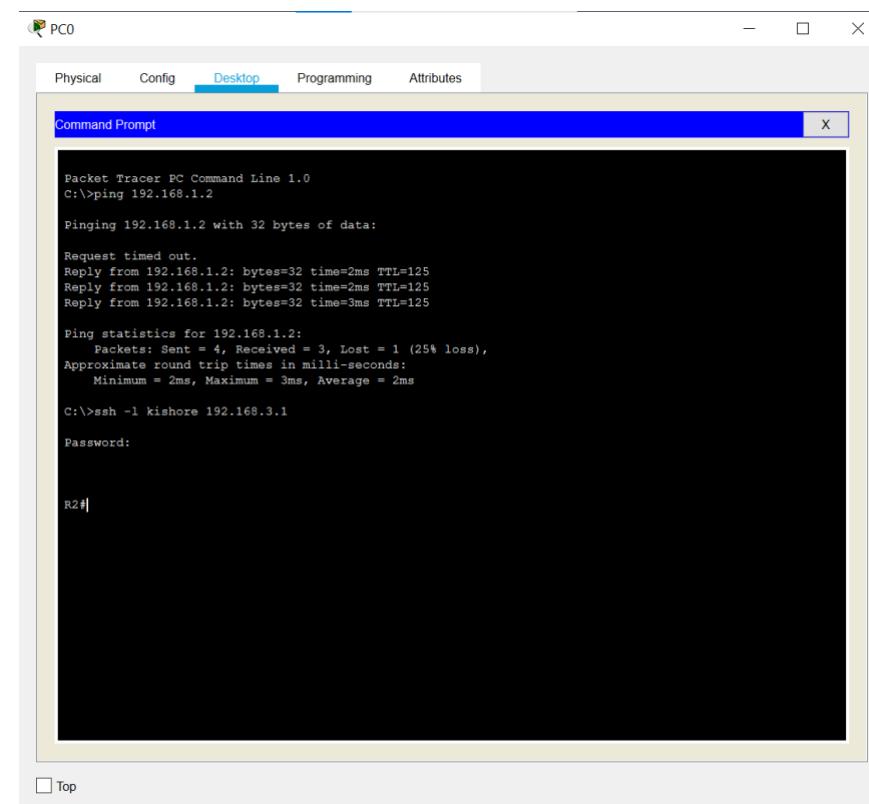
```
Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
router(config)#ip domain-name ismile.com
Router(config)#hostname R2
R2(config)#crypto key generate rsa
The name for the keys will be: R2.ismile.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

R2(config)#line vty 0 4
*Mar 1 1:45:32.935: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 1:45:32.936: %SSH-5-ENABLED: SSH 1.5 has been enabled
R2(config-line)#transport input ssh
R2(config-line)#login local
R2(config-line)#exit
R2(config)#username kishore privilege 15 password cisco
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console
R2#exit

Ctrl+F6 to exit CLI focus
```

Top



**Create the firewall zones on Router1**

The screenshot shows a window titled "Router1" with a tab bar at the top containing "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Below the tab bar is a header "IOS Command Line Interface". The main area of the window displays the output of a "show version" command. The output includes the following information:

```
Router>en
Router#enable
Router#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 2 hours, 5 minutes, 33 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wlc/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
--More-- |
```

At the bottom left of the CLI window, there is a message "Ctrl+F6 to exit CLI focus". On the right side, there are two buttons: "Copy" and "Paste". At the very bottom of the window, there is a "Top" button.

**Router1**

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router>en
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#license boot module c1900 terminal-package securityk5
^
% Invalid input detected at '^' marker.

Router(config)#license boot module c1900 technology-package securityk5
^
% Invalid input detected at '^' marker.

Router(config)#license boot module c1900 technology-package securityks
^
% Invalid input detected at '^' marker.

Router(config)#license boot module c1900 technology-package security
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
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of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN\_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
together with any supplements relating to such product feature. The

```

Ctrl+F6 to exit CLI focus

**Copy** **Paste**

Top

**Router1**

Physical Config **CLI** Attributes

IOS Command Line Interface

```

ACCEPT? [yes/no]: y
% use 'write' command to make license boot config take effect on next boot

Router(config)#: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = C1900 Next reboot
level = securityk9 and License = securityk9

Router(config)#relo
^
% Invalid input detected at '^' marker.

Router(config)#reload
^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#reload
System configuration has been modified. Save? [yes/no]:y
Building configuration...
[OK]
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with ECC disabled

 Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0x1b340
program load complete, entry point: 0x80803000, size: 0x1b340

```

Ctrl+F6 to exit CLI focus

**Copy** **Paste**

Top

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
ios image load test
Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
#####
Smart Init is enabled
smart init is sizing iomem
    TYPE      MEMORY_REQ
    HWIC Slot 1  0x00200000  Onboard devices &
    buffer pools 0x01E8F000
-----
    TOTAL: 0x0268F000
Rounded IOMEM up to: 40Mb.
Using 6 percent iomem. [40Mb/512Mb]

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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 Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706

Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thurs 5-Jan-12 15:41 by pt_team
Image text-base: 0x2100F918, data-base: 0x24729040

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
a license to use the product in any manner that complies
with the End User License Agreement (EULA) for the product. The
features and functionality of this product are subject to change
without notice or consultation, and the features described in this
material are not guaranteed to be deployed in all products. The
development of new features and functions may require the
use of a license.
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
http://www.cisco.com/wnl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:
License UDI:
-----
Device# PID SN
-----
*0 CISCO1941/K9 FTX1524E8T2

Technology Package License Information for Module:'c1900'

-----
Technology Technology-package Technology-package
        Current      Type      Next reboot
-----
ipbase     ipbasek9   Permanent   ipbasek9
security   securityk9 Evaluation  securityk9
data       disable     None       None

Configuration register is 0x2102
--More--
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router#
Router#
Router#enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#license boot module c1900 technology-package securityk5
^
% Invalid input detected at '^' marker.

Router(config)#license boot module c1900 technology-package security
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.

Use of this product feature requires an additional license from Cisco,
together with an additional payment. You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EUIKEN\_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
together with any supplements relating to such product feature. The
above applies even if the evaluation license is not automatically
terminated and you do not receive any notice of the expiration of the
evaluation period. It is your responsibility to determine when the
evaluation period is complete and you are required to make payment to
Cisco for your use of the product feature beyond the evaluation period.

Your acceptance of this agreement for the software features on one
product shall be deemed your acceptance with respect to all such

```

Ctrl+F6 to exit CLI focus     

Activate Window  
Go to Settings to act

Top

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router(config)#relo
^
% Invalid input detected at '^' marker.

Router(config)#reload
^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
SYS-5-CONFIG_I: Configured from console by console

Router#reload
System configuration has been modified. Save? [yes/no]:y
Building configuration...
[OK]
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by Cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with ECC disabled

Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0xb340
program load complete, entry point: 0x80803000, size: 0xb340

IOS Image Load Test

Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
#####

```

Ctrl+F6 to exit CLI focus     

Activate Window  
Go to Settings

**Router1**

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router>enable
Router#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 2 minutes, 57 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

**Router1**

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router>
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#zone security in-zone
Router(config-sec-zone)#exit
Router(config)#zone security out-zone
Router(config-sec-zone)#exit
Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip address 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0 0.0.0.255 any
Router(config)#class-map type inspect match-all in-map
Router(config-cmap)#match access-group 101
Router(config-cmap)#exit

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router(config-set-zone)#exit
Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip address 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0 0.0.0.255 any
Router(config)#class-map type inspect match-all in-map
Router(config-cmap)#match access-group 101
Router(config-cmap)#exit
Router(config)#policy-map type inspect in-out
Router(config-pmap)#class type inspect in-map
Router(config-pmap-c)#inspect
%No specific protocol configured in class in-map for inspection. All protocols will be inspected
Router(config-pmap-c)#exit
Router(config-pmap)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Activate Windows  
Go to Settings to activate Windows

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router(config)#access-list 101 permit ip address 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0.0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config)#access-list 101 permit ip 192.168.4.0 0.0.0.255 any
Router(config)#class-map type inspect match-all in-map
Router(config-cmap)#match access-group 101
Router(config-cmap)#exit
Router(config)#policy-map type inspect in-out
Router(config-pmap)#class type inspect in-map
Router(config-pmap-c)#inspect
%No specific protocol configured in class in-map for inspection. All protocols will be inspected
Router(config-pmap-c)#exit
Router(config-pmap)#zone-pair security in-out-zone source in-zone destination out-zone
Router(config-sec-zone-pair)#security-policy type inspect in-out
^
% Invalid input detected at '^' marker.

Router(config-sec-zone-pair)#service-policy type inspect in-out
Router(config-sec-zone-pair)#exit
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#zone-member security in-zone
Router(config-if)#exit
Router(config)#interface serial 0/1/1
Router(config-if)#zone-member security out-zone
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Activ  
Go to

Top

The screenshot shows a Windows-style application window titled "Router1". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following text:

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

Router con0 is now available

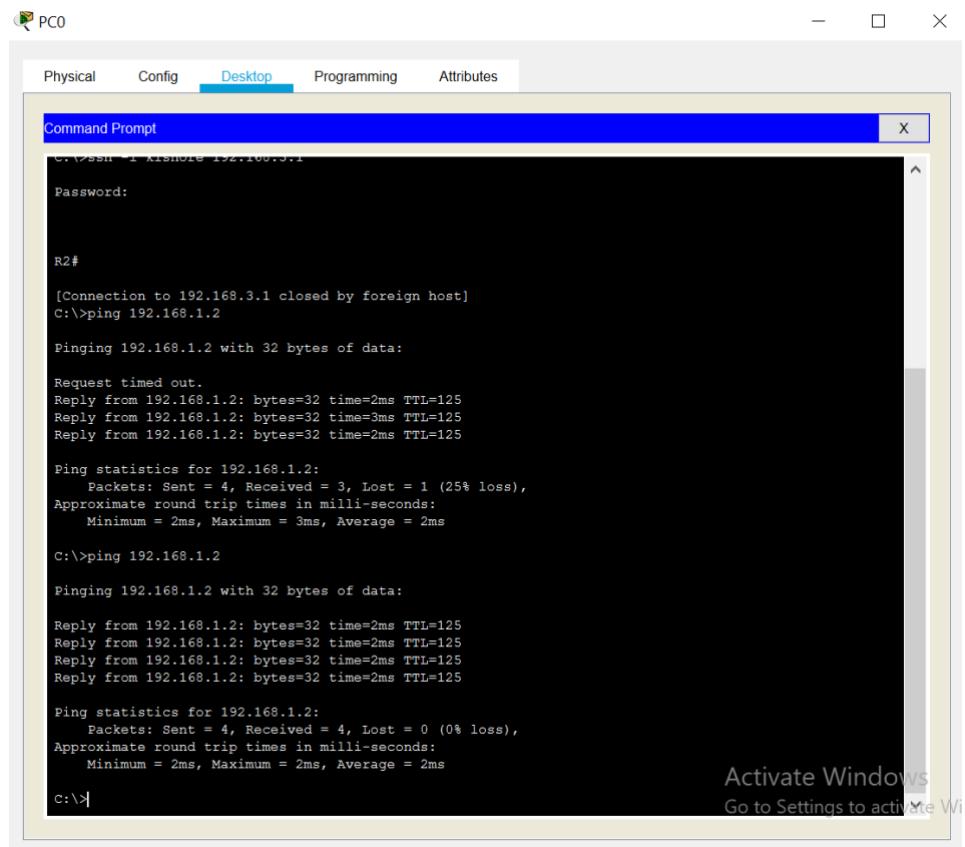
Press RETURN to get started.
```

At the bottom of the window, there are several status messages and buttons:

- "Ctrl+F6 to exit CLI focus"
- "Copy" and "Paste" buttons
- "Activate Windows" message: "Go to Settings to activate Windows"
- "Top" checkbox

## Testing the firewall functionality (from in-zone to out-zone)

**We ping the server from PC**



```

C:\>ssh -l kishore 192.168.3.1
Password:
R2#
[Connection to 192.168.3.1 closed by foreign host]
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125
Reply from 192.168.1.2: bytes=32 time=3ms TTL=125
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

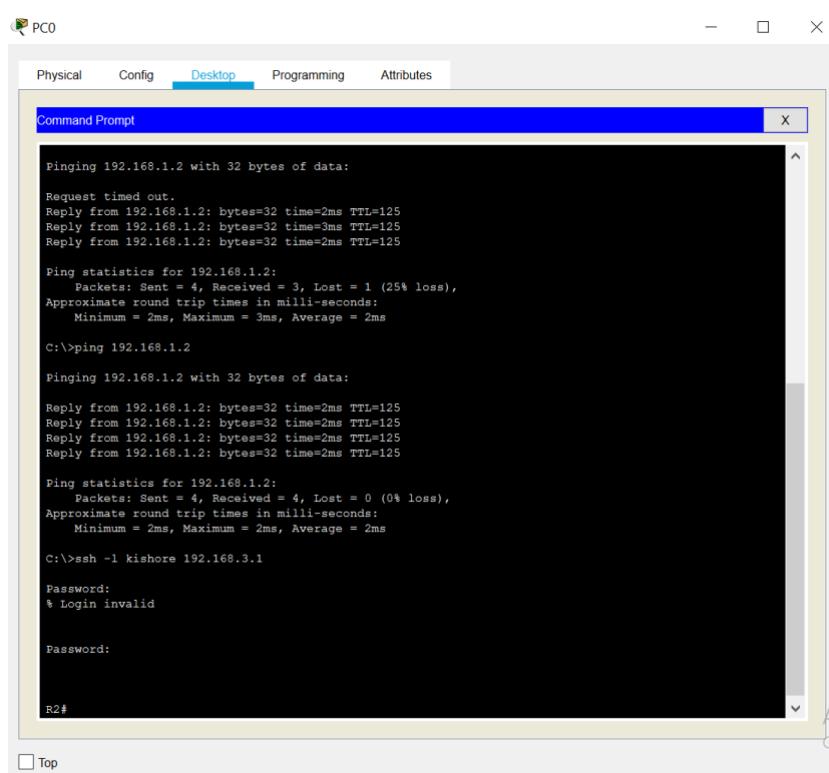
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\>

```

**The ping was successful now we open a SSH connection from PC to Router 2**



```

C:\>ping 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125
Reply from 192.168.1.2: bytes=32 time=3ms TTL=125
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\>ssh -l kishore 192.168.3.1
Password:
% Login invalid

Password:
R2#

```

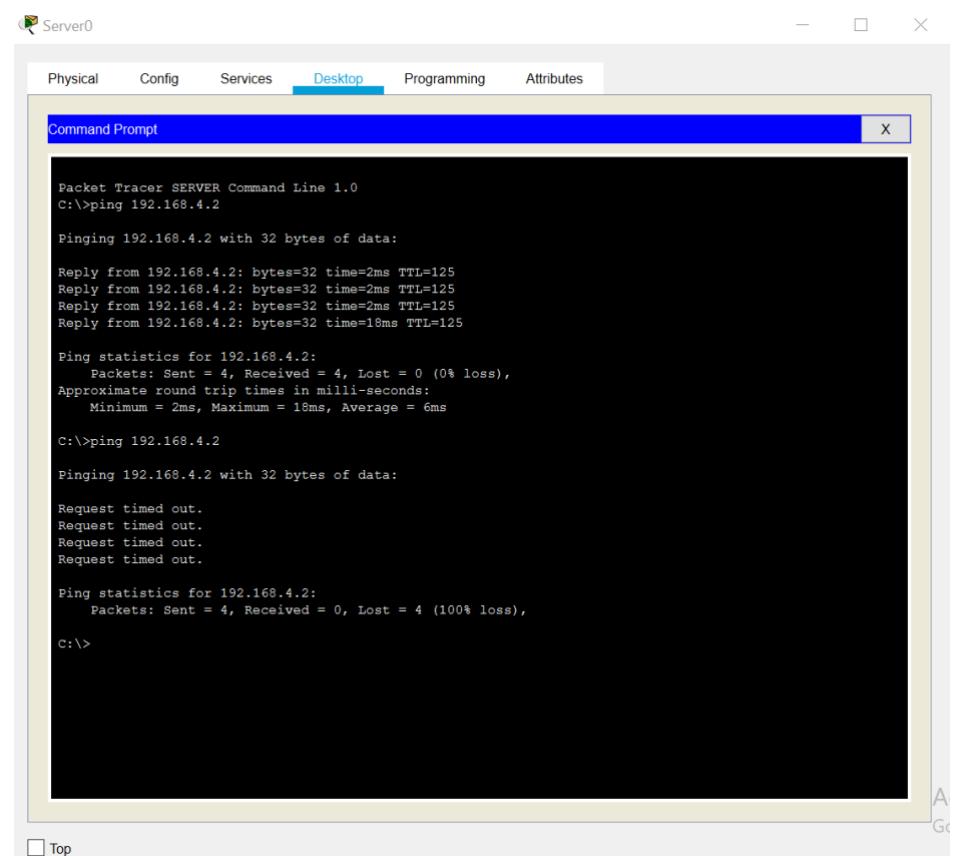
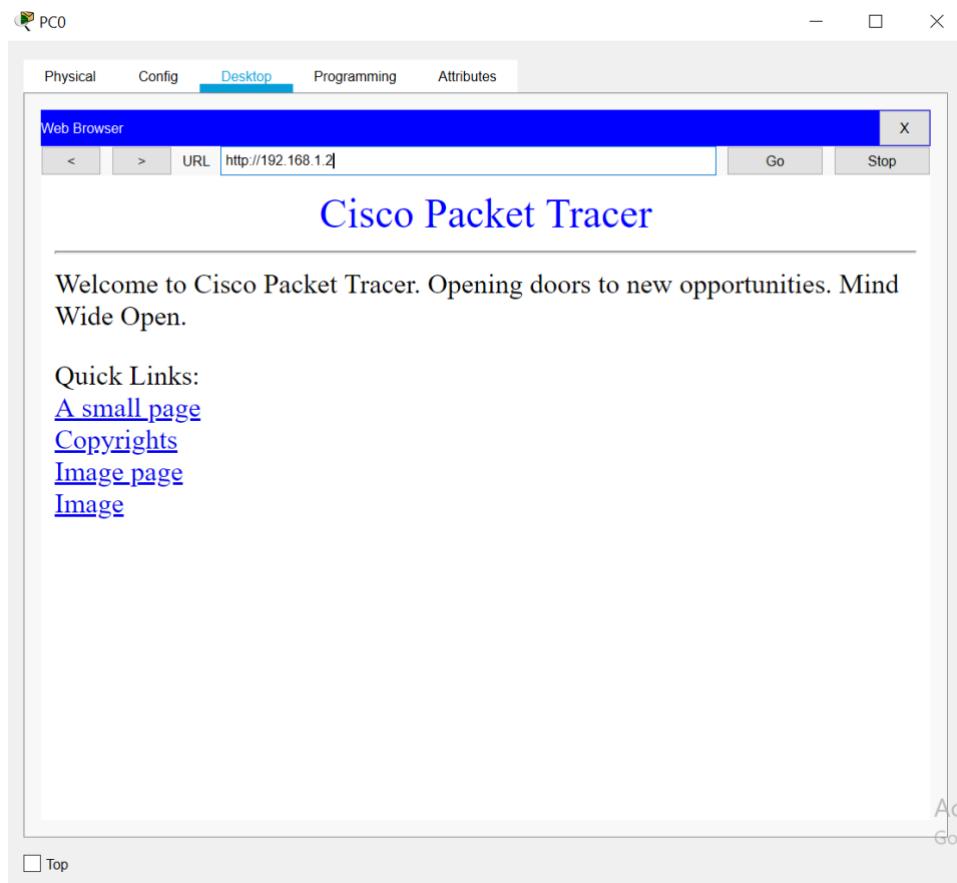
**Now we type the following command in the CLI mode of Router 1**

The screenshot shows a Windows application window titled "Router1" with the tab "CLI" selected. The main area is labeled "IOS Command Line Interface". It displays the following output of a command:

```
Router>enable
Router#show policy-map type inspect zone-pair sessions
policy exists on zp in-out-zone
Zone-pair: in-out-zone
  Service-policy inspect : in-out
    Class-map: in-map (match-all)
      Match: access-group 101
      Inspect
      Number of Established Sessions = 1
      Established Sessions
        Session 320461440 (192.168.4.2:1031)=>(192.168.3.1:22) tcp SIS_OPEN/TCP_ESTAB
          Created 00:07:25, Last heard 00:07:14
          Bytes sent (initiator:responder) [2281:1573]
        Class-map: class-default (match-any)
          Match: any
          Drop (default action)
            0 packets, 0 bytes
Router#
```

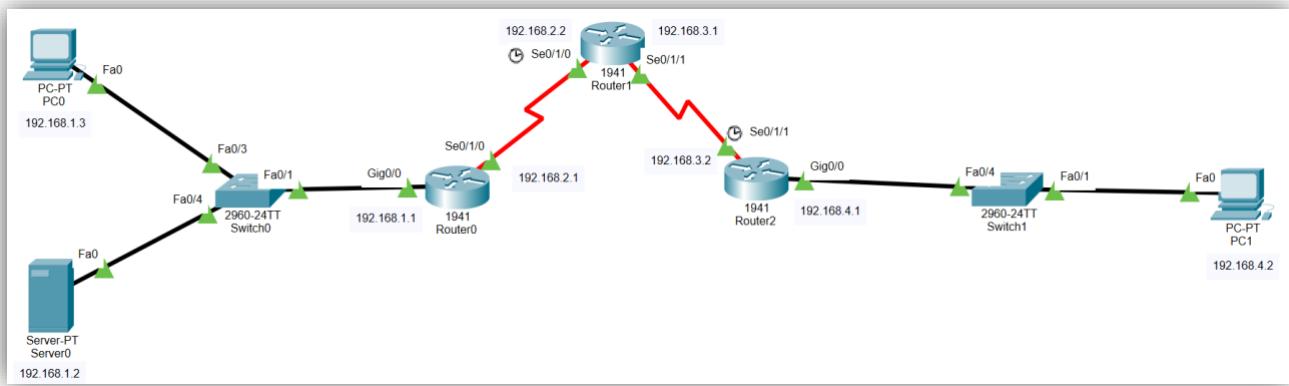
At the bottom of the window, there are buttons for "Copy" and "Paste". A watermark for "Activate Windows" is visible.

**It shows one session is established  
Next we access the web service of  
Server from the PC**



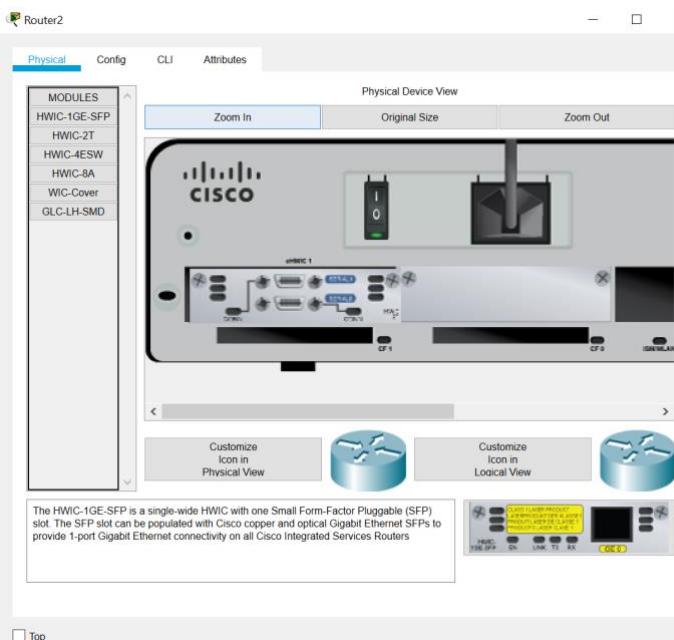
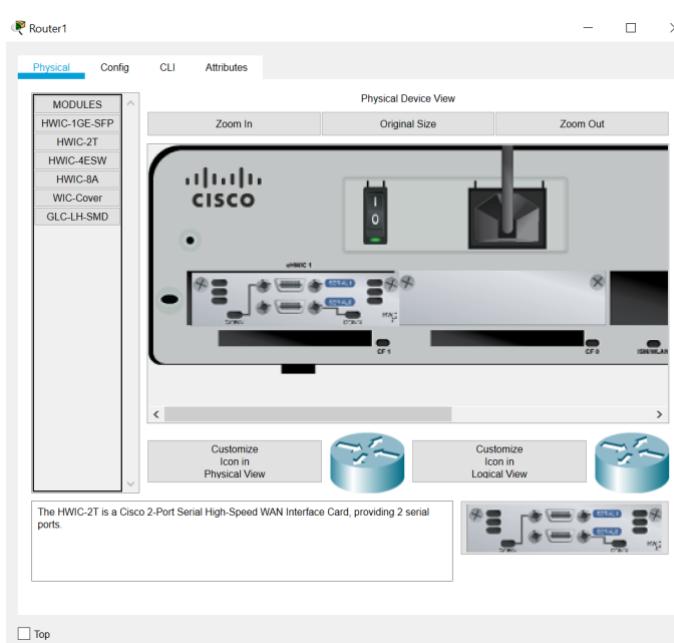
### Practical 7 – Configure IOS Intrusion Prevention System

#### Topology

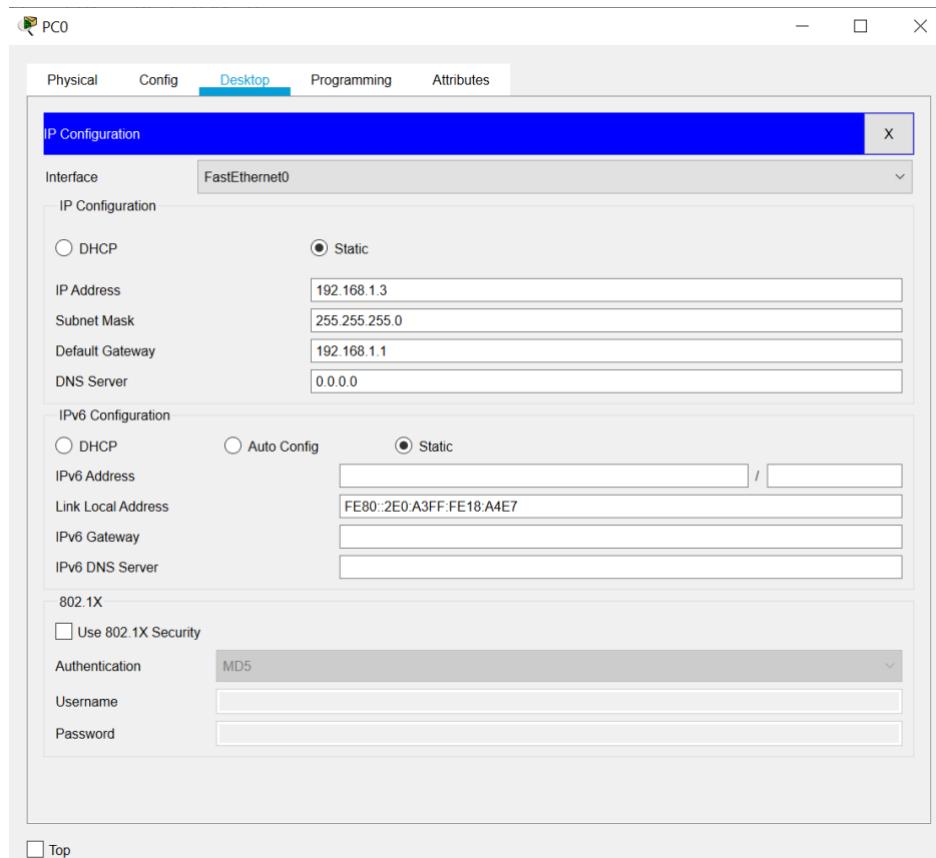


#### Addressing Table:

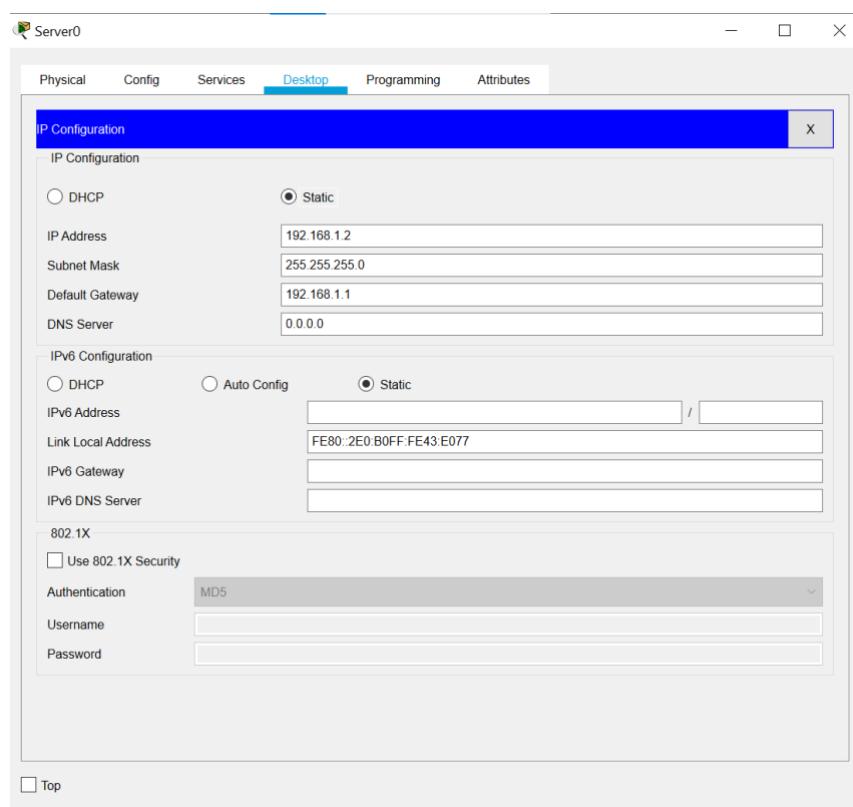
Sr No.	Devices Sequences	Name	IP Address	Subnet Mask	Default Gateway	RIP
1	PC-PT	PC0	192.168.1.3	255.255.255.0	192.168.1.1	-
2	Server-PT	Server0	192.168.1.2	255.255.255.0	192.168.1.1	-
3	2960-24TT Switch	Switch0	-	-	-	-
4	1941 Router	Router0	(Port ON Status) Gig 0/0 - 192.168.1.1 Se0/1/0 - 192.168.2.1	255.255.255.0 255.255.255.0	-	Adding Network 192.168.1.0 192.168.2.0
5	1941 Router	Router1	(Port ON Status) Se0/1/0 - 192.168.2.2 Se0/1/1 - 192.168.3.1	255.255.255.0 255.255.255.0	-	192.168.2.0 192.168.3.0
6	1941 Router	Router2	(Port ON Status) Se0/1/1 - 192.168.3.2 Gig 0/0 - 192.168.4.1	255.255.255.0 255.255.255.0		192.168.3.0 192.168.4.0
7	2960-24TT Switch	Switch1	-	-	-	-
8	PC-PT	PC1	192.168.4.2	255.255.255.0	192.168.4.1	-



## Configure PC0

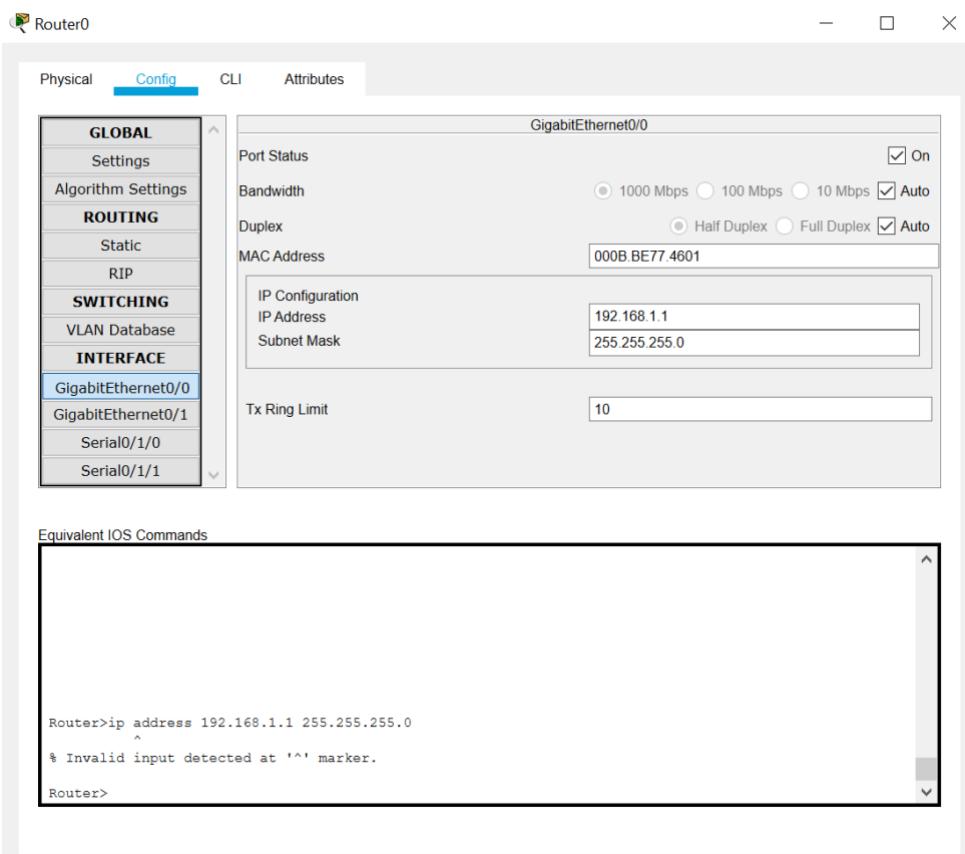


## Configure Server0



## Adding Configurations in Router0

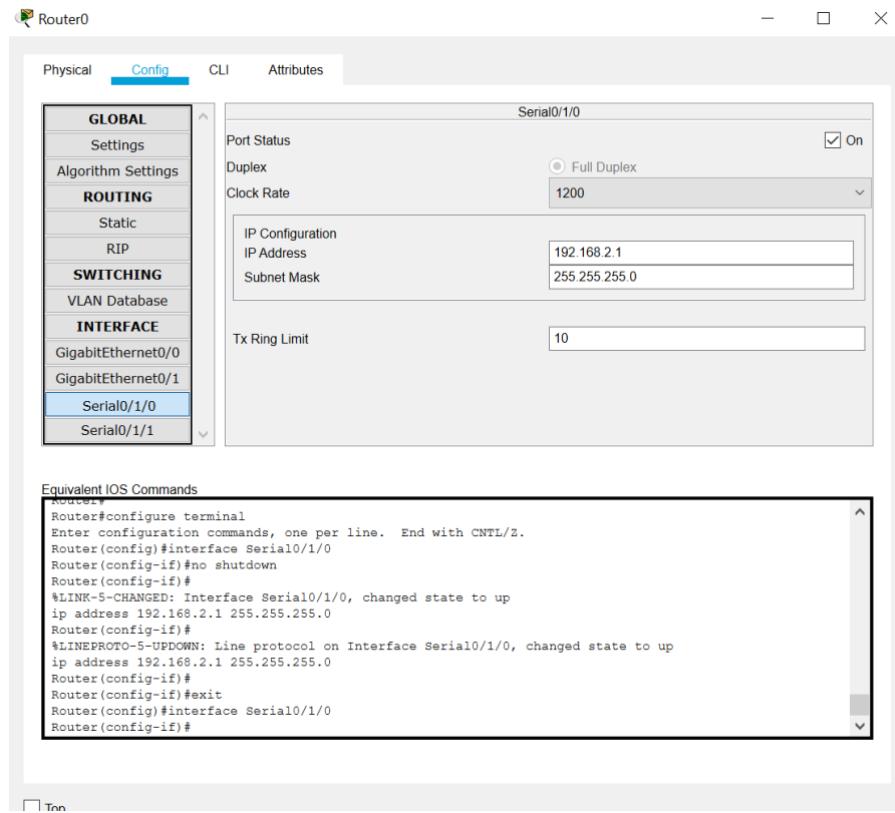
### Gig 0/0



The screenshot shows the Router0 configuration interface with the 'Config' tab selected. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING, VLAN Database, and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The 'GigabitEthernet0/0' option is currently selected. The main panel displays the configuration for GigabitEthernet0/0, including Port Status (On), Bandwidth (1000 Mbps selected), Duplex (Half Duplex selected), MAC Address (000B BE77.4601), IP Configuration (IP Address: 192.168.1.1, Subnet Mask: 255.255.255.0), and Tx Ring Limit (10). Below this, a section titled 'Equivalent IOS Commands' contains the following command:

```
Router>ip address 192.168.1.1 255.255.255.0
^
% Invalid input detected at '^' marker.
```

### Serial 0/1/0



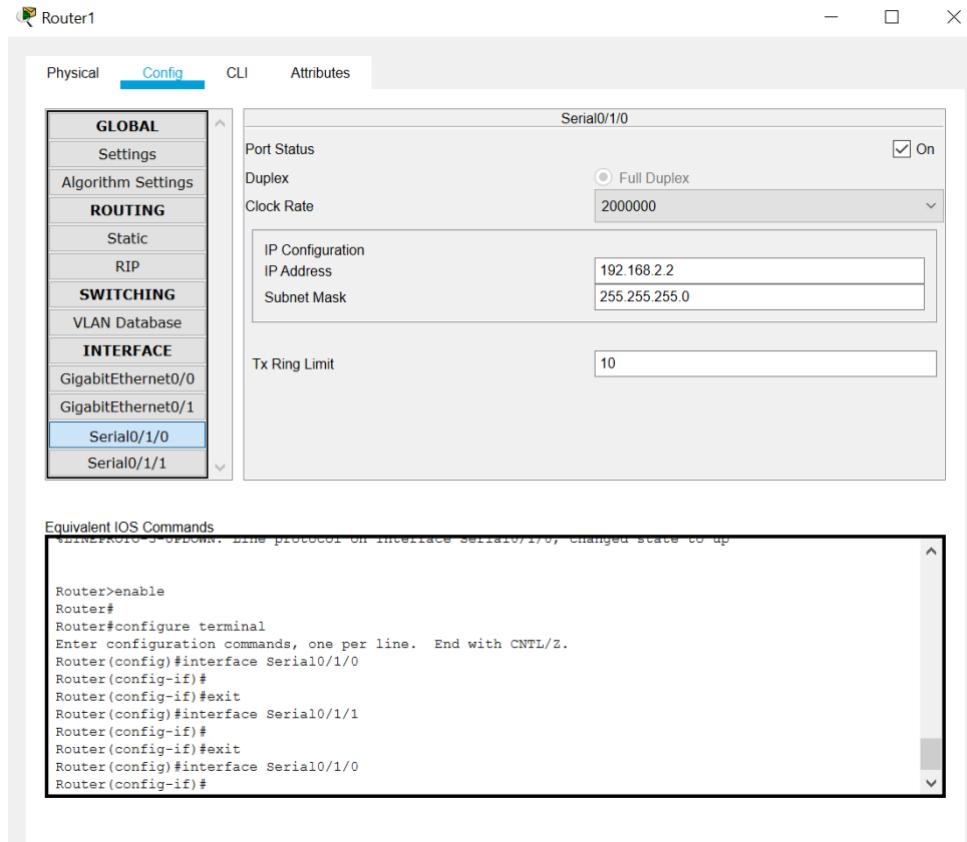
The screenshot shows the Router0 configuration interface with the 'Config' tab selected. The left sidebar lists various configuration categories: GLOBAL, Settings, Algorithm Settings, ROUTING (Static, RIP), SWITCHING, VLAN Database, and INTERFACE (GigabitEthernet0/0, GigabitEthernet0/1, Serial0/1/0, Serial0/1/1). The 'Serial0/1/0' option is currently selected. The main panel displays the configuration for Serial0/1/0, including Port Status (On), Duplex (Full Duplex selected), Clock Rate (1200), IP Configuration (IP Address: 192.168.2.1, Subnet Mask: 255.255.255.0), and Tx Ring Limit (10). Below this, a section titled 'Equivalent IOS Commands' contains the following command sequence:

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial0/1/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
ip address 192.168.2.1 255.255.255.0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
ip address 192.168.2.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#

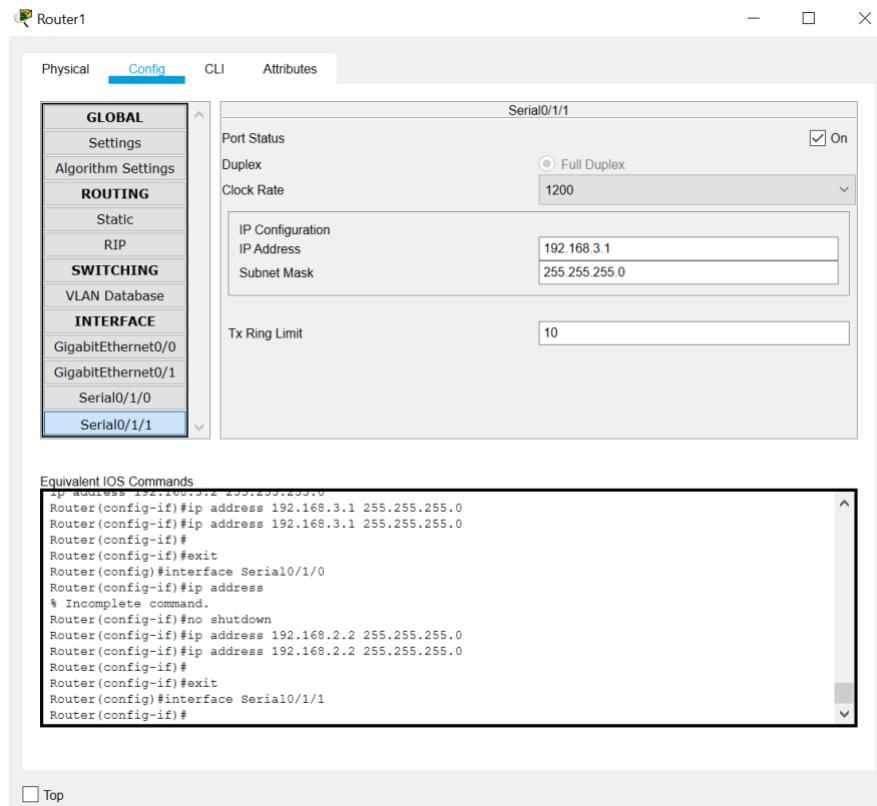
```

## Adding Configurations in Router1

### Serial 0/1/0

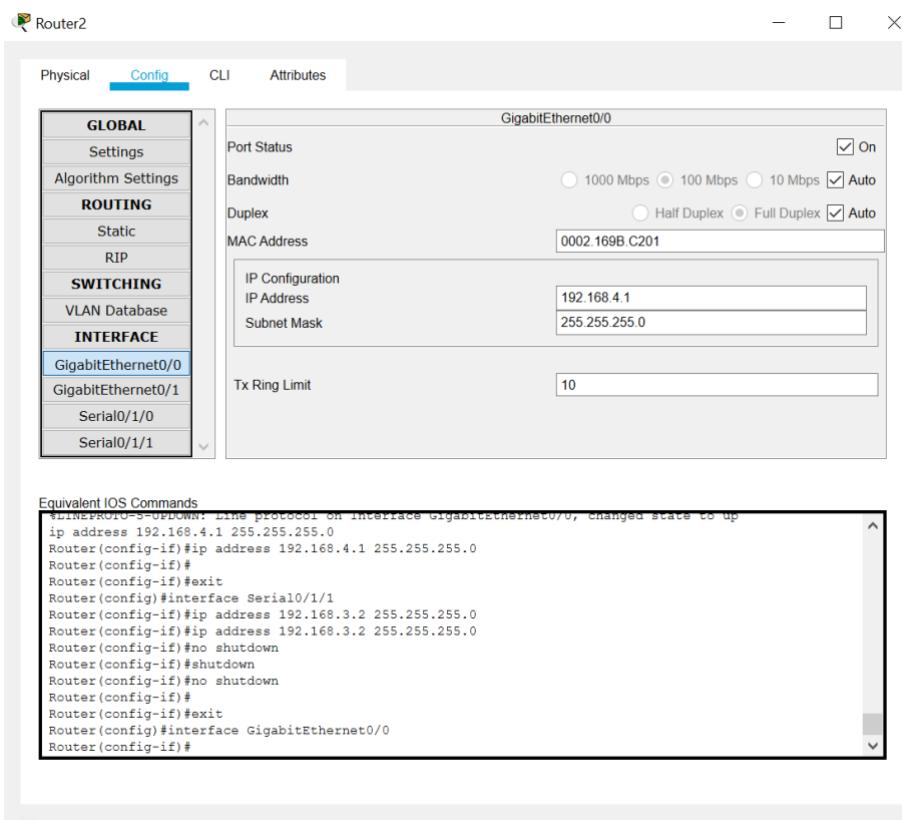
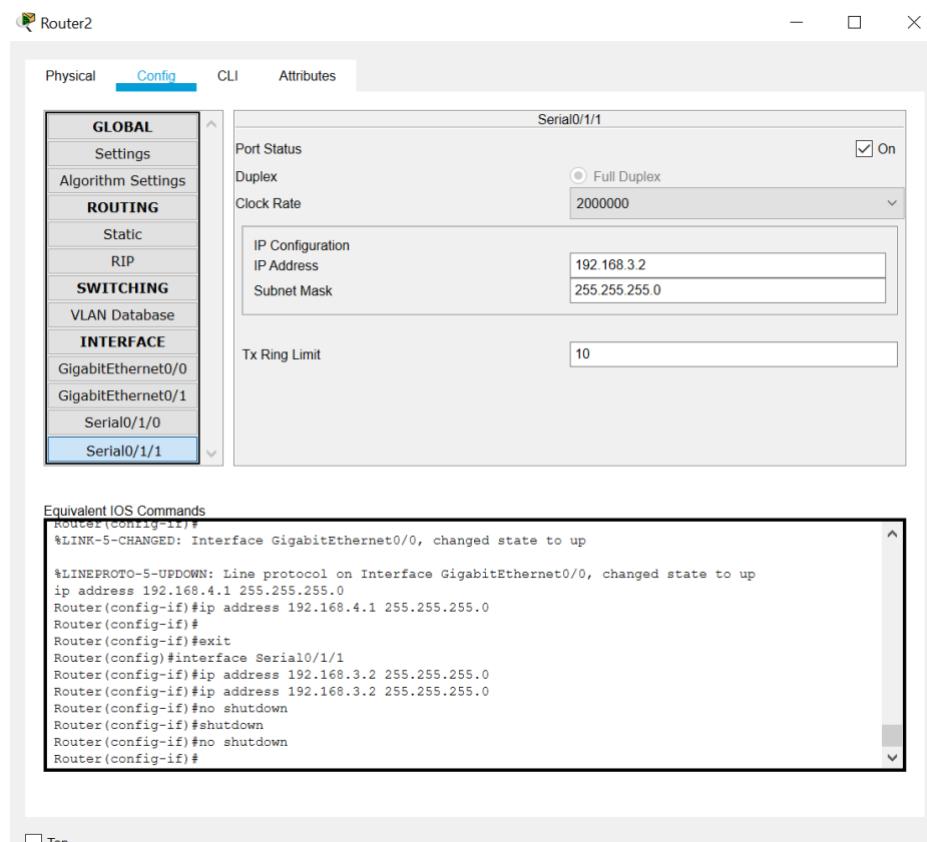


### Serial 0/1/1

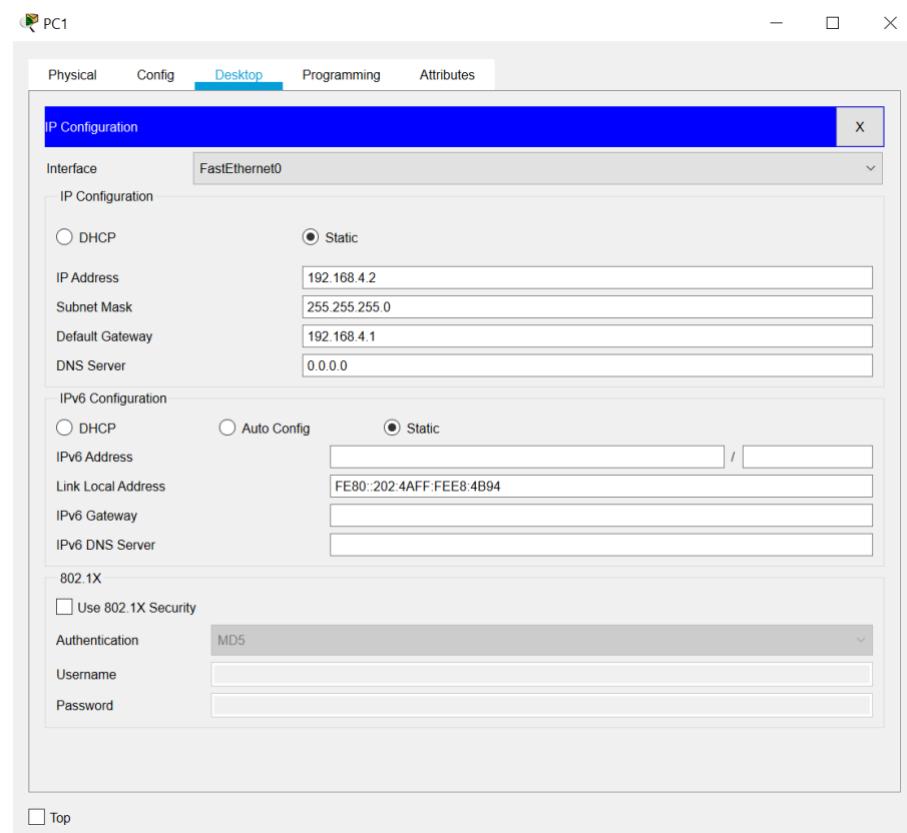


## Adding Configurations in Router2

### Serial 0/1/1

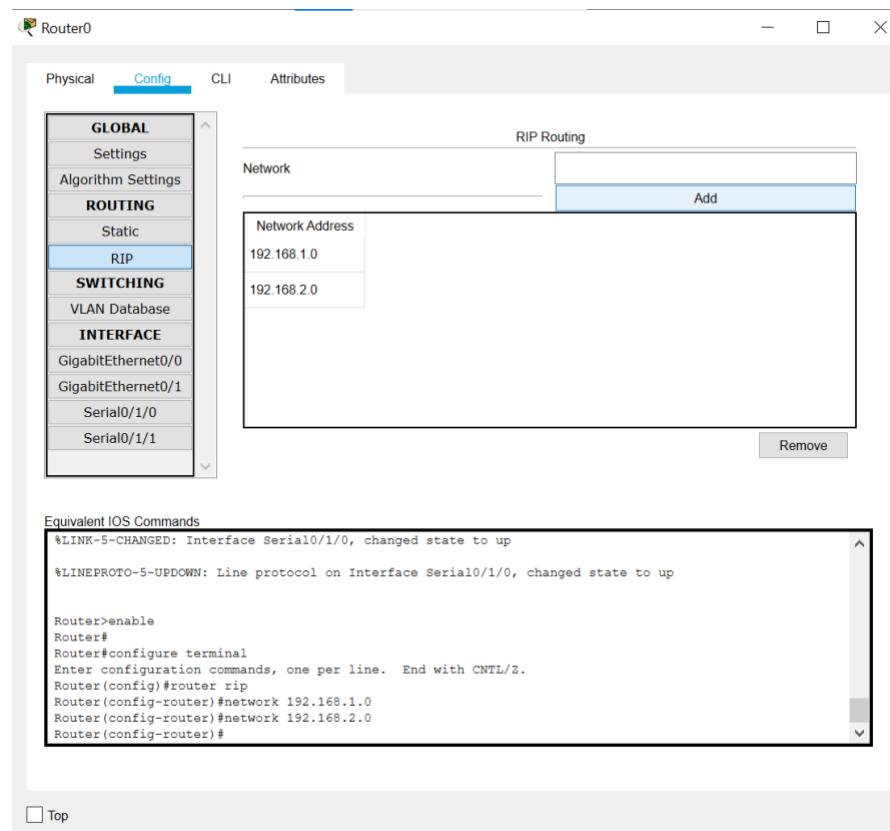


## Configure PC1

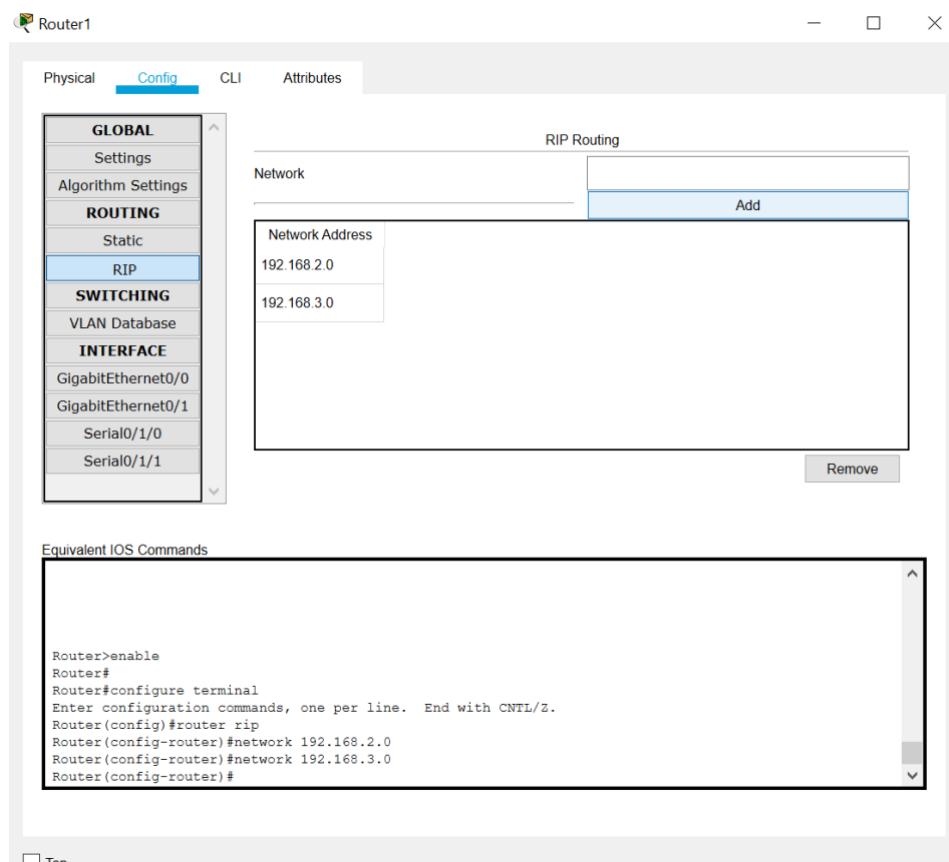


## Adding Routing Path

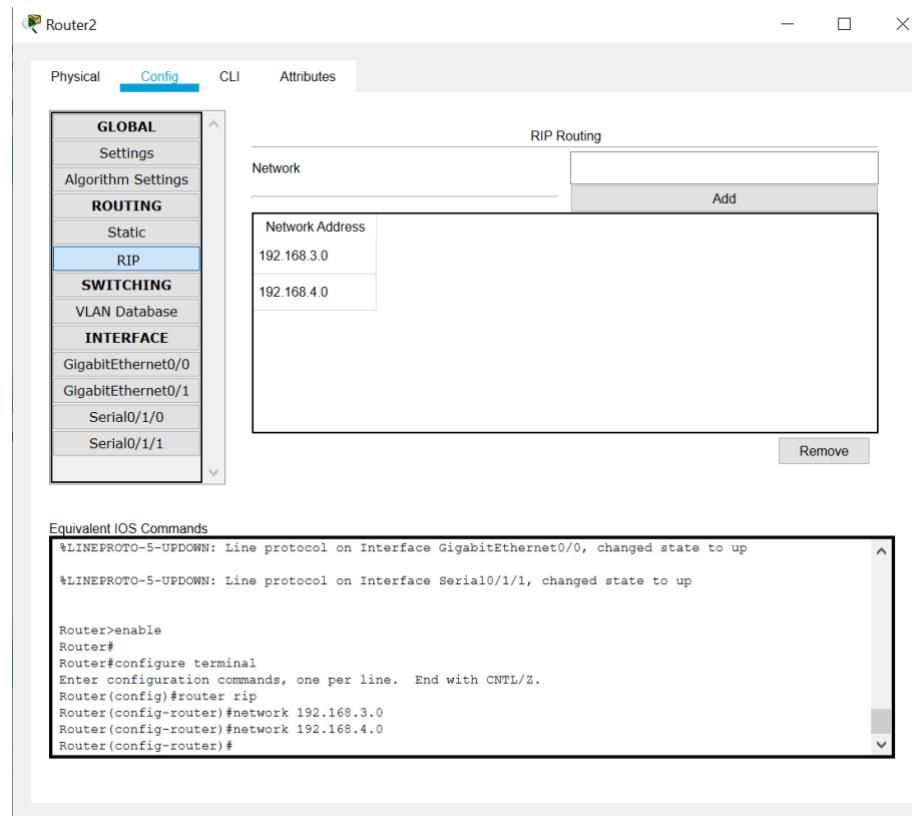
Router0



## Router1



## Routing2



## Ping Server0 with PC1

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=3ms TTL=125
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125
Reply from 192.168.1.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>
```

 Top

## Ping PC1 with PC0

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=3ms TTL=125
Reply from 192.168.4.2: bytes=32 time=7ms TTL=125
Reply from 192.168.4.2: bytes=32 time=7ms TTL=125
Reply from 192.168.4.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 7ms, Average = 4ms

C:\>
```

 Top

## Part 1: Enable the IOS IPS on Router1

### Configure IOS Intrusion Detection System Part Starts

First Check Security Package is Enabled or Not

```

Router>en
Router#enable
Router#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 54 minutes, 4 seconds
System returned to ROM by power-on
System image file is "flash:c1900-universalk9-m2.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wl/export/crypto/tool/stqrg.html
--More--

```

Copy      Paste

Top

Keep on clicking enter...

```

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

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:
License UDI:

-----  

Device# PID SN  

-----  

*0 CISCO1941/K9 FTX152450UQ-  

-----  

Technology Package License Information for Module:'c1900'  

-----  

Technology Technology-package Technology-package
Current Type Next reboot  

-----  

ipbase ipbasek9 Permanent ipbasek9
security disable None None
data disable None None
-----  

Configuration register is 0x2102
--More--

```

Copy      Paste

Top

So here the security package is disabled.

To enable use the following command

```

Technology      Technology-package      Technology-package
Current        Type                  Next reboot
ipbase          ipbasek9            Permanent       ipbasek9
security        disable              None           None
data            disable              None           None

Configuration register is 0x2102

Router#
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#license boot module c1900 technology-package
% Incomplete command.
Router(config)#license boot module c1900 technology-package securityk9
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.

Use of this product feature requires an additional license from Cisco,
together with an additional payment. You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EUIKEN_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
together with any supplements relating to such product feature. The
above applies even if the evaluation license is not automatically

```

Ctrl+F6 to exit CLI focus     

Top

```

ACCEPT? [yes/no]: y
% use 'write' command to make license boot config take effect on next boot

Router(config)#: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = C1900 Next reboot
level = securityk9 and License = securityk9

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#reload
System configuration has been modified. Save? [yes/no]:y
Building configuration...
[OK]
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with ECC disabled

 Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0xb340
program load complete, entry point: 0x80803000, size: 0xb340

IOS Image Load Test

Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
#####

```

Ctrl+F6 to exit CLI focus     

Top

Now check the security package

```

Router>
Router#en
Router#enable
Router#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed Feb 23 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 19 minutes, 14 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wl/export/crypto/tool/stqrg.html
--More--

```

Ctrl+F6 to exit CLI focus

  Top

Keep on entering More

```

Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:
License UDI:

-----  

Device# PID SN  

-----  

*0 CISCO1941/R9 FTX152450UQ-  

-----  

Technology Package License Information for Module:'c1900'  

-----  

Technology Technology-package Technology-package
Current Type Next reboot  

-----  

ipbase ipbasek9 Permanent ipbasek9
Security securityk9 Evaluation securityk9
data disable None None
-----  

Configuration register is 0x2102
--More--

```

Ctrl+F6 to exit CLI focus

  Top

**Security package enabled**

Now start IOS IPS Process

```
Router#clock set 19:02:24 february 19 2024
Router#mkdir smile
Create directory filename [smile]?y
Created dir flash:smile

Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip ips config location flash:smile
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-default.xml - Directory doesn't exist
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-delta.xml - Directory doesn't exist
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-category.xml - Directory doesn't exist
Router(config)#ip ips config location flash:smile
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-default.xml - Directory doesn't exist
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-delta.xml - Directory doesn't exist
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-category.xml - Directory doesn't exist
Router(config)#ip ips name iosips
Router(config)#ip ips not
% Incomplete command.
Router(config)#ip ips notify log
Router(config)#ip ips signature-category
Router(config-ips-category)#retired t
^
% Invalid input detected at '^' marker.

Router(config-ips-category)#category all
Router(config-ips-category-action)#retired true
Router(config-ips-category-action)#exit
Router(config-ips-category)#category ios_ips basic
Router(config-ips-category-action)#retired false
Router(config-ips-category-action)#exit
Router(config-ips-category)#exit
Do you want to accept these changes? [confirm]
Applying Category configuration to signatures ...
%IPS-6-ENGINE_BUILDING: atomic-ip - 288 signatures - 6 of 13 engines
%IPS-6-ENGINE_READY: atomic-ip - build time 30 ms - packets for this engine will be scanned
```

Ctrl+F6 to exit CLI focus     

Continue...

```
%IPS-3-IPS_FILE_OPEN_ERROR: flash:smile/sigdef-category.xml - Directory doesn't exist
Router(config)#ip ips name iosips
Router(config)#ip ips not
% Incomplete command.
Router(config)#ip ips notify log
Router(config)#ip ips signature-category
Router(config-ips-category)#retired t
^
% Invalid input detected at '^' marker.

Router(config-ips-category)#category all
Router(config-ips-category-action)#retired true
Router(config-ips-category-action)#exit
Router(config-ips-category)#category ios_ips basic
Router(config-ips-category-action)#retired false
Router(config-ips-category-action)#exit
Router(config-ips-category)#exit
Do you want to accept these changes? [confirm]
Applying Category configuration to signatures ...
%IPS-6-ENGINE_BUILDING: atomic-ip - 288 signatures - 6 of 13 engines
%IPS-6-ENGINE_READY: atomic-ip - build time 30 ms - packets for this engine will be scanned

Router(config)#interface serial 0/1/0
Router(config-if)#ip ips iosips out
Router(config-if)#
%IPS-6-ENGINE_BUILDS_STARTED: 19:13:40 UTC Feb 19 2024

%IPS-6-ENGINE_BUILDING: atomic-ip - 3 signatures - 1 of 13 engines
%IPS-6-ENGINE_READY: atomic-ip - build time 8 ms - packets for this engine will be scanned

%IPS-6-ALL_ENGINE_BUILDS_COMPLETE: elapsed time 8 ms

Router(config-if)#exit
Router(config)#

Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

## Part 2: Modify the signature in Router1

The screenshot shows the Router1 CLI interface. The user has entered several commands related to IPS (Intrusion Prevention System) configuration. A red box highlights the configuration of an interface and the enablement of IPS. The commands include:

```
Router(config)#interface serial 0/1/0
Router(config-if)#ip ips isisips out
Router(config-if)#
%IPS-6-ENGINE_BUILD_STARTED: 19:34:13 UTC Feb 19 2024
%IPS-6-ENGINE_BUILDING: atomic-ip - 3 signatures - 1 of 13 engines
%IPS-6-ENGINE_READY: atomic-ip - build time 8 ms - packets for this engine will be scanned
%IPS-6-ALL_ENGINE_BUILD_COMPLETE: elapsed time 8 ms

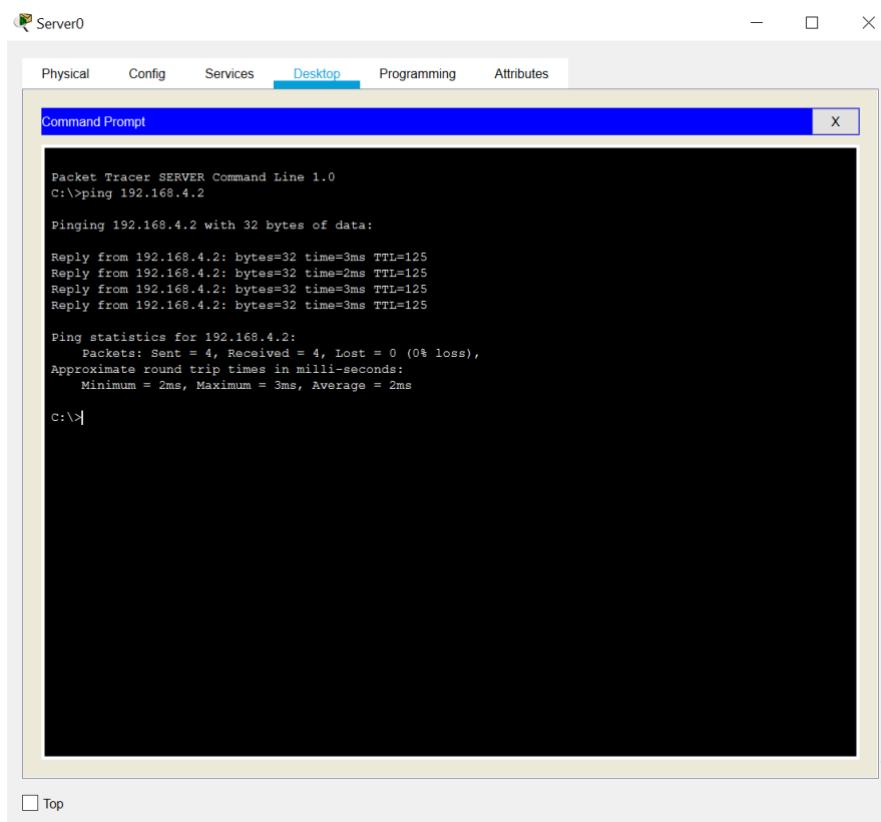
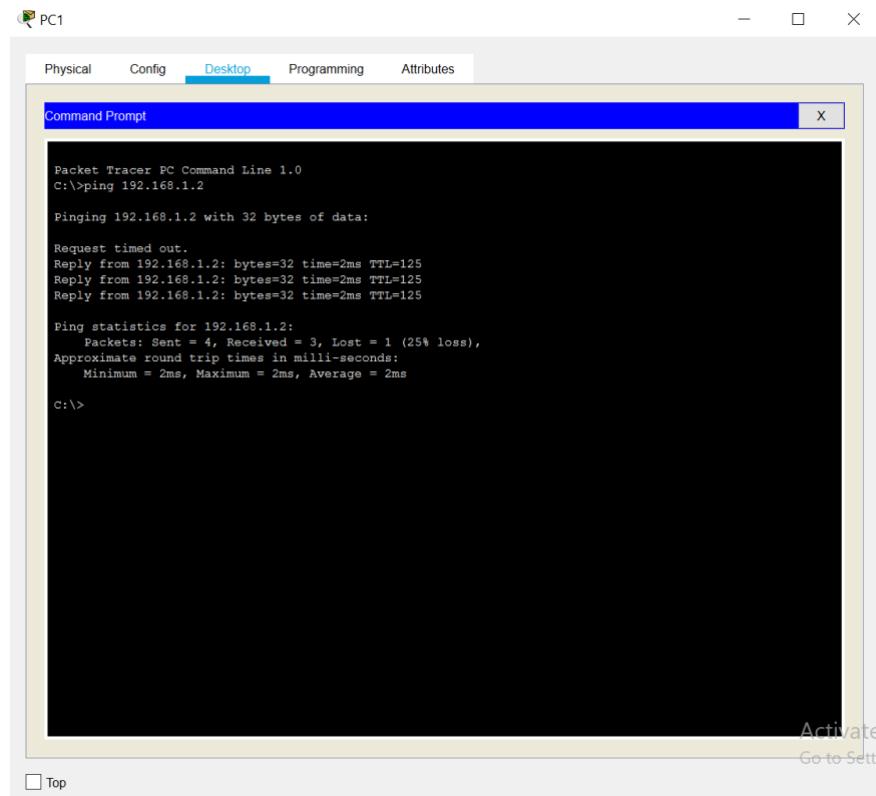
Router(config-if)#exit
Router(config)#ip ips signature-definition
Router(config-sigdef)#signature 2004 0
Router(config-sigdef-sig)#status
Router(config-sigdef-sig-status)#retires false
^
% Invalid input detected at '^' marker.

Router(config-sigdef-sig-status)#retire false
Router(config-sigdef-sig-status)#enable true
Router(config-sigdef-sig-status)#exit
Router(config-sigdef-sig)#engine
Router(config-sigdef-sig-engine)#event-action produce-alert
Router(config-sigdef-sig-engine)#event-action deny-packet-inline
Router(config-sigdef-sig-engine)#exit
Router(config-sigdef-sig)#exit
Do you want to accept these changes? [confirm]y

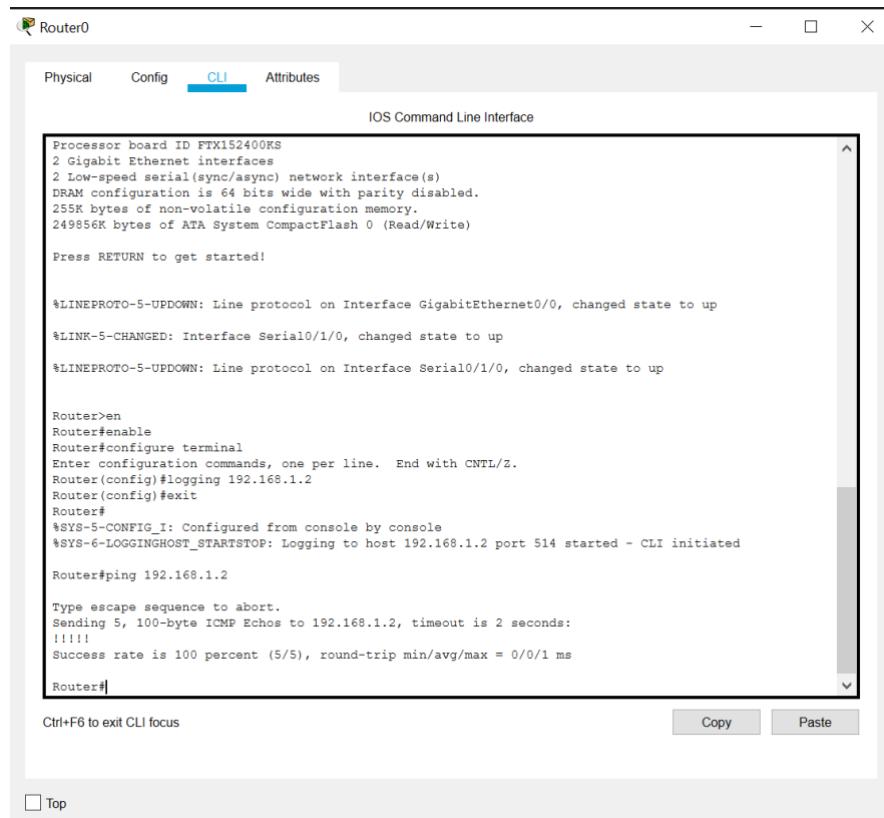
Router(config)#
Ctrl+F6 to exit CLI focus
```

Buttons at the bottom right of the CLI window include 'Copy' and 'Paste'. A checkbox labeled 'Top' is located below the CLI window.

**Now we need to verify the IPS configuration, we do it first by pinging PC1 to SERVER and then from SERVER to PC1**



We check the Syslog service  
on the Server to check the  
logging activity



Router#

Processor board ID FTX152400RS  
2 Gigabit Ethernet interfaces  
2 Low-speed serial(sync/async) network interface(s)  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

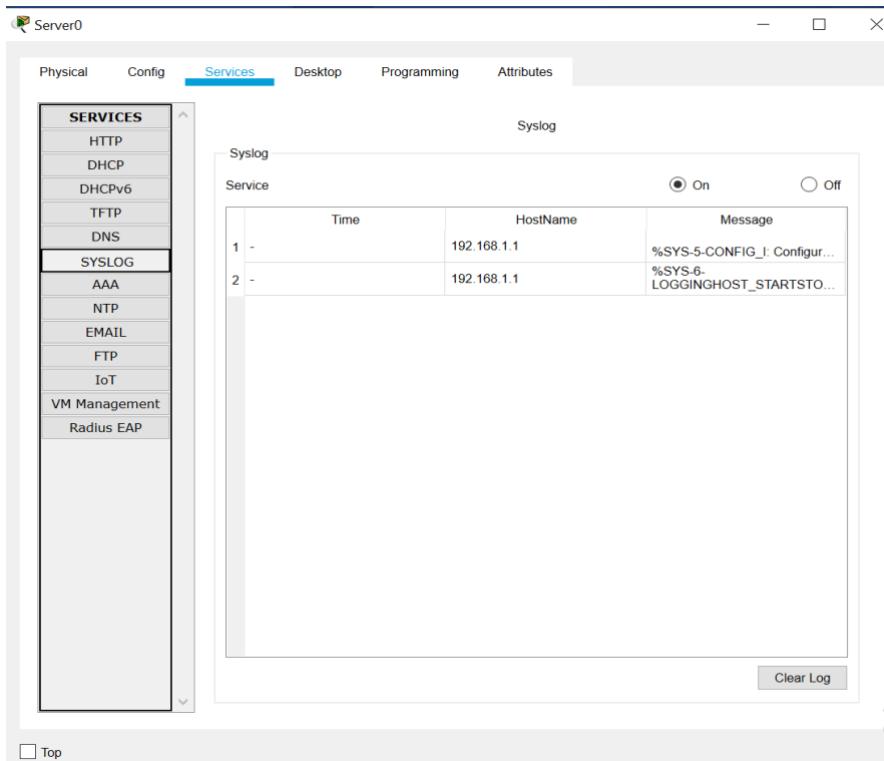
Router>en
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#logging 192.168.1.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 192.168.1.2 port 514 started - CLI initiated

Router#ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router#
```

Ctrl+F6 to exit CLI focus

Top



Server0

Physical Config Services Desktop Programming Attributes

**SERVICES**

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG**
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

**Syslog**

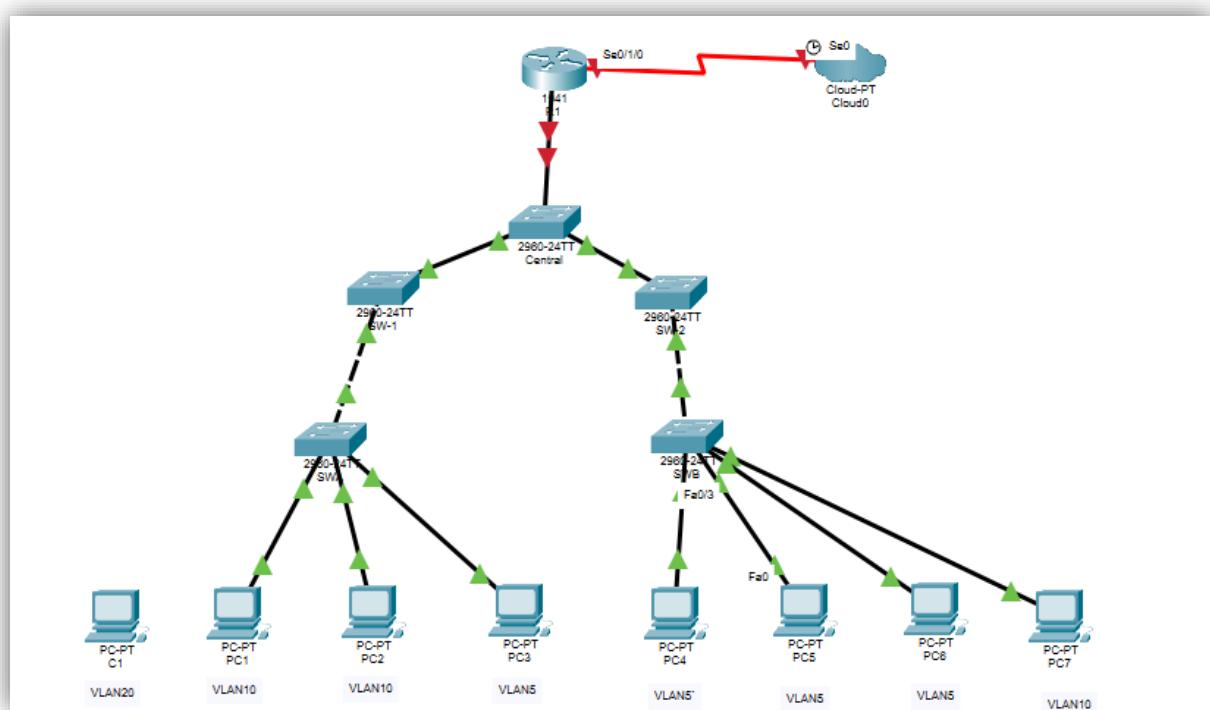
Service  On  Off

Time	HostName	Message
1 -	192.168.1.1	%SYS-5-CONFIG_I: Configur...
2 -	192.168.1.1	%SYS-6-LOGGINGHOST_STARTSTO...

Top

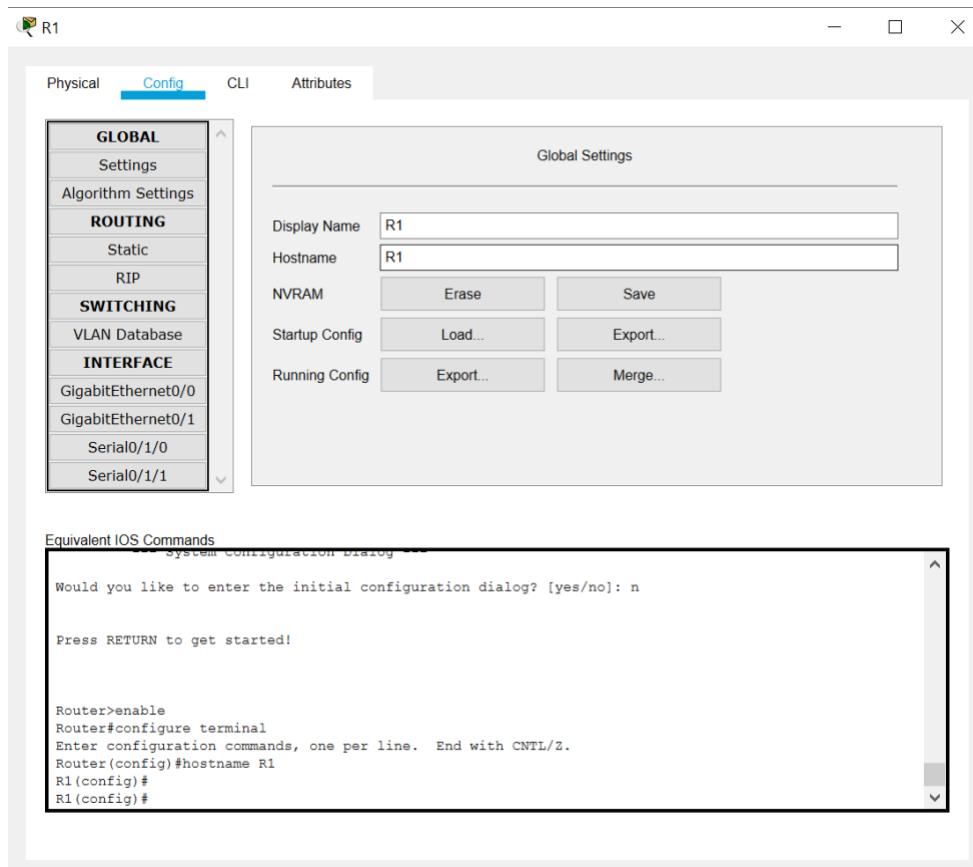
## Practical 8 – Configure Layer 2 VLAN Security

### Topology

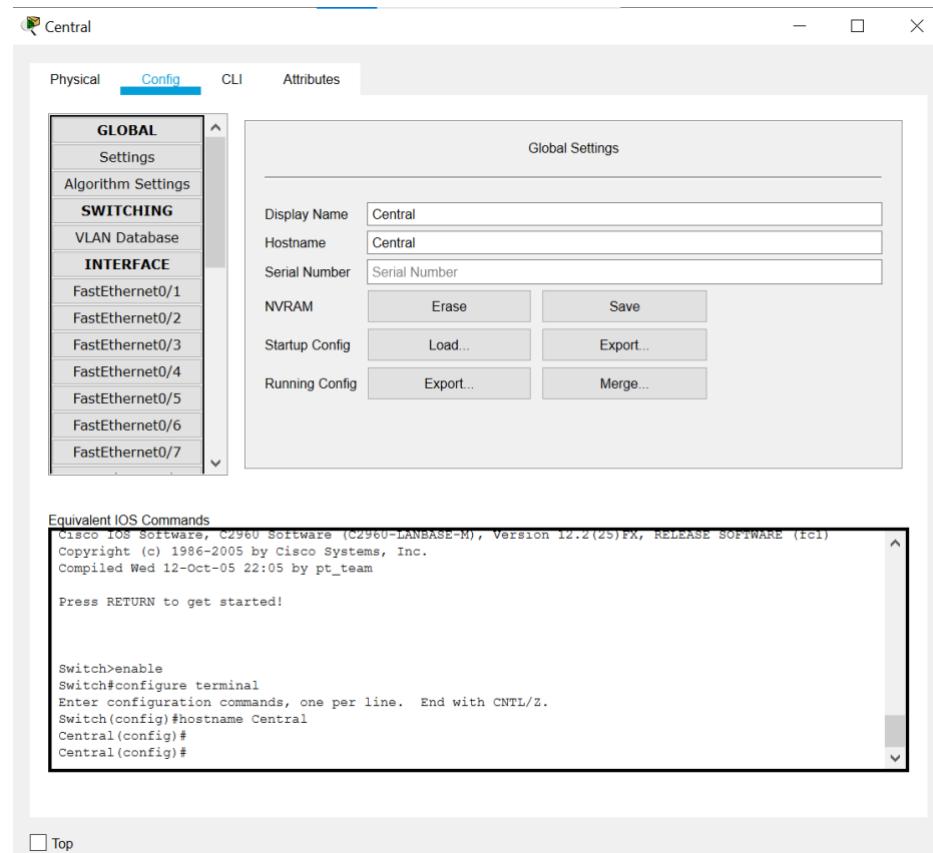


Rename – Router0 to R1

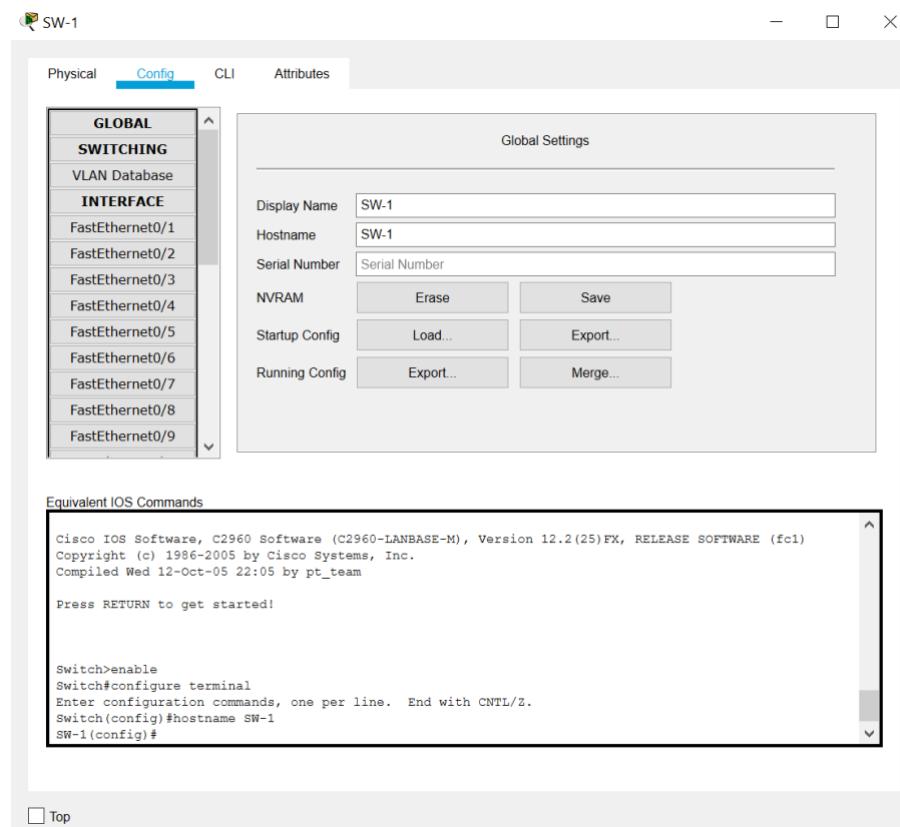




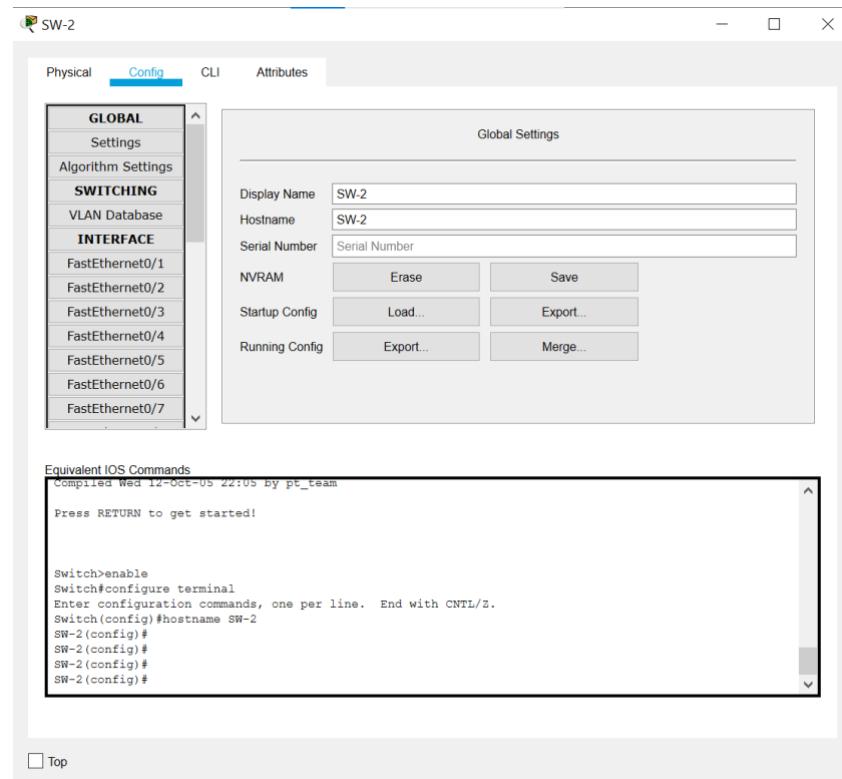
### Rename – Switch0 to Central



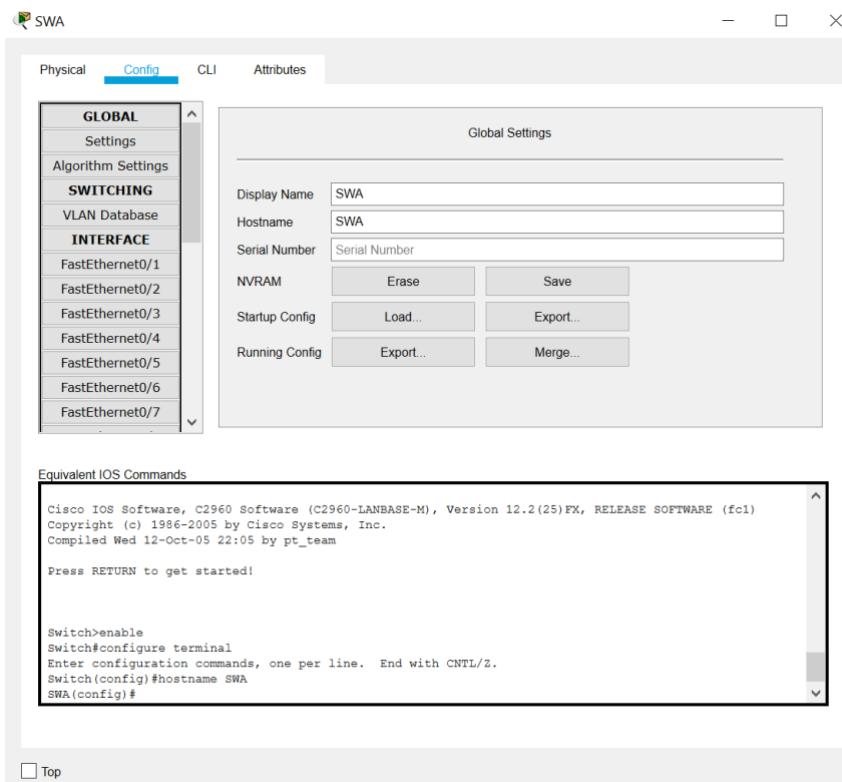
## Rename – Switch1 to SW-1



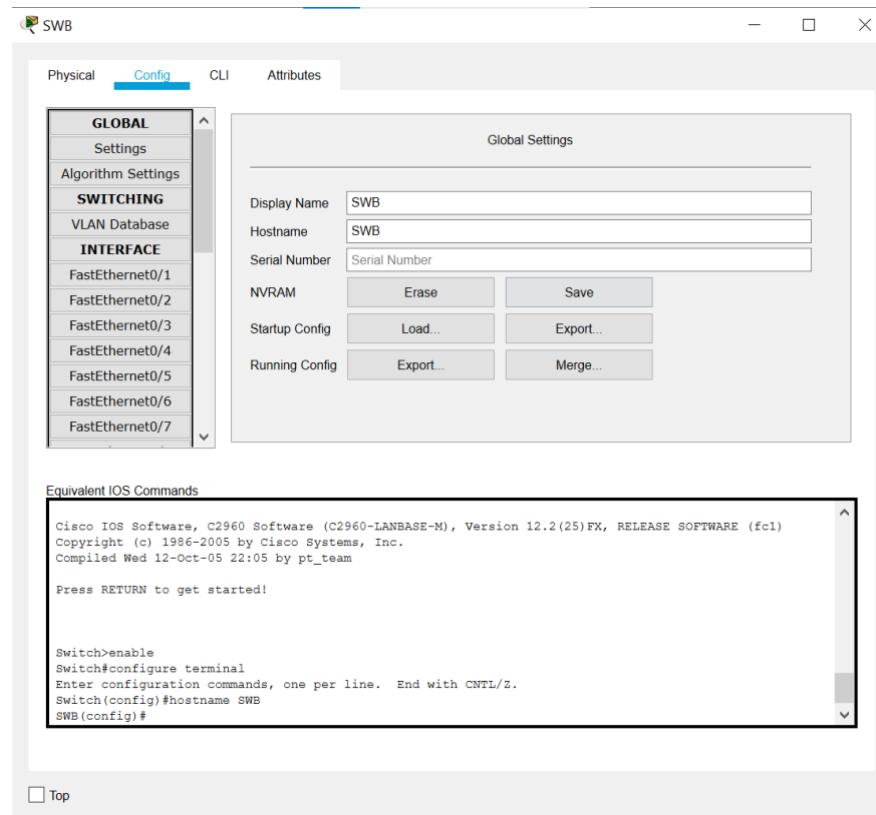
## Rename – Switch2 to SW-2



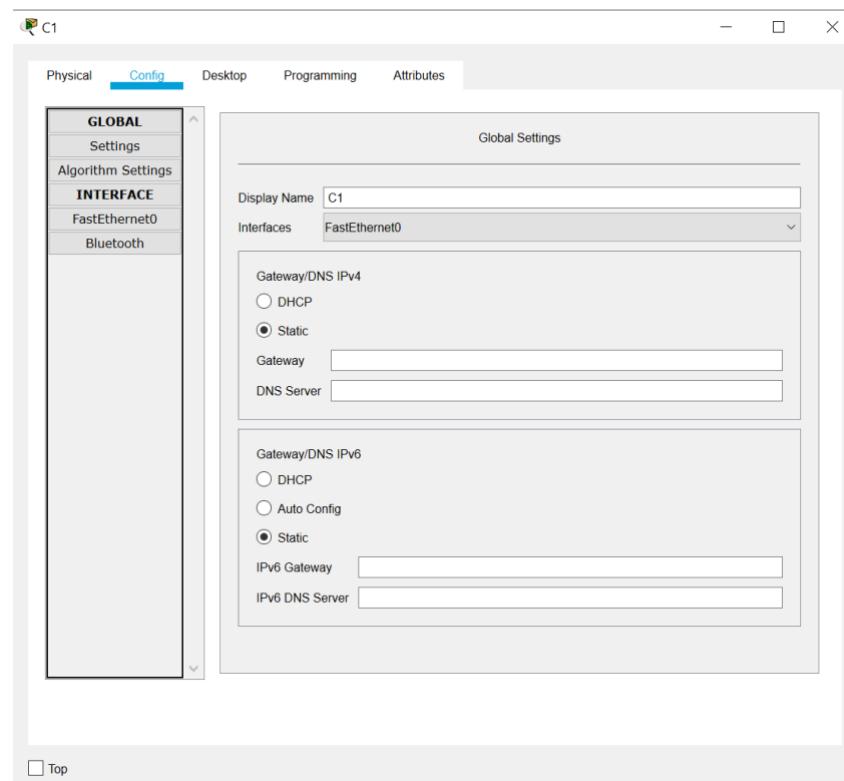
## Rename – Switch3 to SWA



## Rename – Switch4 to SWB

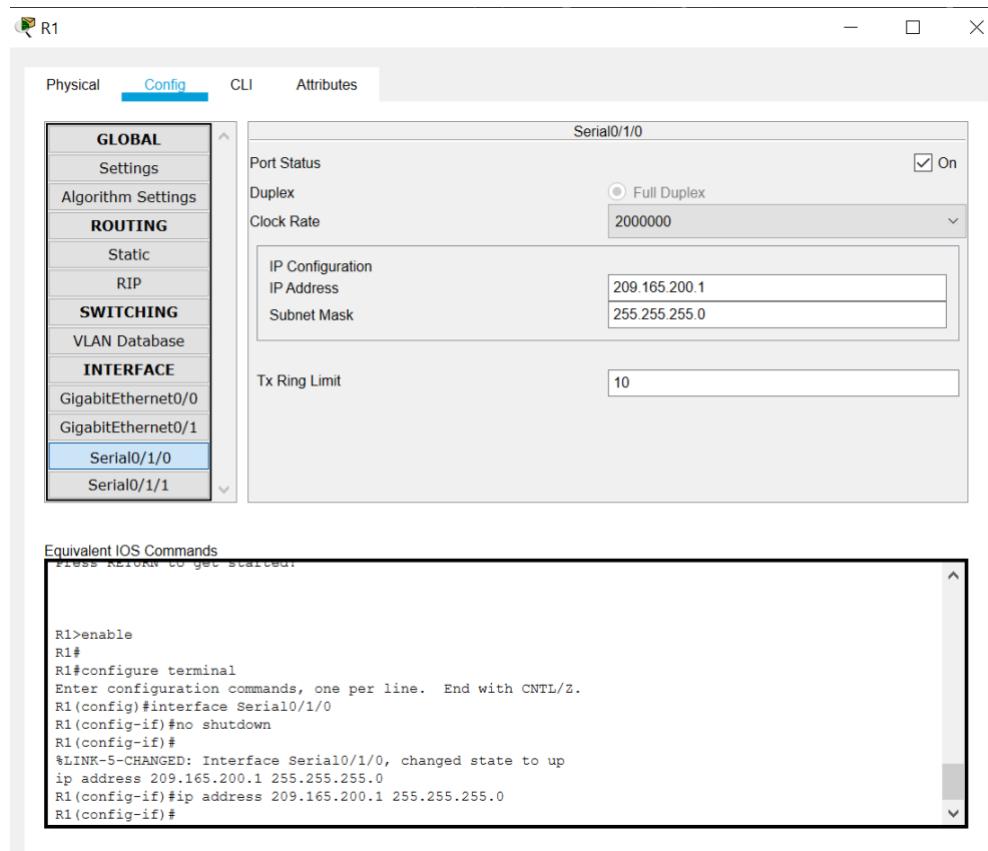


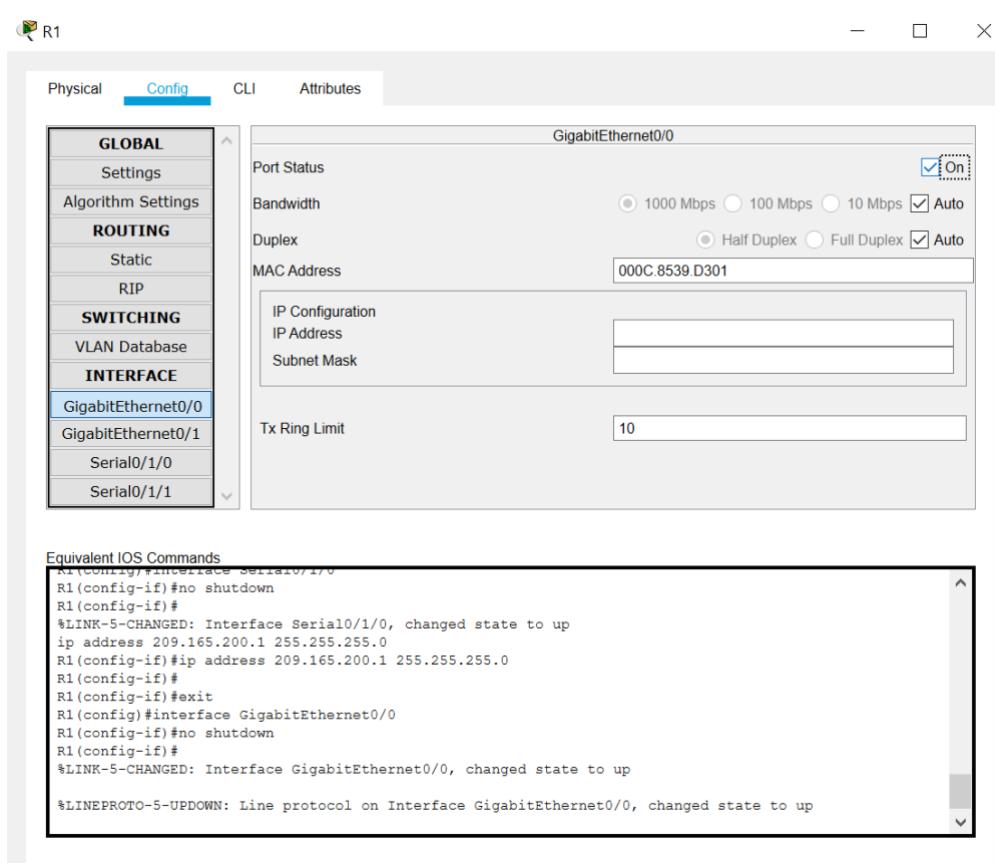
## Rename PC0 to C1



So on Rename PC1 to C2 then PC2 to C3and PC3 to C4

AND ALSO Rename PC4 to D1 then PC5 to D2 and PC6 to D3 and PC7 to D4





C2

Physical Config Desktop Programming Attributes

### IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP  Static

IP Address: 192.168.10.1  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.10.100  
DNS Server: 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /  
Link Local Address: FE80::201:64FF:FE1D:BC66  
IPv6 Gateway:  
IPv6 DNS Server:

802.1X

Use 802.1X Security

Authentication: MD5

Username:   
Password:

Top

C3

Physical Config Desktop Programming Attributes

### IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP  Static

IP Address: 192.168.10.2  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.10.100  
DNS Server: 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: /  
Link Local Address: FE80::20A:41FF:FED9:2157  
IPv6 Gateway:  
IPv6 DNS Server:

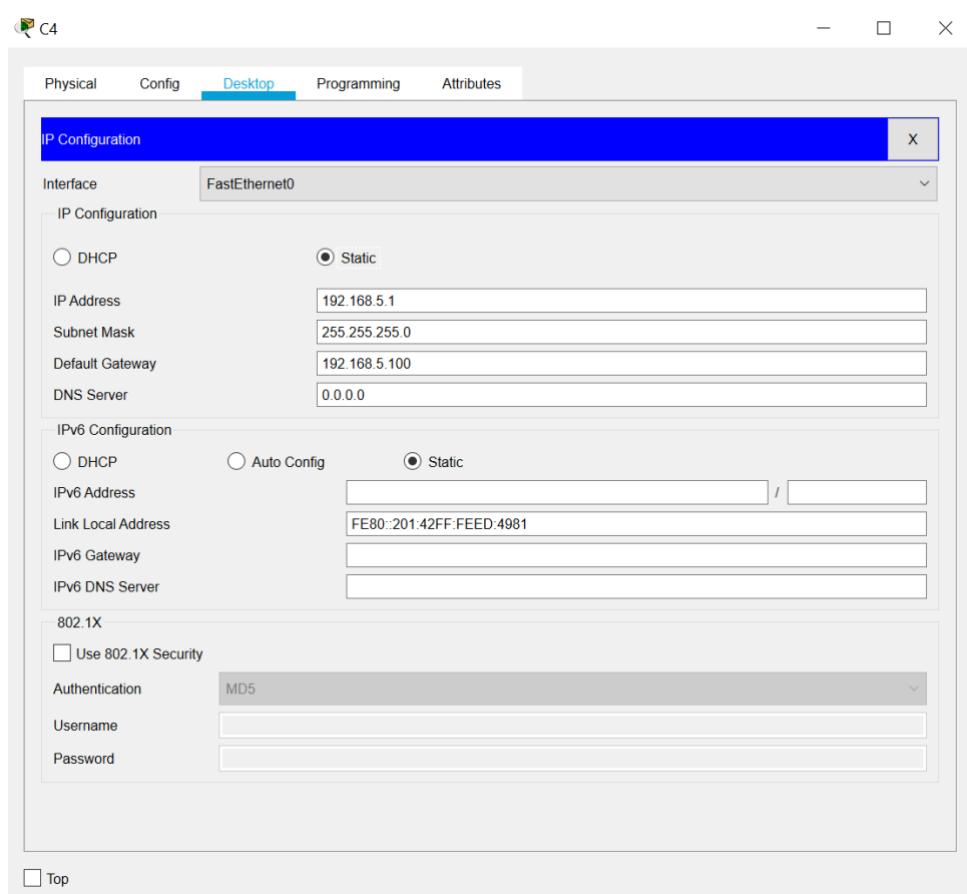
802.1X

Use 802.1X Security

Authentication: MD5

Username:   
Password:

Top



D1

Physical Config Desktop Programming Attributes

### IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP  Static

IP Address: 192.168.5.2  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.5.100  
DNS Server: 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: FE80::260:3EFF:FE20:C741  
Link Local Address: FE80::260:3EFF:FE20:C741  
IPv6 Gateway:  
IPv6 DNS Server:

802.1X

Use 802.1X Security

Authentication: MD5  
Username:   
Password:   
  
 Top

D2

Physical Config Desktop Programming Attributes

### IP Configuration

Interface: FastEthernet0

IP Configuration

DHCP  Static

IP Address: 192.168.5.3  
Subnet Mask: 255.255.255.0  
Default Gateway: 192.168.5.100  
DNS Server: 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address: FE80::230A:3FF:FE62:C25C  
Link Local Address: FE80::230A:3FF:FE62:C25C  
IPv6 Gateway:  
IPv6 DNS Server:

802.1X

Use 802.1X Security

Authentication: MD5  
Username:   
Password:   
  
 Top

D3

Physical	Config	Desktop	Programming	Attributes
<b>IP Configuration</b>				
Interface	FastEthernet0			
IP Configuration				
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static	This address is already used in the network.		
IP Address	192.168.5.4			
Subnet Mask	255.255.255.0			
Default Gateway	192.168.5.100			
DNS Server	0.0.0.0			
IPv6 Configuration				
<input type="radio"/> DHCP	<input type="radio"/> Auto Config	<input checked="" type="radio"/> Static		
IPv6 Address	FE80::260:3EFF:FEA0:AC03			
Link Local Address				
IPv6 Gateway				
IPv6 DNS Server				
802.1X				
<input type="checkbox"/> Use 802.1X Security				
Authentication	MD5			
Username				
Password				

D4

Physical	Config	Desktop	Programming	Attributes
<b>IP Configuration</b>				
Interface	FastEthernet0			
IP Configuration				
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static			
IP Address	192.168.10.3			
Subnet Mask	255.255.255.0			
Default Gateway	192.168.10.100			
DNS Server	0.0.0.0			
IPv6 Configuration				
<input type="radio"/> DHCP	<input type="radio"/> Auto Config	<input checked="" type="radio"/> Static		
IPv6 Address	FE80::202:17FF:FE18:E07B			
Link Local Address				
IPv6 Gateway				
IPv6 DNS Server				
802.1X				
<input type="checkbox"/> Use 802.1X Security				
Authentication	MD5			
Username				
Password				

The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is selected, displaying the IOS Command Line Interface. The terminal window title is 'IOS Command Line Interface'. The command history and output are as follows:

```
R1>en
R1#enable
R1#enable secret enpa55
^
% Invalid input detected at '^' marker.

R1#secret enpa55
^
% Invalid input detected at '^' marker.

R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#enable secret enpa55
R1(config)#line console 0
R1(config-line)#password conpa55
R1(config-line)#login
R1(config-line)#exit
R1(config)#ip domain-name ccnasecurity.com
R1(config)#username admin secret adminpa55
^
% Invalid input detected at '^' marker.

R1(config)#username admin secret adminpa55
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#exit
R1(config)#crypto key generate rsa
The name for the keys will be: R1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]
```

At the bottom left of the terminal window, it says 'Ctrl+F6 to exit CLI focus'. On the right side, there are 'Copy' and 'Paste' buttons. At the very bottom left of the entire window frame, there is a small checkbox labeled 'Top'.

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "R1". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the following configuration commands:

```
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#exit
R1(config)#crypto key generate rsa
The name for the keys will be: R1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 512
% Generating 512 bit RSA keys, keys will be non-exportable...[OK]

R1(config)#username admin secret adminpass55
*Mar 1 1:39:27.874: RSA key size needs to be at least 768 bits for ssh version 2
*Mar 1 1:39:27.875: %SSH-5-ENABLED: SSH 1.5 has been enabled
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#exit
R1(config)#crypto key generate rsa
% You already have RSA keys defined named R1.ccnasecurity.com .
% Do you really want to replace them? [yes/no]: n
R1(config)#crypto key generate rsa
% You already have RSA keys defined named R1.ccnasecurity.com .
% Do you really want to replace them? [yes/no]: y
The name for the keys will be: R1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R1(config)#

```

At the bottom left of the window, there is a note: "Ctrl+F6 to exit CLI focus". At the bottom right, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located just below the "Copy" button.

Central>en  
Central#config terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Central(config)#enable secret enpa55  
Central(config)#line console enpa55  
^  
% Invalid input detected at '^' marker.  
  
Central(config)#line console 0  
Central(config-line)#password conpa55  
Central(config-line)#login  
Central(config-line)#exit  
Central(config)#ip domain-name ccnasecurity.com  
Central(config)#username admin secret adminpa55  
Central(config)#line vty 0 4  
Central(config-line)#login local  
Central(config-line)#exit  
Central(config)#crypto key generate rsa  
The name for the keys will be: Central.ccnnasecurity.com  
Choose the size of the key modulus in the range of 360 to 2048 for your  
General Purpose Keys. Choosing a key modulus greater than 512 may take  
a few minutes.  
  
How many bits in the modulus [512]: 1024  
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]  
  
Central(config)#

Ctrl+F6 to exit CLI focus     

Top

Press RETURN to get started!

```
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

SW-1>en
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#enable secret enpa55
SW-1(config)#line console 0
SW-1(config-line)#password conpa55
SW-1(config-line)#login
SW-1(config-line)#exit
SW-1(config)#ip domain-name ccnasecurity.com
SW-1(config)#username admin secret adminpa55
SW-1(config)#line vty 0 4
SW-1(config-line)#login local
SW-1(config-line)#exit
SW-1(config)#crypto key generate rsa
The name for the keys will be: SW-1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SW-1(config)#
```

Ctrl+F6 to exit CLI focus

Top

Copy Paste

**SW-2**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
PRESS RETURN to get started!

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/23, changed state to up

SW-2>en
SW-2#enable
SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#line console 0
SW-2(config-line)#password conpa55
SW-2(config-line)#login
SW-2(config-line)#exit
SW-2(config)#ip domain-name ccnasecurity.com
SW-2(config)#username admin secret adminpa55
SW-2(config)#line vty 0 4
SW-2(config-line)#login local
SW-2(config-line)#exit
SW-2(config)#crypto key generate rsa
The name for the keys will be: SW-2.ccnnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SW-2(config)#

Ctrl+F6 to exit CLI focus
```

Copy      Paste      **Activate**      Go to Services

**SWA**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

SWA>en
SWA#enable
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#enable secret enpa55
SWA(config)#line console 0
SWA(config-line)#password conpa55
SWA(config-line)#login
SWA(config-line)#exit
SWA(config)#ip domain-name ccnasecurity.com
SWA(config)#username admin secret adminpa55
SWA(config)#line vty 0 4
SWA(config-line)#login local
SWA(config-line)#exit
SWA(config)#crypto key generate rsa
The name for the keys will be: SWA.ccnnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

SWA(config)#

Ctrl+F6 to exit CLI focus
```

Top

The screenshot shows a window titled "SWB" with the "CLI" tab selected. The main area displays the following configuration commands:

```
SWB>en
SWB#enable
SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#enable secret enpa55
SWB(config)#line console 0
SWB(config-line)#password conpa55
SWB(config-line)#login
SWB(config-line)#exit
SWB(config)#ip domain-name cccnasecurity.com
SWB(config)#username admin secret adminpa55
SWB(config)#line vty 0 4
SWB(config-line)#login local
SWB(config-line)#exit
SWB(config)#crypto key generate rsa
The name for the keys will be: SWB.cccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
* Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
SWB(config)#

```

At the bottom of the window, there are buttons for "Copy" and "Paste". To the right, there are links for "Activate Win" and "Go to Settings to". A checkbox labeled "Top" is also present.

User Access Verification

Password:

Central>en

Password:

**Password: conpa55**

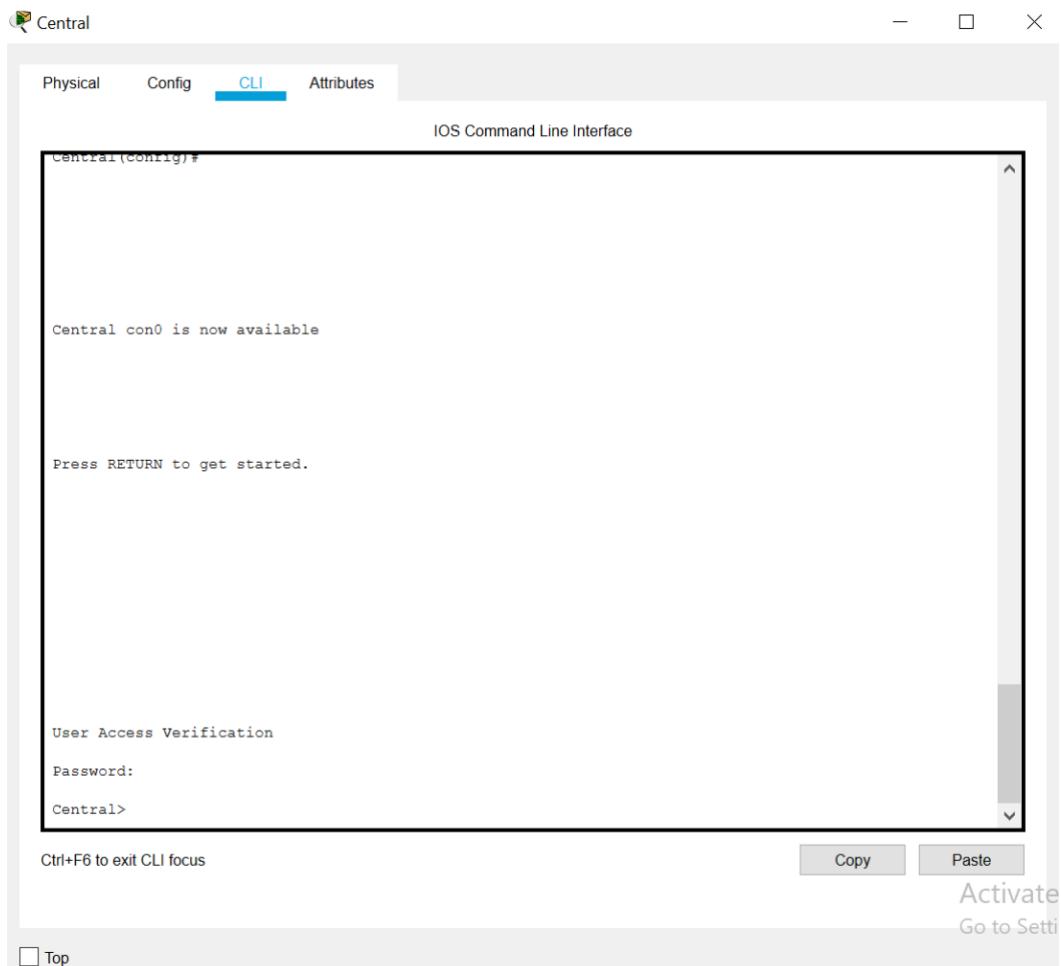
Central>enable

Password:

Password:

Central#|

**Password: enpa55**



The screenshot shows a Cisco IOS CLI interface titled "Central". The "CLI" tab is selected. The terminal window displays the following text:

```
User Access Verification
Password:
Central>en
Password:
Password:
Password:
% Bad secrets

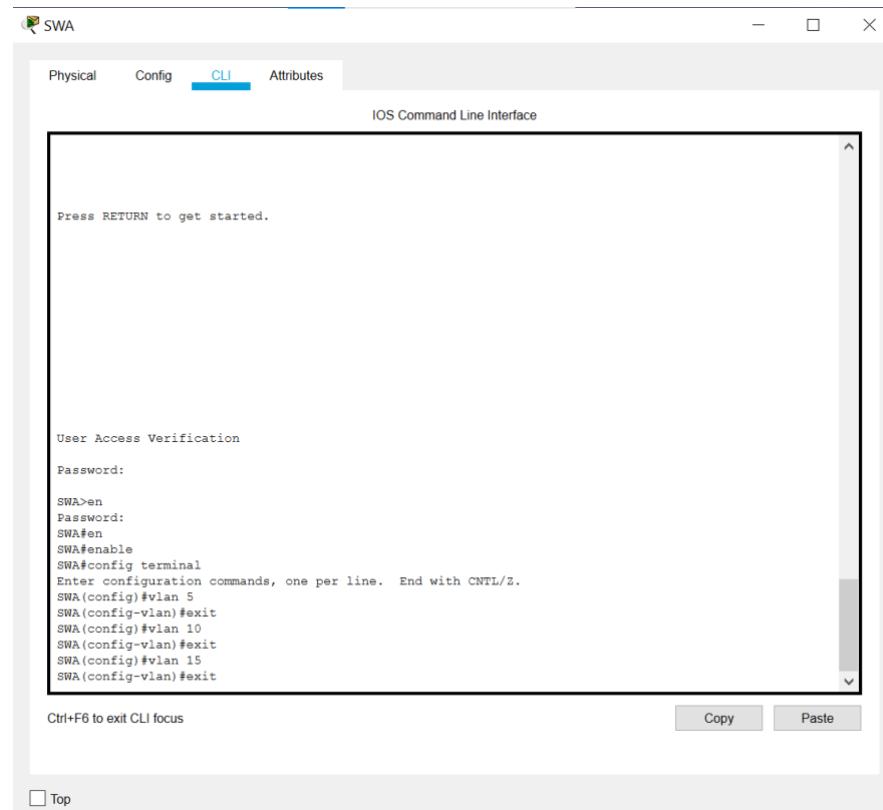
Central>enable
Password:
Password:
Central#show vlan brief

VLAN Name          Status    Ports
----  -----
1    default        active   Fa0/1, Fa0/2, Fa0/3, Fa0/4
                           Fa0/5, Fa0/6, Fa0/7, Fa0/8
                           Fa0/9, Fa0/10, Fa0/11, Fa0/12
                           Fa0/13, Fa0/14, Fa0/15, Fa0/16
                           Fa0/17, Fa0/18, Fa0/19, Fa0/20
                           Fa0/21, Fa0/22, Fa0/23, Fa0/24
                           Gig0/1, Gig0/2

1002 fddi-default   active
1003 token-ring-default  active
1004 fddinet-default   active
1005 trnet-default     active
Central#
```

Below the terminal window, there are several UI elements:

- Ctrl+F6 to exit CLI focus
- Copy button
- Paste button
- Activate button
- Go to Settings button
- Top checkbox

**User Access Verification Password: conpa55****And enable password : enpa55**

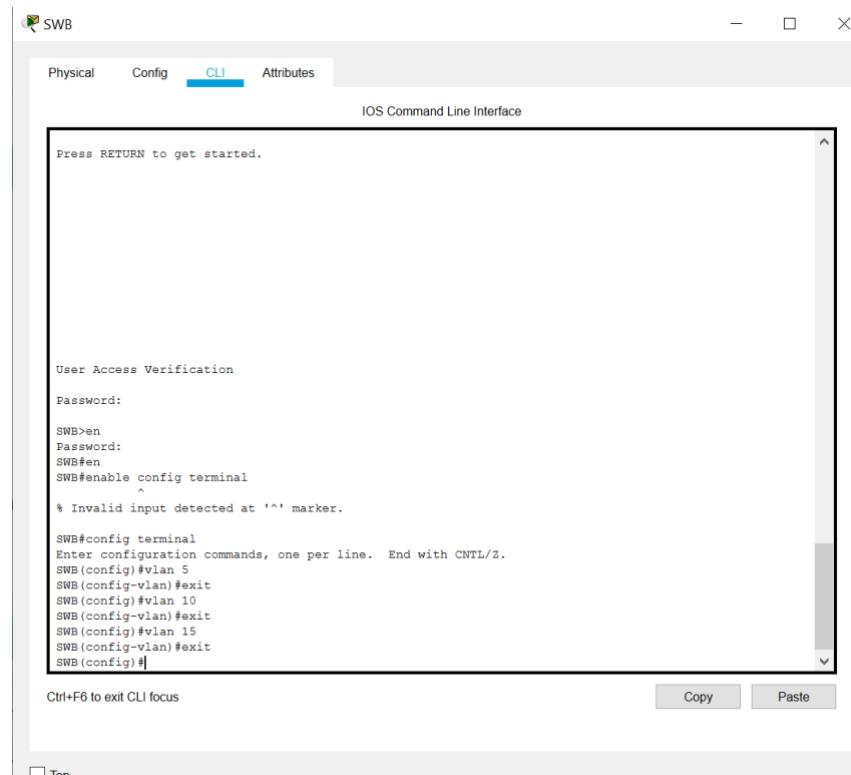
The screenshot shows the SWA CLI interface. The title bar says "SWA". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". It displays the following text:

```
Press RETURN to get started.

User Access Verification
Password:

SWA>en
Password:
SWA#en
SWA#enable
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#vlan 5
SWA(config-vlan)#exit
SWA(config)#vlan 10
SWA(config-vlan)#exit
SWA(config)#vlan 15
SWA(config-vlan)#exit
```

At the bottom of the window, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located below the window.



The screenshot shows the SWB CLI interface. The title bar says "SWB". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". It displays the following text:

```
Press RETURN to get started.

User Access Verification
Password:

SWB>en
Password:
SWB#en
SWB#enable config terminal
^
% Invalid input detected at '^' marker.

SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#vlan 5
SWB(config-vlan)#exit
SWB(config)#vlan 10
SWB(config-vlan)#exit
SWB(config)#vlan 15
SWB(config-vlan)#exit
SWB(config)#[
```

At the bottom of the window, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located below the window.

SW-1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
* 1 26 WS-C2960-24TT 12.2 C2960-LANBASE-M
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version 12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

User Access Verification

Password:

SW-1>en
Password:
Password:
SW-1#enable
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#vlan 5
SW-1(config-vlan)#exit
SW-1(config)#vlan 10
SW-1(config-vlan)#exit
SW-1(config)#vlan 15
SW-1(config-vlan)#exit
SW-1(config)#

Ctrl+F6 to exit CLI focus
```

Top

SW-2

Physical Config **CLI** Attributes

IOS Command Line Interface

Switch	Ports	Model	SW Version	SW Image
*	1 26	WS-C2960-24TT	12.2	C2960-LANBASE-M

```
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version 12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/23, changed state to up

User Access Verification

Password:

SW-2>en
SW-2#enable
SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#vlan 5
SW-2(config-vlan)#exit
SW-2(config)#vlan 10
SW-2(config-vlan)#exit
SW-2(config)#vlan 15
SW-2(config-vlan)#exit
SW-2(config)#

Ctrl+F6 to exit CLI focus
```

Top

**Central**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
% Invalid input detected at '^' marker.

Central#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Central(config)#vlan 5
Central(config-vlan)#name ip5
Central(config-vlan)#exit
Central(config)#exit
Central#
%SYS-5-CONFIG_I: Configured from console by console

Central#show vlan

VLAN Name          Status      Ports
---- -----
1    default        active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                               Fa0/5, Fa0/6, Fa0/7, Fa0/8
                               Fa0/9, Fa0/10, Fa0/11, Fa0/12
                               Fa0/13, Fa0/14, Fa0/15, Fa0/16
                               Fa0/17, Fa0/18, Fa0/19, Fa0/20
                               Fa0/21, Fa0/22, Fa0/23, Fa0/24
                               Gig0/1, Gig0/2

5    ip5            active
10   VLAN0010       active
15   VLAN0015       active
1002 fddi-default  active
1003 token-ring-default  active
1004 fddinet-default  active
1005 trnet-default  active

VLAN Type SAID      MTU  Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- -----
1    enet 100001    1500 -      -      -      -      0      0
5    enet 100005    1500 -      -      -      -      0      0
--More-- |
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

**SWA**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
User Access Verification

Password:

SWA>en
Password:
SWA>enable
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#vlan 10
SWA(config-vlan)#exit
SWA(config)#vlan 15
SWA(config-vlan)#exit
SWA(config)#init
^
% Invalid input detected at '^' marker.

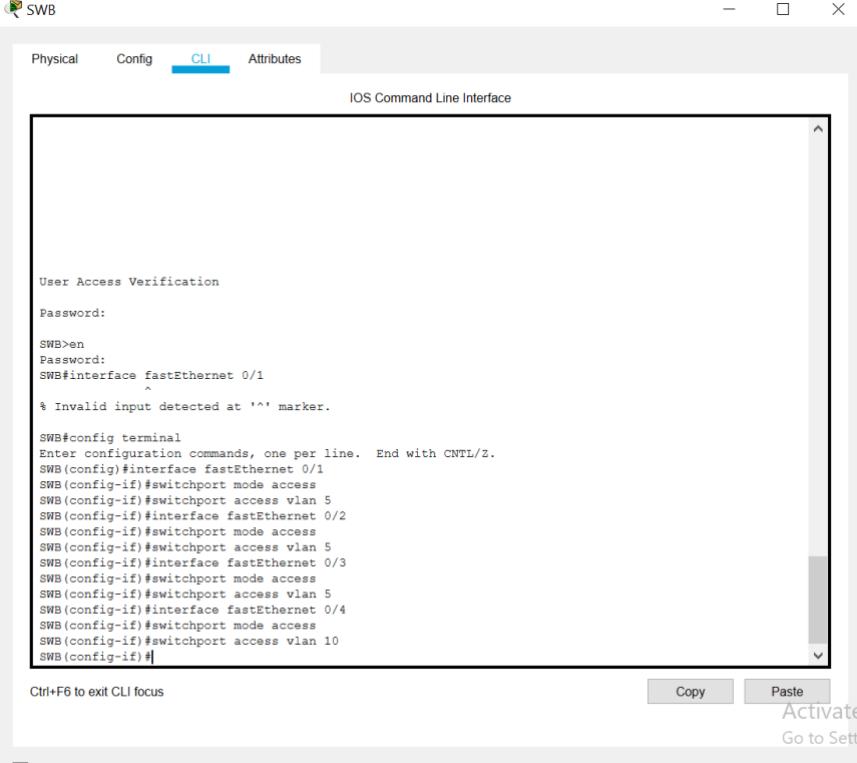
SWA(config)#interface fastEthernet 0/2
SWA(config-if)#switchport mode access
SWA(config-if)#switchport access vlan 10
SWA(config-if)#exit
SWA(config)#interface fastEthernet 0/3
SWA(config-if)#switchport mode access
SWA(config-if)#switchport access vlan
% Incomplete command.
SWA(config-if)#switchport access vlan
% Incomplete command.
SWA(config-if)#switchport access vlan 10
SWA(config-if)#exit
SWA(config)#interface fastEthernet 0/4
SWA(config-if)#switchport mode access
SWA(config-if)#switchport access vlan 5
SWA(config-if)#

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Activate Windows  
Go to Settings to activate W

Top

 SWB

Physical Config **CLI** Attributes

IOS Command Line Interface

```
User Access Verification
Password:
SWB>en
Password:
SWB#interface fastEthernet 0/1
^
% Invalid input detected at '^' marker.

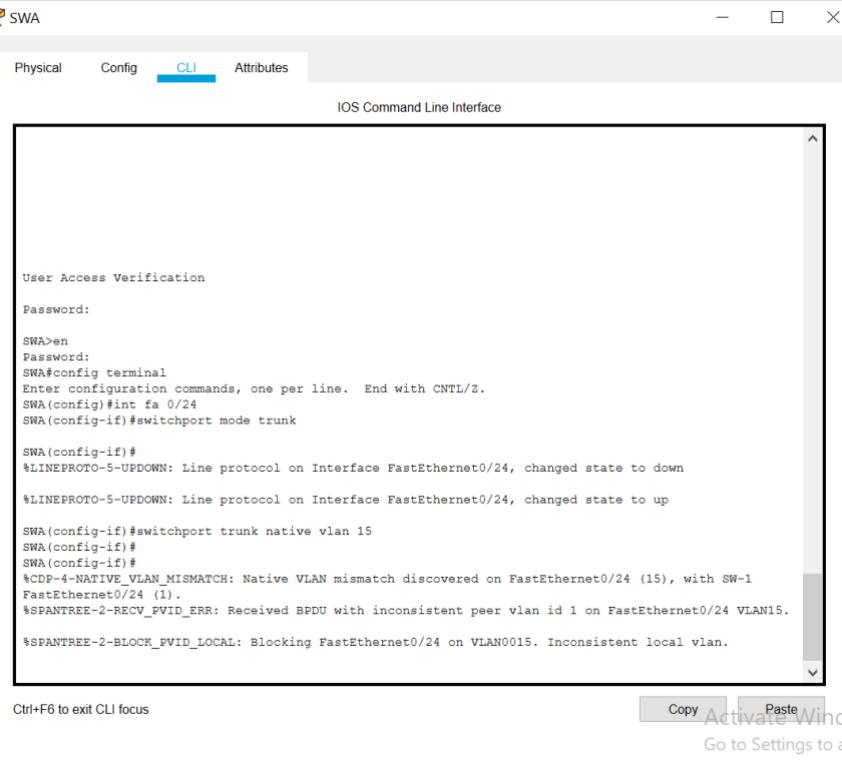
SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#interface fastEthernet 0/1
SWB(config-if)#switchport mode access
SWB(config-if)#switchport access vlan 5
SWB(config-if)#interface fastEthernet 0/2
SWB(config-if)#switchport mode access
SWB(config-if)#switchport access vlan 5
SWB(config-if)#interface fastEthernet 0/3
SWB(config-if)#switchport mode access
SWB(config-if)#switchport access vlan 5
SWB(config-if)#interface fastEthernet 0/4
SWB(config-if)#switchport mode access
SWB(config-if)#switchport access vlan 10
SWB(config-if)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Activate Go to Settings to ac

Top

 SWA

Physical Config **CLI** Attributes

IOS Command Line Interface

```
User Access Verification
Password:
SWA>en
Password:
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#int fa 0/24
SWA(config-if)#switchport mode trunk

SWA(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up

SWA(config-if)#
SWA(config-if)#
SWA(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/24 (1).
%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on FastEthernet0/24 VLAN15.
%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking FastEthernet0/24 on VLAN015. Inconsistent local vlan.
```

Ctrl+F6 to exit CLI focus      Copy      Paste

Activate Go to Settings to ac

Top

SW-1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (1), with SWA
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (1), with SWA
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (1), with SWA
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (1), with SWA
FastEthernet0/24 (15).

User Access Verification

Password:

SW-1>en
Password:
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#int fa 0/24
SW-1(config-if)#switchport mode trunk
SW-1(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (1), with SWA
FastEthernet0/24 (15).

SW-1(config-if)#switch trunk native vlan 15
SW-1(config-if)##SPAN TREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/24 on VLAN0015. Port
consistency restored.

##SPAN TREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/24 on VLAN0001. Port consistency restored.
```

Ctrl+F6 to exit CLI focus   

Top    Activate V  
Go to Setting

SWB

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Press RETURN to get started.

User Access Verification

Password:

SWB>en
Password:
SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#int fa 0/24
SWB(config-if)#switchport mode trunk

SWB(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up
SWB(config-if)#

Ctrl+F6 to exit CLI focus     
```

Top    Activate Windows  
Go to Settings to activate Windo

SW-2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

%SPANTREE-2-RECV_PVID_ERR: Received 802.1Q BPDU on non trunk FastEthernet0/23 VLAN1.
%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking FastEthernet0/23 on VLAN0001. Inconsistent port type.

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/23, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/23, changed state to up

User Access Verification
Password:
SW-2>en
SW-2>config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#int fa 0/24
SW-2(config-if)#switchport mode trunk
SW-2(config-if)#switch trunk native vlan 15
SW-2(config-if)#
SW-2(config-if)#

Ctrl+F6 to exit CLI focus
```

Copy Paste

Activate Window  
Go to Settings to activate V

SW-1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

User Access Verification
Password:
SW-1>en
Password:
SW-1#interface gigabitEthernet 0/1
^
% Invalid input detected at '^' marker.

SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#interface gigabitEthernet 0/1
SW-1(config-if)#switchport mode trunk

SW-1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

SW-1(config-if)#

Ctrl+F6 to exit CLI focus
```

Copy Paste

Activate Window  
Go to Settings to activa

Top

SW-2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
User Access Verification
Password:
SW-2>en
SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#interface gigabitEthernet 0/1
SW-2(config-if)#switchport mode trunk

SW-2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

SW-2(config-if)#switch trunk native vlan 15
SW-2(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with Central
GigabitEthernet0/2 (1).
%SPANTREE-2-RECV_PVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/1
VLAN15.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking GigabitEthernet0/1 on VLAN0015. Inconsistent local vlan.

|
```

Ctrl+F6 to exit CLI focus     

Top

Central

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Password:
Central>en
Password:
Password:
Central#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (1), with SW-2
GigabitEthernet0/1 (15).

Central#interface range gigabitEthernet 0/1-2
^
% Invalid input detected at '^' marker.

Central#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Central(config)#interface range gigabitEthernet 0/1-2
Central(config-if-range)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (1), with SW-2
GigabitEthernet0/1 (15).

Central(config-if-range)#switchport mode trunk
Central(config-if-range)#switchport trunk native vlan 15
Central(config-if-range)##SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking GigabitEthernet0/2 on VLAN0015.
Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking GigabitEthernet0/2 on VLAN0001. Port consistency
restored.

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

Central(config-if-range)#
Central(config-if-range)#

|
```

Ctrl+F6 to exit CLI focus     

**Activate Window**

Go to Settings to activa

Top

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
User Access Verification

Password:
R1>enable
Password:
Password:
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface GigabitEthernet0/0
R1(config-if)#no shutdown
R1(config-if)#
R1(config-if)#exit
R1(config)#interface GigabitEthernet0/1
R1(config-if)#R1(config-if)#ex
^
% Invalid input detected at '^' marker.

R1(config-if)#ex
R1(config)#interface gigabitEthernet 0/0.1
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1, changed state to up

R1(config-subif)#en
% Ambiguous command: "en"
R1(config)#interface gigabitEthernet 0/0.1
R1(config-subif)#encapsulation dot1Q 5
R1(config-subif)#ip address 192.168.5.100 255.255.255.0
R1(config-subif)#ex
R1(config)#interface gigabitEthernet 0/0.2
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.2, changed state to up
```

Ctrl+F6 to exit CLI focus     

Top      Activate Windows  
Go to Settings to activate W

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
% Invalid input detected at '^' marker.

R1(config-if)#ex
R1(config)#interface gigabitEthernet 0/0.1
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1, changed state to up

R1(config-subif)#en
% Ambiguous command: "en"
R1(config)#interface gigabitEthernet 0/0.1
R1(config-subif)#encapsulation dot1Q 5
R1(config-subif)#ip address 192.168.5.100 255.255.255.0
R1(config-subif)#ex
R1(config)#interface gigabitEthernet 0/0.2
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.2, changed state to up

R1(config-subif)#encapsulation dot1Q 10
R1(config-subif)#ip address 192.168.10.100 255.255.255.0
R1(config-subif)#
R1(config)#interface gigabitEthernet 0/0.15
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.15, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.15, changed state to up

R1(config-subif)#encapsulation dot1Q 15
R1(config-subif)#ip address 192.168.15.100 255.255.255.0
R1(config-subif)#ex
R1(config)#


```

Ctrl+F6 to exit CLI focus     

Top      Activate Windows  
Go to Settings to activate W

C2

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=18ms TTL=128
Reply from 192.168.10.2: bytes=32 time=1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 18ms, Average = 4ms

C:\>ping 192.168.5.2

Pinging 192.168.5.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
c:\>
```

Activate Windows  
Go to Settings to activate Windows.

 Top

Central

Physical Config CLI Attributes

IOS Command Line Interface

```
Central>en
Password:
Central#interface fastEthernet 0/1
^
% Invalid input detected at '^' marker.

Central#interface fastEthernet 0/1
Central#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

Central#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Central(config)#interface fastEthernet 0/1
Central(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

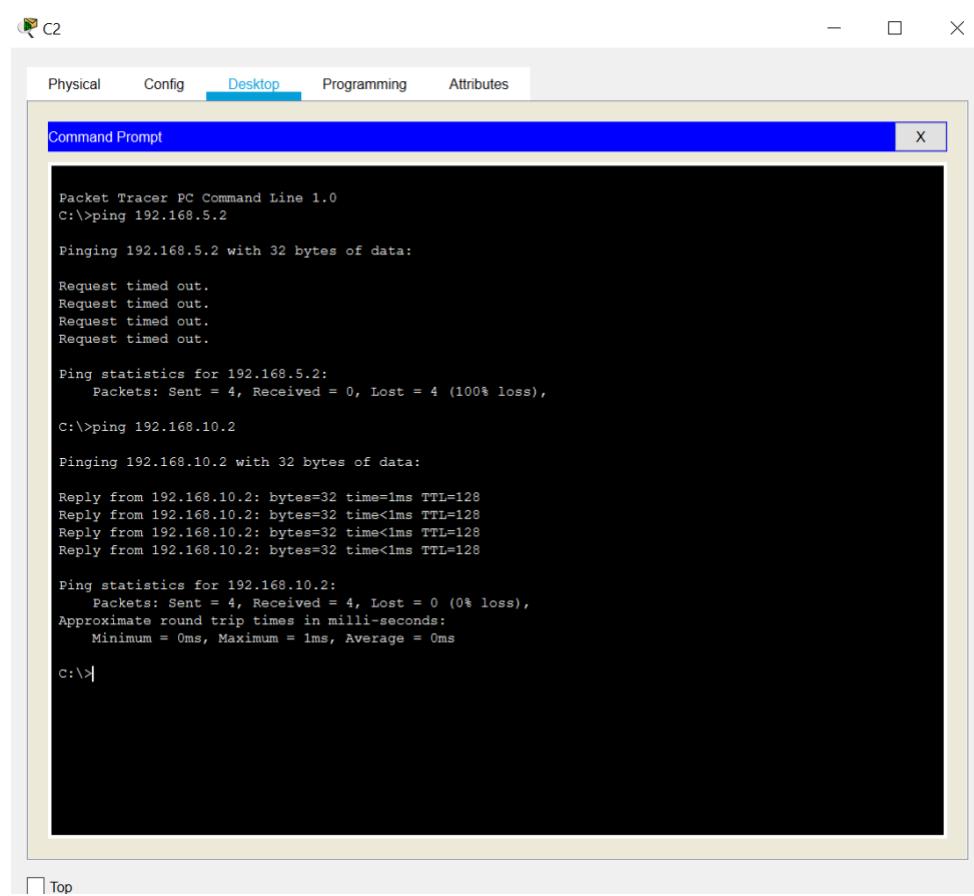
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

Central(config-if)#switchport mode trunk
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

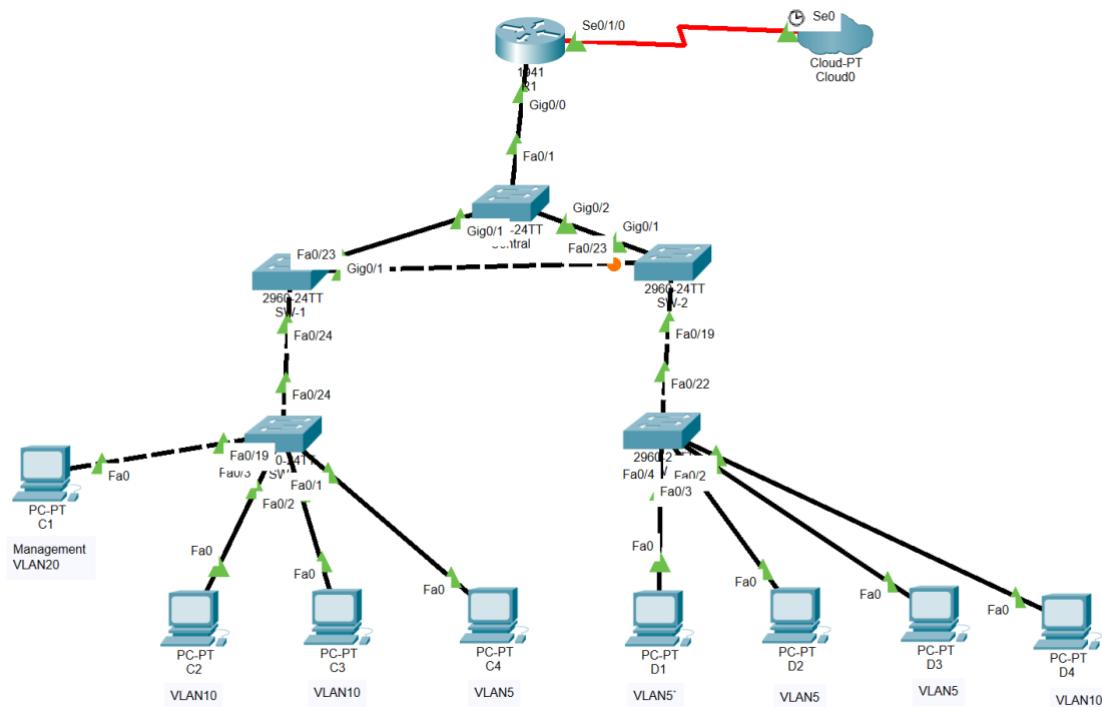
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Central(config-if)#switchport mode trunk
```

Ctrl+F6 to exit CLI focus     

Top



## Practical 9 – Configure VLAN 20



**Create a Redundant Link between SW-1 and SW-2**

SW-1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).

User Access Verification
Password:
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

SW-1>en
Password:
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#interface fastEthernet 0/24
SW-1(config-if)#switchport mode trunk
SW-1(config-if)#swit
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).
ch
% Incomplete command.
SW-1(config-if)#switchport trunk native vlan 15
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

SW-1(config-if)#switch nonegotiate
SW-1(config-if)#no shutdown
SW-1(config-if)#

```

Ctrl+F6 to exit CLI focus           

Top

SW-2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

User Access Verification

Password:

SW-2>en
SW-2#en
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

SW-2(config)#inter
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

% Incomplete command.
SW-2(config)#interface fastEthernet 0/24
SW-2(config-if)#switchport mode trunk
SW-2(config-if)#switchport trunk native vlan 15
SW-2(config-if)#switchport no
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

SW-2(config-if)#switchport nonegotiate
SW-2(config-if)#no shutdown
SW-2(config-if)#

Ctrl+F6 to exit CLI focus
```

Top

**Copy**    **Paste**

SWA

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Cisco IOS Software, C2960 Software (C2960-LANBASE-M), Version 12.2(25)FX, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Wed 12-Oct-05 22:05 by pt_team

Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

User Access Verification

Password:

SWA>en
Password:
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#vlan 20
SWA(config-vlan)#exit
SWA(config)#

Ctrl+F6 to exit CLI focus
```

Top

**SWB**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

User Access Verification

Password:

SWB>en
Password:
SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#vlan 20
SWB(config-vlan)#exit
SWB(config)#[
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

**SW-1**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

User Access Verification

Password:

SW-1>en
Password:
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/14 (1), with SW-2
FastEthernet0/24 (15).

SW-1(config)#vlan 20
SW-1(config-vlan)#exit
SW-1(config)#[
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

**SW-2**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/24 (15), with SW-1
FastEthernet0/14 (1).

User Access Verification

Password:

SW-2>en
SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#vlan 20
SW-2(config-vlan)#exit
SW-2(config)#

Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

**SWA**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

User Access Verification

Password:

SWA>en
Password:
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#interface vlan 20
SWA(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed state to up
SWA(config-if)#ip address 192.168.20.1 255.255.255.0
SWA(config-if)#

Ctrl+F6 to exit CLI focus
```

Top

SWB

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/24, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/22, changed state to up

User Access Verification

Password:

SWB>en
Password:
SWB#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWB(config)#vlan 20
SWB(config-vlan)#x
SWB(config)#interface vlan 20
SWB(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up
SWB(config-if)#ip address 192.168.20.2 255.255.255.0
SWB(config-if)#

Ctrl+F6 to exit CLI focus
```

Top

Copy    Paste

SW-1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

User Access Verification

Password:

SW-1>
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (1), with Central
GigabitEthernet0/1 (15).

SW-1>en
Password:
SW-1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-1(config)#interface vlan 20
SW-1(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed state to up
SW-1(config-if)#ip address 192.168.20.3 255.255.255.0
SW-1(config-if)#

Ctrl+F6 to exit CLI focus
```

Top

Copy    Paste

SW-2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

Press RETURN to get started!

User Access Verification
Password:

SW-2>en
SW-2#enpa55
Translating "enpa55"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

SW-2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SW-2(config)#interface vlan 20
SW-2(config-if)#
%LINK-5-CHANGED: Interface Vlan20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed state to up
SW-2(config-if)#ip address 192.168.20.4 255.255.255.0
SW-2(config-if)#

```

Ctrl+F6 to exit CLI focus       

Top

Central

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

User Access Verification
Password:

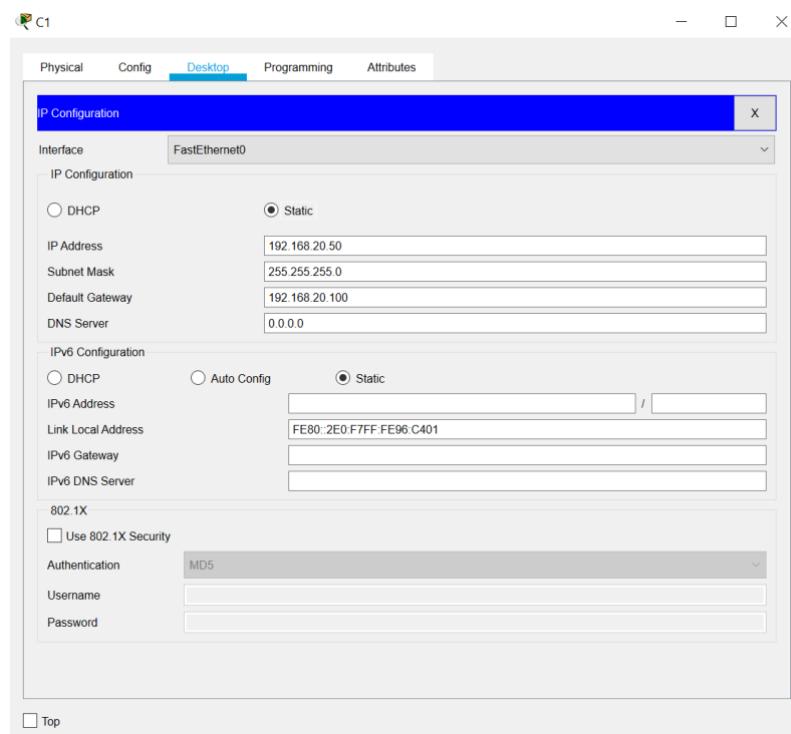
Central>en
Password:
Central#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Central(config)#
%CDFP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (15), with SW-1
GigabitEthernet0/1 (1).

Central(config)#interface vlan 20
Central(config-if)#ip address 192.168.20.5 255.255.255.0
Central(config-if)#

```

Ctrl+F6 to exit CLI focus       

Top



**SWA**

Physical Config CLI Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/20, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/20, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/20, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/19, changed state to up

User Access Verification

Password:

SWA>en
Password:
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#interface vlan 20
SWA(config-if)#ip address 192.168.20.1 255.255.255.0
SWA(config-if)#exit
SWA(config)#interface fastEthernet 0/2
SWA(config-if)#interface fastEthernet 0/1
SWA(config-if)#mode
^
% Invalid input detected at '^' marker.

SWA(config-if)#switchport mode access
SWA(config-if)#switchport access vlan 20
SWA(config-if)#exit
SWA(config-if)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Top

The screenshot shows a window titled "SWA" with a tab bar at the top containing "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Below the tab bar is a header "IOS Command Line Interface". The main area of the window displays the following text:

```
SWA con0 is now available

Press RETURN to get started.

User Access Verification
Password:
SWA>en
Password:
SWA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
SWA(config)#interface FastEthernet 0/1
SWA(config-if)#no shutdown
SWA(config-if)#[
```

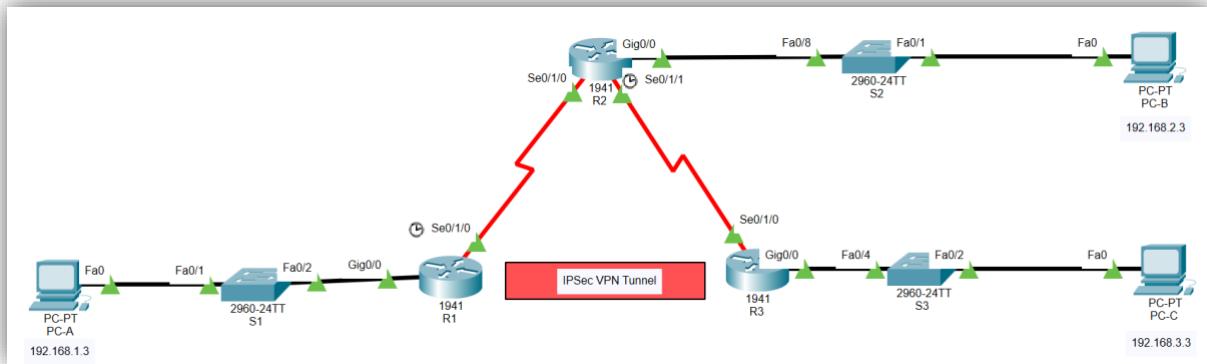
At the bottom left of the window, there is a message "Ctrl+F6 to exit CLI focus". On the right side, there are two buttons: "Copy" and "Paste".

Top

## Practical 10

### Configure and Verify a Site to Site IPSec VPN Using CLI

#### Topology



#### Addressing Table:

Sr No	Devices Sequences	Name	IP Address	Subnet Mask	Default Gateway
1	PC-PT	PC-A	192.168.1.3	255.255.255.0	192.168.1.1
2	2940-24TT Switch	S1	-	-	-
3	1941 Router	R1	Gig0/0-192.168.1.1 (Port ON) Serial0/1/0-10.1.1.2	Gig0/0-255.255.255.0 (Port ON) Serial0/1/0-255.255.255.252	-
4	1941 Router	R2	Gig0/0 – 192.168.2.1 Serial0/1/0-10.1.1.1 Serial0/1/1-10.2.2.1	Gig0/0 – 255.255.255.0 Serial0/1/0-255.255.255.252 Serial0/1/1-255.255.255.252	-
5	1941 Router	R3	Gig0/0-192.168.3.1 (Port ON) Serial0/1/0-10.2.2.2	Gig0/0-255.255.255.0 (Port ON) Serial0/1/0-255.255.255.252	-
6	2940-24TT Switch	S2	-	-	-
7	2940-24TT Switch	S3	-	-	-
8	PC-PT	PC-B	192.168.2.3	255.255.255.0	192.168.2.1
9	PC-PT	PC-C	192.168.3.3	255.255.255.0	192.168.1.3

Rename all 3 Routers in Config in Display name and hostname both as R1 R2 and R3

And Add HWIC-2T

```

User Access Verification
Password:
R1>en
Password:
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#enable secret enpa55
R1(config)#line console 0
R1(config-line)#password conpa55
R1(config-line)#login
R1(config-line)#exit
R1(config)#ip domain-name ccnasecurity.com
R1(config)#username admin secret adminpa55
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#crypto key generate rsa
The name for the keys will be: R1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R1(config)#

```

Ctrl+F6 to exit CLI focus

Copy

Paste

Top

```

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#enable secret enpa55
R2(config)#line console 0
R2(config-line)#password conpa55
R2(config-line)#login
R2(config-line)#exit
R2(config)#ip domain-name ccnasecurity.com
R2(config)#username admin secret adminpa55
R2(config)#line vty 0 4
R2(config-line)#login local
R2(config-line)#crypto key generate rsa
The name for the keys will be: R2.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R2(config)#

```

Ctrl+F6 to exit CLI focus

Copy

Paste

Top

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#enable secret enpa55
R3(config)#line console 0
R3(config-line)#password conpa55
R3(config-line)#login
R3(config-line)#exit
R3(config)#ip domain-name ccnasecurity.com
R3(config)#username admin secret adminpa55
R3(config)#line vty 0 4
R3(config-line)#login local
R3(config-line)#crypto key generate rsa
The name for the keys will be: R3.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R3(config)#

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

User Access Verification
Password:

R1>en
Password:
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#enable secret enpa55
R1(config)#line console 0
R1(config-line)#password conpa55
R1(config-line)#login
R1(config-line)#exit
R1(config)#ip domain-name ccnasecurity.com
R1(config)#username admin secret adminpa55
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#crypto key generate rsa
The name for the keys will be: R1.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R1(config)#router ospf 1
*Mar 1 0:45:47.752: %SSH-5-ENABLED: SSH 1.99 has been enabled
R1(config-router)#network 192.168.1.0 0.0.0.255 area 0
R1(config-router)#network 10.1.1.0 0.0.0.3 area 0
R1(config-router)#ex
R1(config)#

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

R2

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#enable secret enpa55
R2(config)#line console 0
R2(config-line)#password conpa55
R2(config-line)#login
R2(config-line)#exit
R2(config)#ip domain-name ccnasecurity.com
R2(config)#username admin secret adminpa55
R2(config)#line vty 0 4
R2(config-line)#login local
R2(config-line)#crypto key generate rsa
The name for the keys will be: R2.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R2(config)#router ospf 1
*Mar 1 0:50:14.591: %SSH-5-ENABLED: SSH 1.99 has been enabled
R2(config-router)#network 192.168.2.0 0.0.0.255 area 0
R2(config-router)#network 10.1.1.0 0.0.0.3 area 0
R2(config-router)#network 10.2.2.0 0.0.0.3 area 0
R2(config-router)#
00:59:05: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial0/1/0 from LOADING to FULL, Loading
Done

R2(config-router)#ex
R2(config)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Top

R3

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#enable secret enpa55
R3(config)#line console 0
R3(config-line)#password conpa55
R3(config-line)#login
R3(config-line)#exit
R3(config)#ip domain-name ccnasecurity.com
R3(config)#username admin secret adminpa55
R3(config)#line vty 0 4
R3(config-line)#login local
R3(config-line)#crypto key generate rsa
The name for the keys will be: R3.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

R3(config)#
*Mar 1 0:52:38.655: %SSH-5-ENABLED: SSH 1.99 has been enabled
R3(config)#router ospf 1
R3(config-router)#network 192.168.3.0 0.0.0.255 area 0
R3(config-router)#network 10.2.2.0 0.0.0.3 area 0
R3(config-router)#
01:02:41: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/1/0 from LOADING to FULL, Loading
Done

R3(config-router)#ex
R3(config)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Top

PC-A

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.3.3: bytes=32 time=2ms TTL=125
Reply from 192.168.3.3: bytes=32 time=2ms TTL=125
Reply from 192.168.3.3: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Reply from 192.168.3.3: bytes=32 time=2ms TTL=125

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 27ms, Average = 8ms

C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.3: bytes=32 time=7ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
Reply from 192.168.2.3: bytes=32 time=1ms TTL=126
```

Top

PC-B

Physical Config Desktop Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Reply from 192.168.3.3: bytes=32 time=1ms TTL=126
Reply from 192.168.3.3: bytes=32 time=10ms TTL=126
Reply from 192.168.3.3: bytes=32 time=1ms TTL=126
Reply from 192.168.3.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 10ms, Average = 3ms

C:\>
```

Top

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R1(config)#ex
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed Feb 23 2011 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 1 hours, 15 minutes, 42 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wlc/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
```

Ctrl+F6 to exit CLI focus      Copy      Paste

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:
License UDI:
-----
Device# PID SN
-----
*0 CISCO1941/K9 FTX15240GD2

Technology Package License Information for Module:'c1900'
-----
Technology Technology-package Technology-package
Current Type Next reboot
-----
ipbase ipbasek9 Permanent ipbasek9
security disable None None
data disable None None

Configuration register is 0x2102

R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config) #
```

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R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#license boot module c1900 technology-package security k9
^
% Invalid input detected at '^' marker.

R1(config)#license boot module c1900 technology-package security k9
^
% Invalid input detected at '^' marker.

R1(config)#license boot module c1900 technology-package security
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.

Use of this product feature requires an additional license from Cisco,
together with an additional payment. You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
together with any supplements relating to such product feature. The
above applies even if the evaluation license is not automatically
terminated and you do not receive any notice of the expiration of the
evaluation period. It is your responsibility to determine when the
evaluation period is complete and you are required to make payment to
Cisco for your use of the product feature beyond the evaluation period.
```

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Top

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
ACCEPT? [yes/no]: yes
# use 'write' command to make license boot config take effect on next boot

R1(config)#: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = C1900 Next reboot level =
securityk9 and License = securityk9

R1(config)#exit
R1#
$SYS-5-CONFIG_I: Configured from console by console

R1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R1#reload
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with ECC disabled

 Readonly ROMMON initialized

 program load complete, entry point: 0x80803000, size: 0x1b340
 program load complete, entry point: 0x80803000, size: 0x1b340

 IOS Image Load Test
-----
Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
#####
#
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Password:
R1#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 1 minutes, 21 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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
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http://www.cisco.com/wlc/export/crypto/tool/stgrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)
```

Ctrl+F6 to exit CLI focus

Top

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R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

export@Cisco:
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

License Info:
License UDI:

-----
Device# PID SN
-----
*0 CISCO1941/K9 FTX15240GD2-

Technology Package License Information for Module:'c1900'
-----
Technology Technology-package Technology-package
Current Type Next reboot
-----
ipbase ipbasek9 Permanent ipbasek9
security securityk9 Evaluation securityk9
data disable None None

Configuration register is 0x2102

R1#
R1#
R1#
```

Ctrl+F6 to exit CLI focus

Top

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**R1**

Physical Config **CLI** Attributes

IOS Command Line Interface

Technology	Technology-package	Type	Technology-package
Current	ipbasek9	Permanent	ipbasek9
security	securityk9	Evaluation	securityk9
data	disable	None	None

Configuration register is 0x2102

```

R1#
R1#
R1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#access-list 110 permit ip 192.168.1.0 0.0.0.255 192.168.3.0 0.0.0.255
R1(config)#crypto isakmp policy 10
R1(config-isakmp)#encryption aes 256
R1(config-isakmp)#authentication pre-share
R1(config-isakmp)#group 5
R1(config-isakmp)#exit
R1(config)#crypto isakmp key vpnna address 10.2.2.2
R1(config)#crypto ipsec transform-set VPN-SET esp-aes esp-sha-hmac
R1(config)#crypto map VPN-MAP 10 ipsec-isakmp
% NOTE: This new crypto map will remain disabled until a peer
       and a valid access list have been configured.
R1(config-crypto-map)#description VPN connection to R3
R1(config-crypto-map)#set peer 10.2.2.2
R1(config-crypto-map)#set transform-set VPN-SET
R1(config-crypto-map)#match address 110
R1(config-crypto-map)#exit
R1(config)#int se0/1/0
R1(config-if)#crypto map VPN-MAP
*Jan 3 07:16:26.785: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is ON
R1(config-if)#exit
R1(config)#

```

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Top

**R3**

Physical Config **CLI** Attributes

IOS Command Line Interface

User Access Verification

Password:

```

R3>en
Password:
R3#show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 23-Feb-11 14:19 by pt_team

ROM: System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
cisco1941 uptime is 1 hours, 33 minutes, 34 seconds
System returned to ROM by power-on
System image file is "flash0:c1900-universalk9-mz.SPA.151-1.M4.bin"
Last reload type: Normal Reload

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/wl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.
Cisco CISCO1941/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS

```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Top

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Configuration register is 0x2102

R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#license boot module c1900 technology-package security
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.

Use of this product feature requires an additional license from Cisco,
together with an additional payment. You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
together with any supplements relating to such product feature. The
above applies even if the evaluation license is not automatically
terminated and you do not receive any notice of the expiration of the
evaluation period. It is your responsibility to determine when the
evaluation period is complete and you are required to make payment to
Cisco for your use of the product feature beyond the evaluation period.

Your acceptance of this agreement for the software features on one
product shall be deemed your acceptance with respect to all such
software on all Cisco products you purchase which includes the same
software. (The foregoing notwithstanding, you must purchase a license
for each software feature you use past the 60 days evaluation period,
so that if you enable a software feature on 1000 devices, you must
```

Ctrl+F6 to exit CLI focus

Top

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R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
securityk9 and License = securityk9

R3(config)#ex
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R3#reload
Proceed with reload? [confirm]
System Bootstrap, Version 15.1(4)M4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2010 by cisco Systems, Inc.
Total memory size = 512 MB - On-board = 512 MB, DIMM0 = 0 MB
CISCO1941/K9 platform with 524288 Kbytes of main memory
Main memory is configured to 64/-1(On-board/DIMM0) bit mode with ECC disabled

Readonly ROMMON initialized

program load complete, entry point: 0x80803000, size: 0xb340
program load complete, entry point: 0x80803000, size: 0xb340

IOS Image Load Test

Digitally Signed Release Software
program load complete, entry point: 0x81000000, size: 0x2bb1c58
Self decompressing the image :
#####
Smart Init is enabled
smart init is sizing iomem
      TYPE      MEMORY_REQ
    HWIC Slot 1  0x00200000  Onboard devices &
      buffer pools  0x01e8f000
```

Ctrl+F6 to exit CLI focus

Top

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```

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
00:00:20: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/1/0 from LOADING to FULL, Loading Done

User Access Verification

Password:
R3>enpa55
Translating "enpa55"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

R3>en
Password:
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#access-list 110 permit 192.168.3.0 0.0.0.255 192.168.1.0 0.0.0.255
          ^
% Invalid input detected at '^' marker.

R3(config)#access-list 110 permit ip 192.168.3.0 0.0.0.255 192.168.1.0 0.0.0.255
R3(config)#
R3(config)#crypto isakmp policy 10
R3(config-isakmp)#encryption aes 256
R3(config-isakmp)#authentication pre-share
R3(config-isakmp)#group 5
R3(config-isakmp)#exit
R3(config)#crypto isakmp key vpnna address 10.1.1.2
R3(config)#

```

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```

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
00:00:10: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/1/0 from LOADING to FULL, Loading Done

User Access Verification

Password:
R3>en
Password:
R3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#crypto ipsec transform-set VPN-SET esp-aes esp-sha-hmac
R3(config)#description VPN connection to R1
          ^
% Invalid input detected at '^' marker.

R3(config)#crypto map VPN-MAP 10 ipsec-isakmp
R3(config-crypto-map)#description VPN connection to R1
R3(config-crypto-map)#set peer 10.1.1.2
R3(config-crypto-map)#set transform-set VPN-SET
R3(config-crypto-map)#match address 110
R3(config-crypto-map)#exit
R3(config)#int se0/1/0
R3(config-if)#crypto map VPN-MAP
*Jan 3 07:16:26.785: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is ON
R3(config-if)#exit
R3(config)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

Top

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1#show crypto ipsec
% Incomplete command.
R1#show crypto ipsec sa

interface: Serial0/1/0
  Crypto map tag: VPN-MAP, local addr 10.1.1.2

  protected vrf: (none)
  local ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
  remote ident (addr/mask/prot/port): (192.168.3.0/255.255.255.0/0/0)
  current_peer 10.2.2.2 port 500
    PERMIT, flags=(origin_is_acl,)
  #pkts encaps: 0, #pkts encrypt: 0, #pkts digest: 0
  #pkts decaps: 0, #pkts decrypt: 0, #pkts verify: 0
  #pkts compressed: 0, #pkts decompressed: 0
  #pkts not compressed: 0, #pkts compr. failed: 0
  #pkts not decompressed: 0, #pkts decompress failed: 0
  #send errors 0, #recv errors 0

  local crypto endpt.: 10.1.1.2, remote crypto endpt.:10.2.2.2
  path mtu 1500, ip mtu 1500, ip mtu idb Serial0/1/0
  current outbound spi: 0x0(0)

  inbound esp sas:
  inbound ah sas:
  inbound pcp sas:
  outbound esp sas:
  outbound ah sas:
  outbound pcp sas:

Ctrl+F6 to exit CLI focus
```

Top

PC-C

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 192.168.1.3: bytes=32 time=3ms TTL=126
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.3:
  Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126
Reply from 192.168.1.3: bytes=32 time=3ms TTL=126
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.3:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>
```

Top

R1#show crypto ipsec sa

interface: Serial0/1/0  
Crypto map tag: VPN-MAP, local addr 10.1.1.2

protected vrf: (none)  
local ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)  
remote ident (addr/mask/prot/port): (192.168.3.0/255.255.255.0/0/0)  
current\_peer 10.2.2.2 port 500  
PERMIT, flags=(origin\_is\_acl,)  
#pkts encap: 6, #pkts encrypt: 6, #pkts digest: 0  
#pkts decaps: 7, #pkts decrypt: 7, #pkts verify: 0  
#pkts compressed: 0, #pkts decompressed: 0  
#pkts not compressed: 0, #pkts compr. failed: 0  
#pkts not decompressed: 0, #pkts decompress failed: 0  
#send errors 0, #recv errors 0

local crypto endpt.: 10.1.1.2, remote crypto endpt.:10.2.2.2  
path mtu 1500, ip mtu 1500, ip mtu idb Serial0/1/0  
current outbound spi: 0x24706525(611345701)

inbound esp sas:  
spi: 0x76711BE1(1987124193)  
transform: esp-aes esp-sha-hmac ,  
in use settings =(Tunnel, )  
conn id: 2003, flow\_id: FPGA:1, crypto map: VPN-MAP  
sa timing: remaining key lifetime (k/sec): (4525504/3473)  
IV size: 16 bytes  
replay detection support: N  
Status: ACTIVE

inbound ah sas:

inbound pcp sas:

Ctrl+F6 to exit CLI focus

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 Top

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

current_peer 10.2.2.2 port 500
    PERMIT, flags=(origin_is_acl)
#pkts encaps: 6, #pkts encrypt: 6, #pkts digest: 0
#pkts decaps: 7, #pkts decrypt: 7, #pkts verify: 0
#pkts compressed: 0, #pkts decompressed: 0
#pkts not compressed: 0, #pkts compr. failed: 0
#pkts not decompressed: 0, #pkts decompress failed: 0
#send errors 0, #recv errors 0

local crypto endpt.: 10.1.1.2, remote crypto endpt.:10.2.2.2
path mtu 1500, ip mtu 1500, ip mtu idb Serial0/1/0
current outbound spi: 0x24706525(611345701)

inbound esp sas:
    spi: 0x76711BEB1(1987124193)
        transform: esp-aes esp-sha-hmac ,
        in use settings =(Tunnel, )
        conn id: 2003, flow_id: FFGA:1, crypto map: VPN-MAP
        sa timing: remaining key lifetime (k/sec): (4525504/3473)
        IV size: 16 bytes
        replay detection support: N
        Status: ACTIVE

inbound ah sas:

inbound pcp sas:

outbound esp sas:
    spi: 0x24706525(611345701)
        transform: esp-aes esp-sha-hmac ,
        in use settings =(Tunnel, )
        conn id: 2004, flow_id: FFGA:1, crypto map: VPN-MAP
        sa timing: remaining key lifetime (k/sec): (4525504/3473)
        IV size: 16 bytes
--More--

```

Ctrl+F6 to exit CLI focus

Top

PC-B

Physical    Config    **Desktop**    Programming    Attributes

Command Prompt

```

Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=11ms TTL=126
Reply from 192.168.1.3: bytes=32 time=3ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 11ms, Average = 4ms

C:\>

```

Top

The image shows two separate terminal windows, each titled with the router's name (R1 and R3) and displaying the Cisco IOS Command Line Interface (CLI). Both windows have tabs for Physical, Config, CLI (which is selected), and Attributes.

**R1 Terminal Output:**

```
in use settings ={Tunnel, }
conn id: 2003, flow_id: FPGA:1, crypto map: VPN-MAP
sa timing: remaining key lifetime (k/sec): (4525504/3473)
IV size: 16 bytes
replay detection support: N
Status: ACTIVE

inbound ah sas:
inbound pcp sas:

outbound esp sas:
    spi: 0x24706525(611345701)
        transform: esp-aes esp-sha-hmac ,
    in use settings ={Tunnel, }
    conn id: 2004, flow_id: FPGA:1, crypto map: VPN-MAP
    sa timing: remaining key lifetime (k/sec): (4525504/3473)
    IV size: 16 bytes
    replay detection support: N
    Status: ACTIVE

outbound ah sas:
outbound pcp sas:

R1#
R1#
R1#ping 192.168.3.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.3.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/5/14 ms

R1#
```

**R3 Terminal Output:**

```
R3 con0 is now available

Press RETURN to get started.

User Access Verification

Password:
R3>en
Password:
R3#ping 192.168.1.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/7/24 ms

R3#
```

Both terminals include standard Cisco CLI controls at the bottom: "Ctrl+F6 to exit CLI focus", "Copy", and "Paste". There is also a "Top" button in the bottom-left corner of each window.

R1>en  
Password:  
R1#show crypto ipsec sa

```
interface: Serial0/1/0
    Crypto map tag: VPN-MAP, local addr 10.1.1.2
    protected vrf: (none)
    local ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
    remote ident (addr/mask/prot/port): (192.168.3.0/255.255.255.0/0/0)
    current_peer 10.2.2.2 port 500
        PERMIT, flags=(origin_is_acl,)
    #pkts encaps: 6, #pkts encrypt: 6, #pkts digest: 0
    #pkts decaps: 7, #pkts decrypt: 7, #pkts verify: 0
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

    local crypto endpt.: 10.1.1.2, remote crypto endpt.:10.2.2.2
    path mtu 1500, ip mtu 1500, ip mtu idb Serial0/1/0
    current outbound spi: 0x24706525(611345701)

    inbound esp sas:
        spi: 0x76711BEC(1987124193)
        transform: esp-aes esp-sha-hmac ,
        in use settings ={Tunnel, }
        conn id: 2003, flow_id: FPGA:1, crypto map: VPN-MAP
        sa timing: remaining key lifetime (k/sec): (4525504/2318)
        IV size: 16 bytes
        replay detection support: N
        Status: ACTIVE

    inbound ah sas:
```

Ctrl+F6 to exit CLI focus       Top