# INDEX

| s.no | Topic | Date | Signature |
|---|---|---|---|
| 1. | To explore networking commands | 01/08/22 | |
| 2. | To explore configure various network topologies. | 01/08/22 | |
| 3. | To configure switch for different topologies. | 08/08/22 | |
| 4. | To explore and configure VLANs. | 29/08/22 | |
| 5. | To configure Router | 12/09/22 | |
| 6. | Configuring router and learn about 802.11 protocol | 19/09/22 | |
| 7. | To configure ipv6 address on a router | 26/09/22 | |
| 8. | To learn static routing of the routers | 03/10/22 | |
| 9. | To use DHCP, DNS & WEB service using servers | 10/10/22 | |
| | | | |
| | | | |
| | | | |
| | | | |

# Lab-1

**Aim :** To explore and learn networking commands.

**Commands:**
*Name:* ping

Usage:
A ping is a basic internet program that allows a user to test and verify if a particular destination IP address exists and can accept requests in computer network administration.

Syntax:

```
ping [options] <target address>
```

options:

-t Ping the specified host until stopped.
To see statistics and continue - type Control-Break;
To stop - type Control-C.

-a Resolve addresses to hostnames.

-n count Number of echo requests to send.

-l size Send buffer size.

-f Set Don't Fragment flag in packet (IPv4-only).

-i TTL Time To Live.

-v TOS Type Of Service (IPv4-only. This setting has been deprecated and has no effect on the type of service field in the IP Header).

-r count Record route for count hops (IPv4-only).

-s count Timestamp for count hops (IPv4-only).

-j host-list Loose source route along host-list (IPv4-only).

-k host-list Strict source route along host-list (IPv4-only).

-w timeout Timeout in milliseconds to wait for each reply.

-R Use routing header to test reverse route also (IPv6-only).
Per RFC 5095 the use of this routing header has been deprecated. Some systems may drop echo requests if this header is used.

-S <Srcaddr> Source address to use.

-c compartment Routing compartment identifier.

-p Ping a Hyper-V Network Virtualization provider address.

-4 Force using IPv4.

-6 Force using IPv6.

Example:

```
:\Users\DELL>ping 202.12.103.20

inging 202.12.103.20 with 32 bytes of data:
eply from 202.12.103.20: bytes=32 time=5ms TTL=251
eply from 202.12.103.20: bytes=32 time=37ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=11ms TTL=251

ing statistics for 202.12.103.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
pproximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 37ms, Average = 13ms
```

```
:\Users\DELL>ping 202.12.103.20 -t

inging 202.12.103.20 with 32 bytes of data:
eply from 202.12.103.20: bytes=32 time=38ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=2ms TTL=251
eply from 202.12.103.20: bytes=32 time=40ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=8ms TTL=251
eply from 202.12.103.20: bytes=32 time=43ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=10ms TTL=251
eply from 202.12.103.20: bytes=32 time=46ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=16ms TTL=251
eply from 202.12.103.20: bytes=32 time=49ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=16ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=12ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=1ms TTL=251
eply from 202.12.103.20: bytes=32 time=14ms TTL=251

ing statistics for 202.12.103.20:
    Packets: Sent = 21, Received = 21, Lost = 0 (0% loss),
pproximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 49ms, Average = 14ms
ontrol-C
C
```

```
C:\Users\DELL>ping 202.12.103.20 -n count
Bad value for option -n, valid range is from 1 to 4294967295.
```

Name: ipconfig

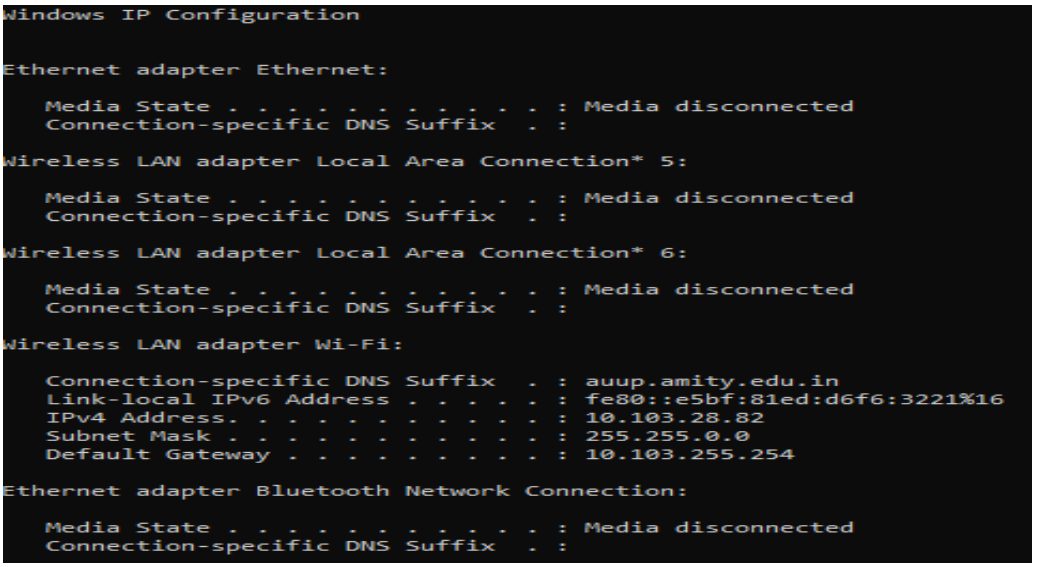
Usage:

The ipconfig command displays all the currently connected network interfaces whether they are active or not.

Syntax:

```
ipconfig [options]

options:

  /all             Display full configuration information.

       /release         Release the IPv4 address for the specified
adapter.

       /release6        Release the IPv6 address for the specified
adapter.

       /renew           Renew the IPv4 address for the specified adapter.

       /renew6          Renew the IPv6 address for the specified adapter.

       /flushdns        Purges the DNS Resolver cache.

     /registerdns     Refreshes all DHCP leases and re-registers DNS names

       /displaydns      Display the contents of the DNS Resolver Cache.

     /showclassid     Displays all the dhcp class IDs allowed for adapter.

       /setclassid      Modifies the dhcp class id.

       /showclassid6    Displays all the IPv6 DHCP class IDs allowed for
adapter.

       /setclassid6     Modifies the IPv6 DHCP class id.
```

Example:



*Name:* `tracert`

`Usage:`

The tracert diagnostic utility determines the route to a destination by sending internet control message protocol(ICMP) echo packets to the destination.

Syntax:

`tracert [options] <target address>`

Options:

-d Do not resolve addresses to hostnames.

-h maximum_hops Maximum number of hops to search for target.

-j host-list Loose source route along host-list (IPv4-only).

-w timeout Wait timeout milliseconds for each reply.

-R Trace round-trip path (IPv6-only).

-S srcaddr Source address to use (IPv6-only).

-4 Force using IPv4.

-6 Force using IPv6.

Example:

```
C:\Users\DELL>tracert 202.12.103.20

Tracing route to 202.12.103.20 over a maximum of 30 hops

  1     1 ms    <1 ms     1 ms  10.103.255.254
  2     8 ms    <1 ms     1 ms  10.0.253.1
  3     9 ms     1 ms     1 ms  202.12.103.126
  4     2 ms     3 ms     1 ms  202.12.103.14
  5     1 ms    <1 ms    <1 ms  202.12.103.20

Trace complete.
```

```
C:\Users\DELL>tracert google.com

Tracing route to google.com [142.250.194.14]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms  10.103.255.254
  2     1 ms     1 ms    <1 ms  10.0.253.1
  3     1 ms     2 ms     1 ms  202.12.103.126
  4    21 ms     1 ms     1 ms  74.125.50.56
  5     5 ms     3 ms     3 ms  108.170.251.97
  6     2 ms     1 ms     1 ms  142.251.52.199
  7    21 ms     1 ms     1 ms  del12s01-in-f14.1e100.net [142.250.194.14]

Trace complete.
```

Name: arp

Usage:

The arp command displays and modifies the Internet-to-adapter address translation tables used by the Address in Networks and communication management.

Syntax:

```
pathping [options] <target name>
```

Options:

-a Displays current ARP entries by interrogating the current protocol data. If inet_addr is specified, the IP and Physical addresses for only the specified computer are displayed. If more than one network interface uses ARP, entries for each ARP table are displayed.

-g Same as -a.

-v Displays current ARP entries in verbose mode. All invalid entries and entries on the loop-back interface will be shown.

inet_addr Specifies an internet address.

-N if_addr Displays the ARP entries for the network interface specified by if_addr.

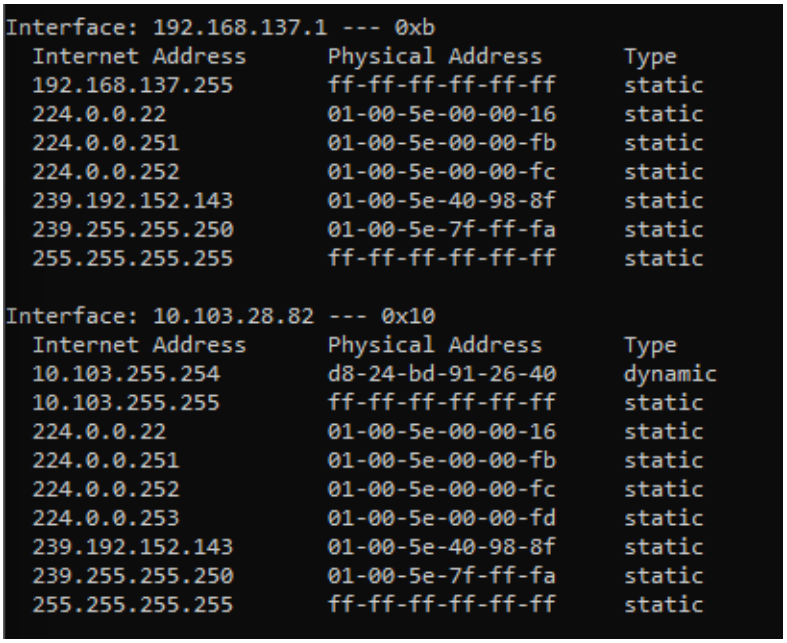
-d Deletes the host specified by inet_addr. inet_addr may be wildcarded with * to delete all hosts.

-s Adds the host and associates the Internet address inet_addr with the Physical address eth_addr. The Physical address is given as 6 hexadecimal bytes separated by hyphens. The entry is permanent.

eth_addr Specifies a physical address.

if_addr If present, this specifies the Internet address of the interface whose address translation table should be modified. If not present, the first applicable interface will be used.

Example:



```
Interface: 192.168.137.1 --- 0xb
  Internet Address      Physical Address      Type
  192.168.137.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.192.152.143       01-00-5e-40-98-8f     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 10.103.28.82 --- 0x10
  Internet Address      Physical Address      Type
  10.103.255.254        d8-24-bd-91-26-40     dynamic
  10.103.255.255        ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  224.0.0.253           01-00-5e-00-00-fd     static
  239.192.152.143       01-00-5e-40-98-8f     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

Name: pathping

Usage:

Provides information about network latency and network loss at intermediate hops between a source and destination.

Syntax:

```
pathping [options] <target name>
```

Options:

`-g`
: Loose source rout along host-list.

`-h <maximum_hops>`
: Maximum number of hops to search for target.

`-i <address>`
: Use the specified source address.

`-n`
: Do not resolve addresses to hostnames.

`-p <period>`
: Wait period milliseconds between pings.

`-q <num_queries>`
: Number of queries per hop.

`-w`
: Wait timeout milliseconds for each reply.

`-4`

Force using IPv4.

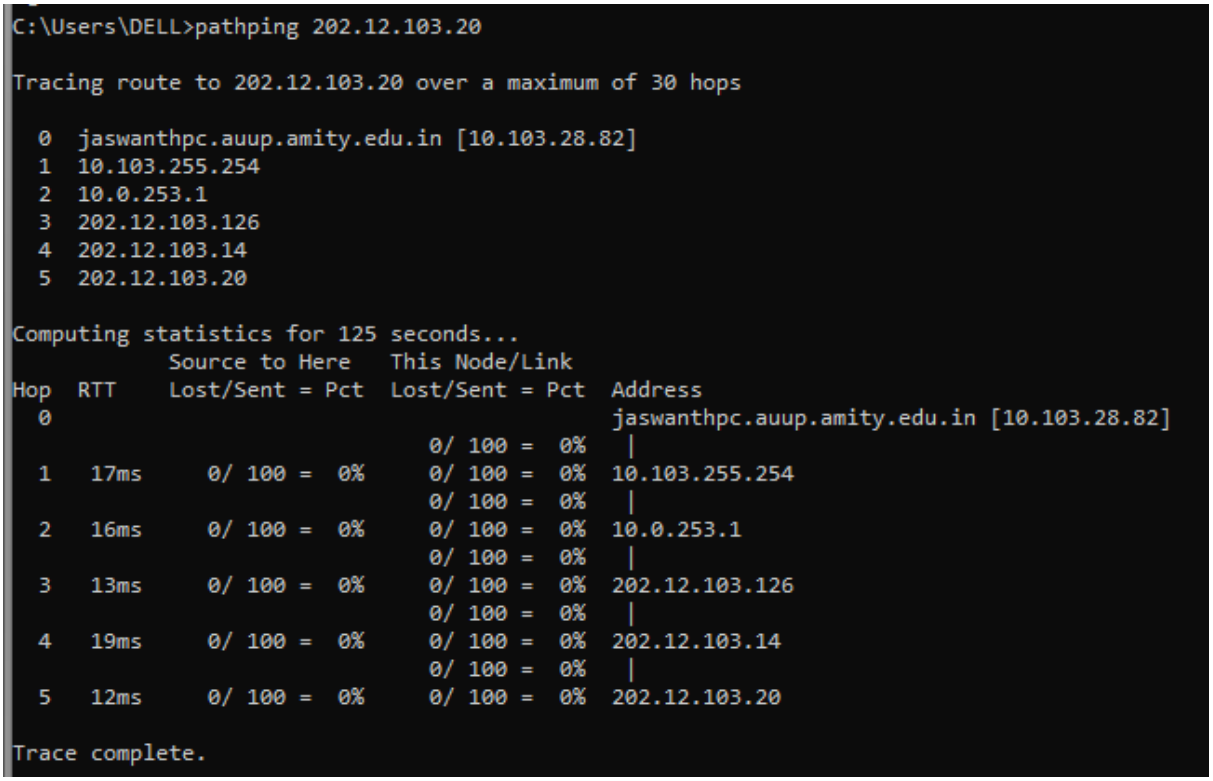
`-6`

Force using IPv6.

`-?`

Displays help at the command prompt.

Example:



```
C:\Users\DELL>pathping 202.12.103.20

Tracing route to 202.12.103.20 over a maximum of 30 hops

  0  jaswanthpc.auup.amity.edu.in [10.103.28.82]
  1  10.103.255.254
  2  10.0.253.1
  3  202.12.103.126
  4  202.12.103.14
  5  202.12.103.20

Computing statistics for 125 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           jaswanthpc.auup.amity.edu.in [10.103.28.82]
                                 0/ 100 =  0%   |
  1   17ms     0/ 100 =  0%     0/ 100 =  0%  10.103.255.254
                                 0/ 100 =  0%   |
  2   16ms     0/ 100 =  0%     0/ 100 =  0%  10.0.253.1
                                 0/ 100 =  0%   |
  3   13ms     0/ 100 =  0%     0/ 100 =  0%  202.12.103.126
                                 0/ 100 =  0%   |
  4   19ms     0/ 100 =  0%     0/ 100 =  0%  202.12.103.14
                                 0/ 100 =  0%   |
  5   12ms     0/ 100 =  0%     0/ 100 =  0%  202.12.103.20

Trace complete.
```

Name: finger

Usage:

Finger command is a user information lookup command which gives details of all the users logged in.

*Syntax:*

```
finger [options]
```

options:

`-l`

Displays information in long list format.

`user`

Specifies the user you want information about. Omit the user parameter to display information about all users on the specified host.

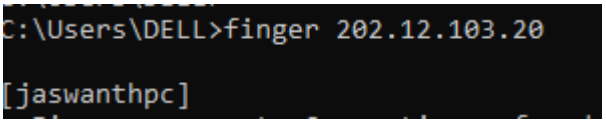
`@host`

Specifies the server on the remote system whose users you want information about.

-?

Displays help at the command prompt.

Example:




Name: hostname

*Usage:*

Displays the host name portion of the full computer name of the computer

Syntax:

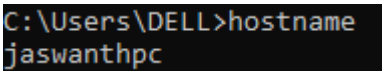
Hostname [options]

Options:

-?

Displays help at the command prompt.

Example:




Name: whoami

*Usage:*

Displays user, group and privileges information for the user who is currently logged on to the local system. If used without parameters, whoami displays the current domain and username.

Syntax:

whoami [options]

options:

/upn

Displays the user name in user principal name (UPN) format.

/fqdn

Displays the user name in fully qualified domain name (FQDN) format.

/logonid

Displays the logon ID of the current user.

/user

Displays the current domain and user name of the security identifier (SID).

/groups

Displays the user groups to which the current user belongs.

/priv

Displays the security privileges of the current user.

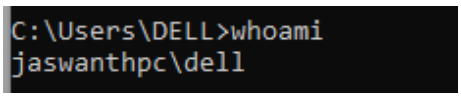
`/fo <Format>`
: Specifies the output format.

`/all`
: Displays all information in the current access token, including the current user name, security identifiers (SID), privileges, and groups that the current user belongs to.

`/nh`
: Specifies that the column header should not be displayed in the output. This is valid only for table and CSV formats.

`/?`
: Displays help at the command prompt.

Example:



# Lab-2

**Aim:** To explore configure various network topologies.

**Theory:**

**Bus topology**

Bus topology, also known as line topology, is a type of network topology in which all devices in the network are connected by one central RJ-45 network cable or coaxial cable.

**Star topology**

Star topology is a network topology in which each network component is physically connected to a central node such as a router, hub, or switch. In a star topology, the central hub acts like a server and the connecting nodes act like clients.

**Mesh topology**

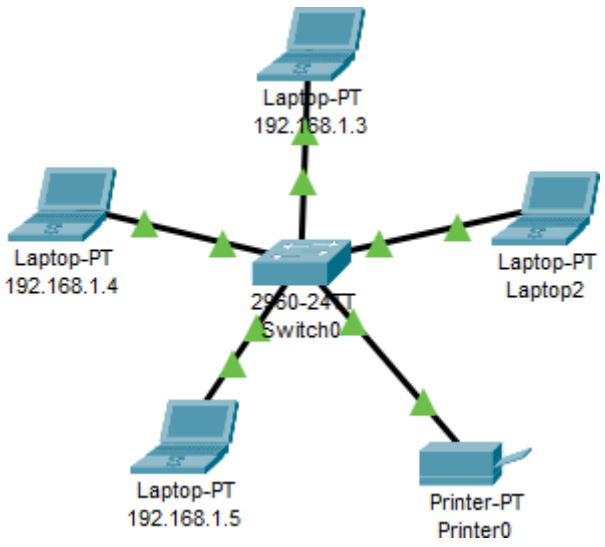
In a mesh topology there is no central connection point. Instead, each node is connected to at least one other node and usually to more than one. Each node is capable of sending messages to and receiving messages from other nodes.

**Ring topology**

Ring topology is a type of network topology in which each device is connected to two other devices on either side via an RJ-45 cable or coaxial cable. This forms a circular ring of connected devices which gives it its name

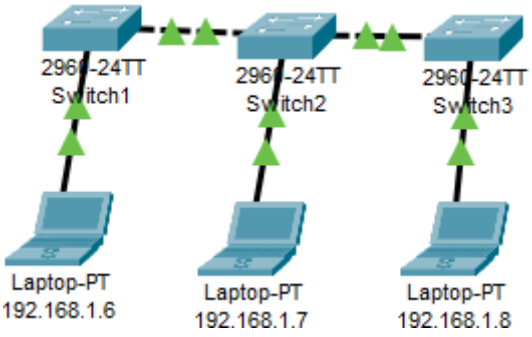
**Output:**

**Star topology:**



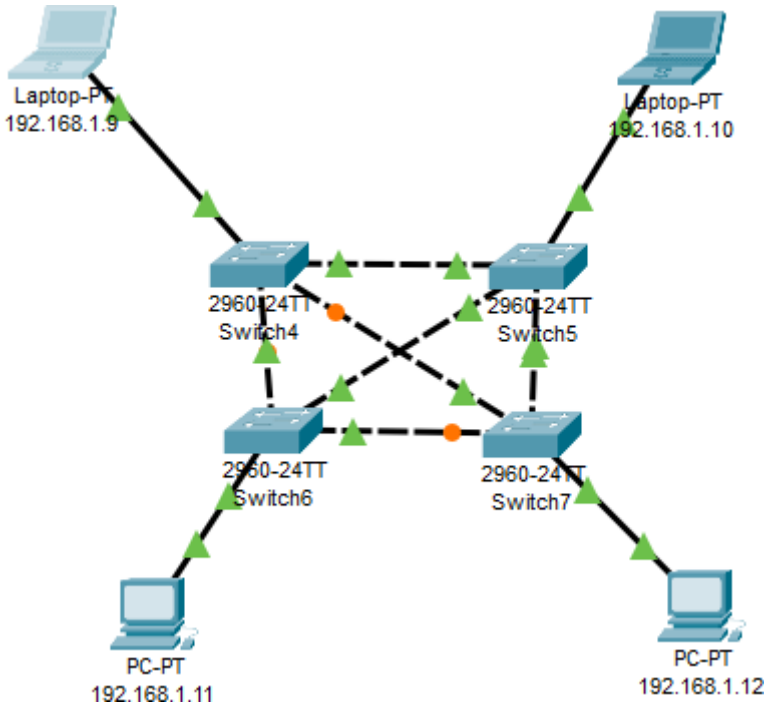
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.4

Pinging 192.168.1.4 with 32 bytes of data:

Reply from 192.168.1.4: bytes=32 time=4ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=2ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms
```

**Bus topology:**



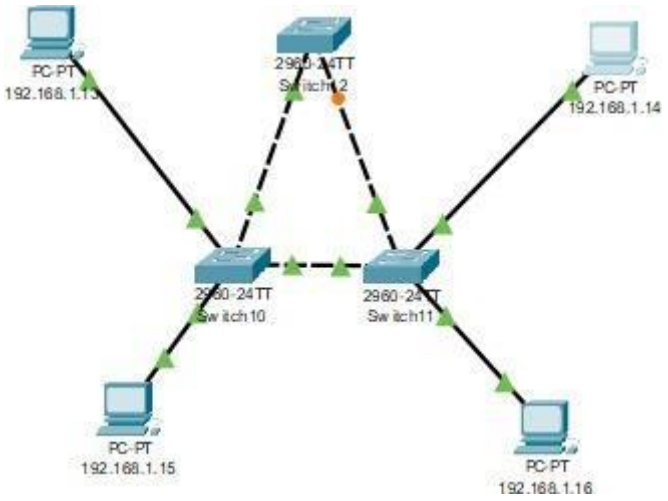

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.6

Pinging 192.168.1.6 with 32 bytes of data:

Reply from 192.168.1.6: bytes=32 time=4ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=2ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms
```

**Mesh topology:**




```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.9

Pinging 192.168.1.9 with 32 bytes of data:

Reply from 192.168.1.9: bytes=32 time=4ms TTL=128
Reply from 192.168.1.9: bytes=32 time<1ms TTL=128
Reply from 192.168.1.9: bytes=32 time=2ms TTL=128
Reply from 192.168.1.9: bytes=32 time=3ms TTL=128

Ping statistics for 192.168.1.9:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 2ms
```

**Ring topology:**




```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.15

Pinging 192.168.1.15 with 32 bytes of data:

Reply from 192.168.1.15: bytes=32 time=301ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.15: bytes=32 time=4ms TTL=128
Reply from 192.168.1.15: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 301ms, Average = 77ms
```

# Lab-3

**Aim:** To configure switch for different topologies.

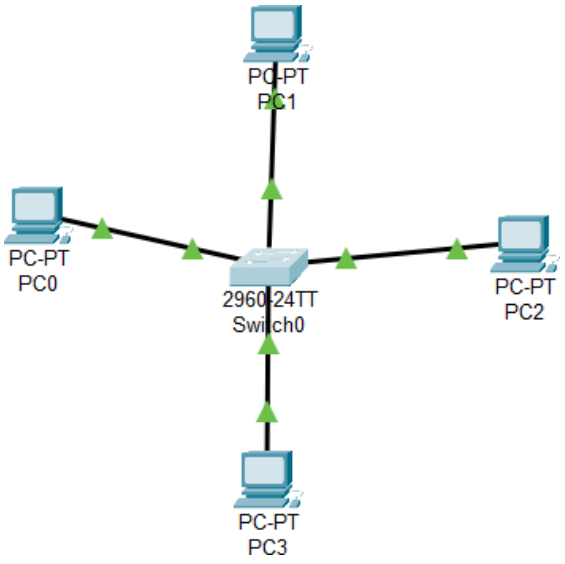
**Theory:** The commands used to configure the switches and assign to them a unique set of ip addresses are:
1.enable: To enter privileged EXEC mode
2.hostname enter-host-here: To set hostname
3.enable secret priv-pass: The password is set in encrypted form
4.ip address enter-ip-here enter-subnet-here: To set ip address and subnet
5.no shutdown: This command enables an interface
6.end: This command is issued to return to privileged mode.

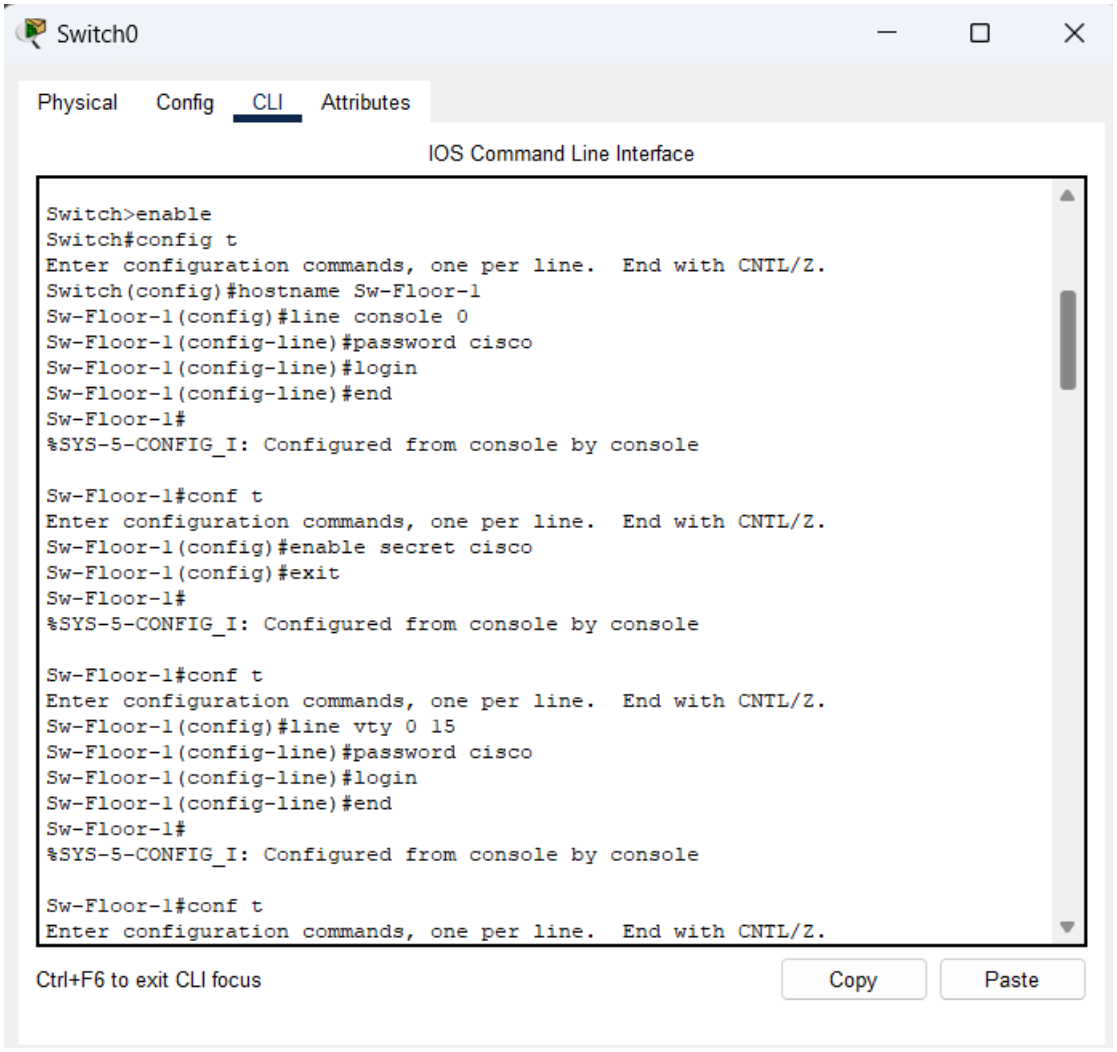
To check for network connectivity:

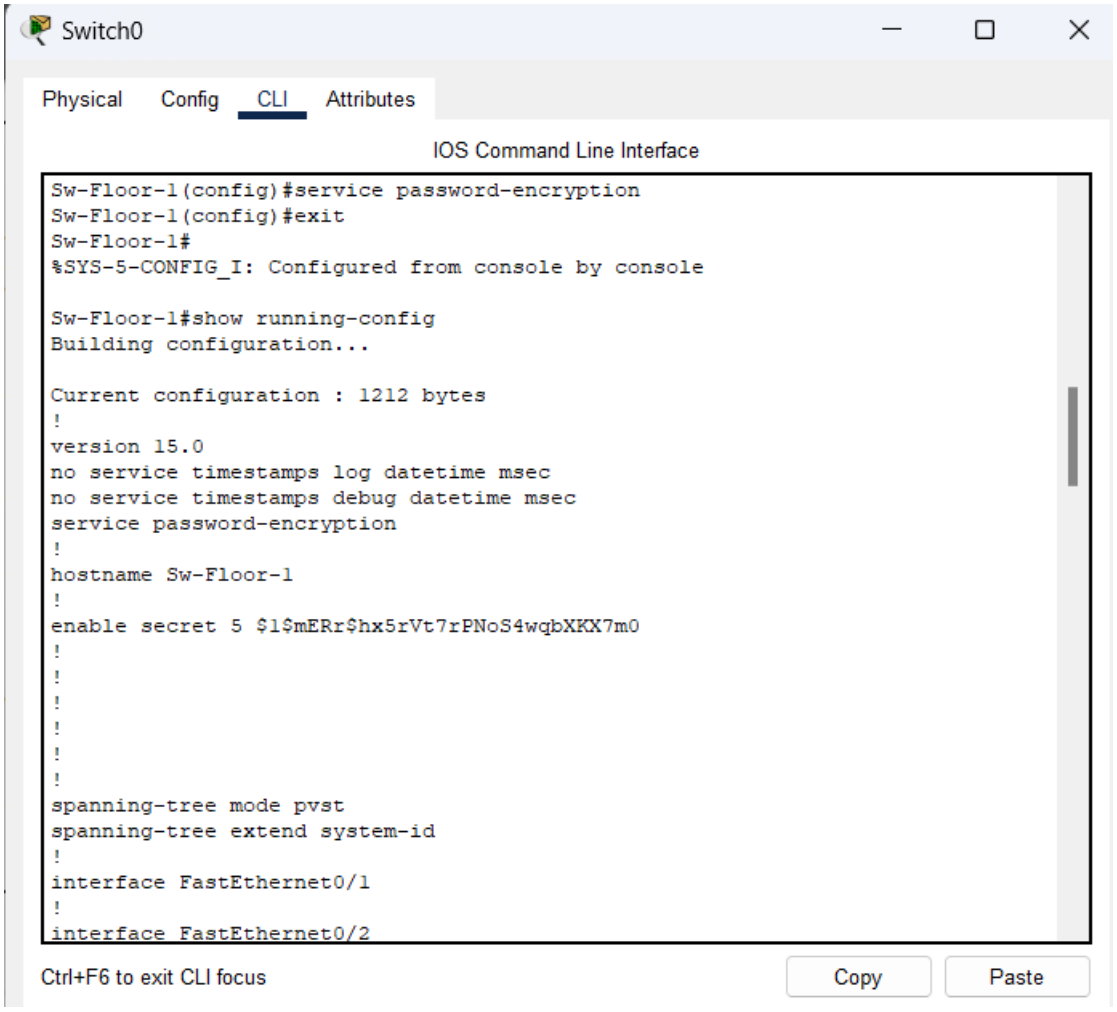
- Ping ip-address-of-end-device-on-network

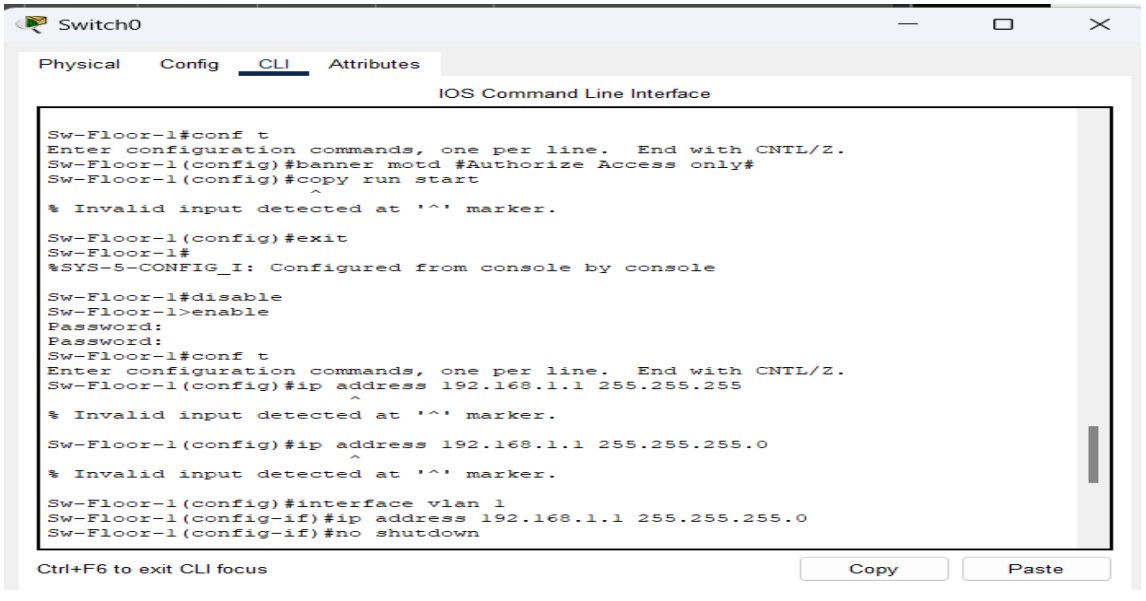
**Outputs:**

- Star topology




Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Sw-Floor-1
Sw-Floor-1(config)#line console 0
Sw-Floor-1(config-line)#password cisco
Sw-Floor-1(config-line)#login
Sw-Floor-1(config-line)#end
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console
Sw-Floor-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Sw-Floor-1(config)#enable secret cisco
Sw-Floor-1(config)#exit
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console
Sw-Floor-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Sw-Floor-1(config)#line vty 0 15
Sw-Floor-1(config-line)#password cisco
Sw-Floor-1(config-line)#login
Sw-Floor-1(config-line)#end
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console
Sw-Floor-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Ctrl+F6 to exit CLI focus
Copy
Paste


Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Sw-Floor-1(config)#service password-encryption
Sw-Floor-1(config)#exit
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console
Sw-Floor-1#show running-config
Building configuration...
Current configuration : 1212 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Sw-Floor-1
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
Ctrl+F6 to exit CLI focus
Copy
Paste


Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Sw-Floor-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Sw-Floor-1(config)#banner motd #Authorize Access only#
Sw-Floor-1(config)#copy run start
% Invalid input detected at '^' marker.
Sw-Floor-1(config)#exit
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console
Sw-Floor-1#disable
Sw-Floor-1>enable
Password:
Password:
Sw-Floor-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Sw-Floor-1(config)#ip address 192.168.1.1 255.255.255
% Invalid input detected at '^' marker.
Sw-Floor-1(config)#ip address 192.168.1.1 255.255.255.0
% Invalid input detected at '^' marker.
Sw-Floor-1(config)#interface vlan 1
Sw-Floor-1(config-if)#ip address 192.168.1.1 255.255.255.0
Sw-Floor-1(config-if)#no shutdown
Ctrl+F6 to exit CLI focus
Copy
Paste

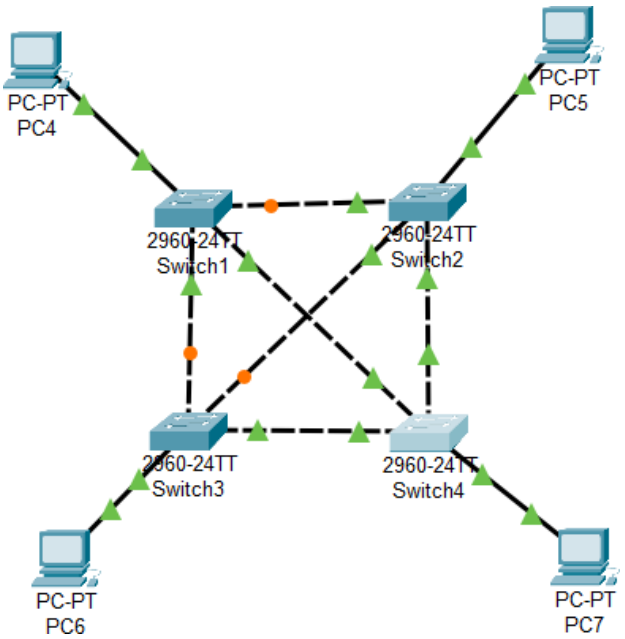
Switch0

Physical Config CLI Attributes

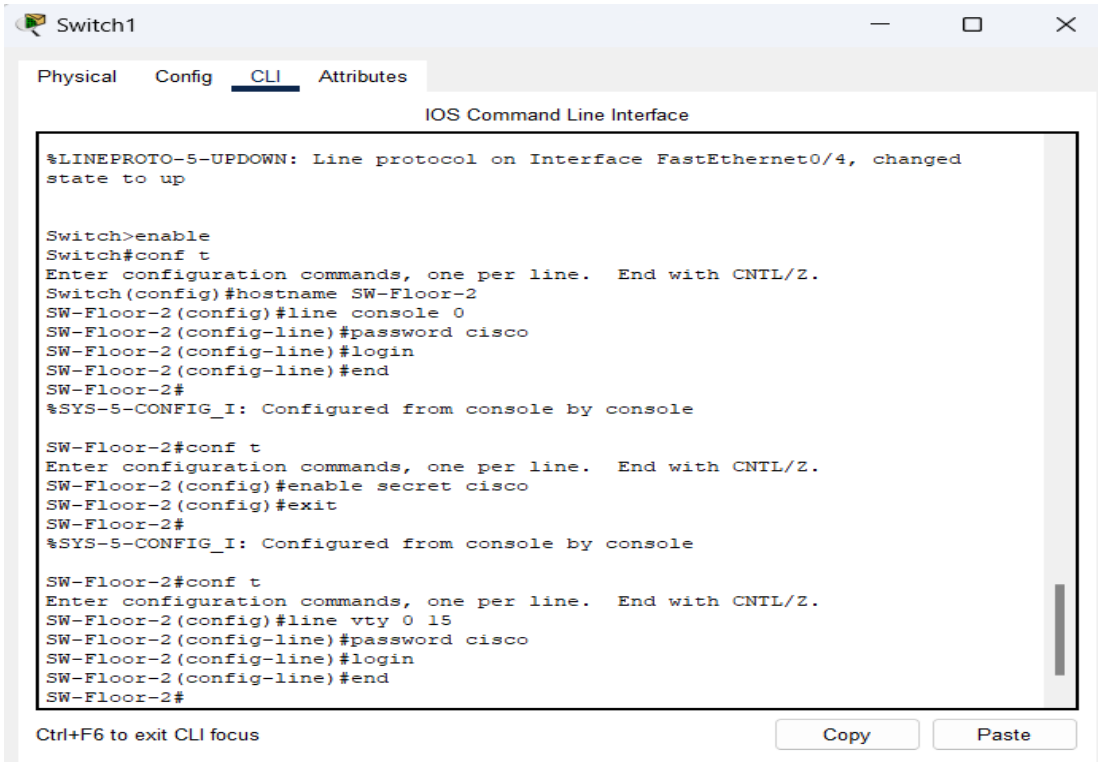
IOS Command Line Interface

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

Sw-Floor-1(config)#interface vlan 1
Sw-Floor-1(config-if)#ip address 192.168.1.1 255.255.255.0
Sw-Floor-1(config-if)#no shutdown

Sw-Floor-1(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%IP-4-DUPADDR: Duplicate address 192.168.1.1 on Vlan1, sourced by 0001.433C.
7081

Sw-Floor-1(config-if)#end
Sw-Floor-1#
%SYS-5-CONFIG_I: Configured from console by console

Sw-Floor-1#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 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

Sw-Floor-1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

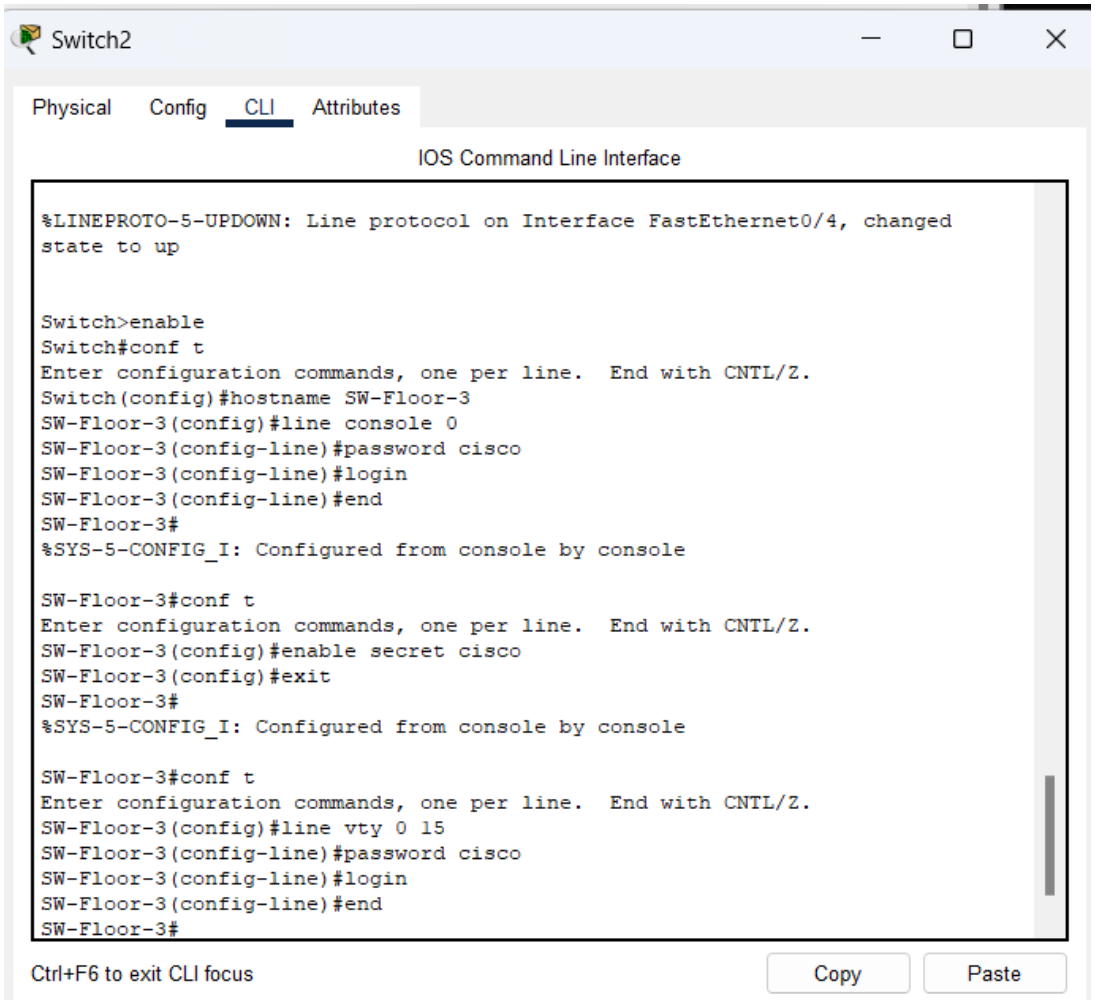
- MESH topology



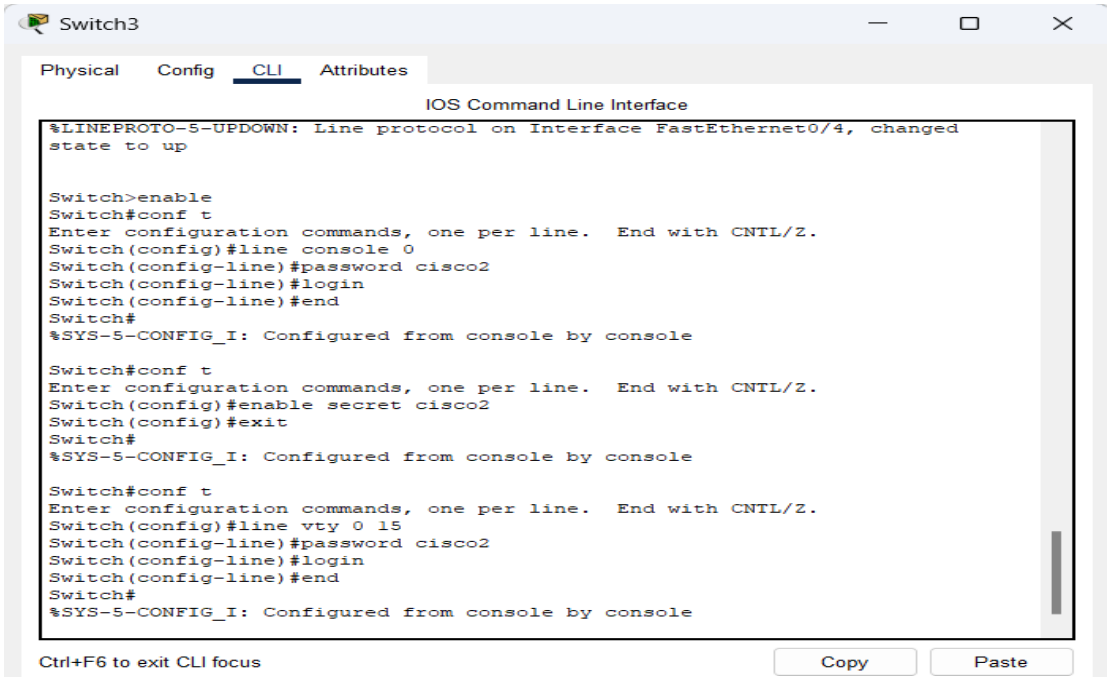
## Switch1 configuration for mesh topology:



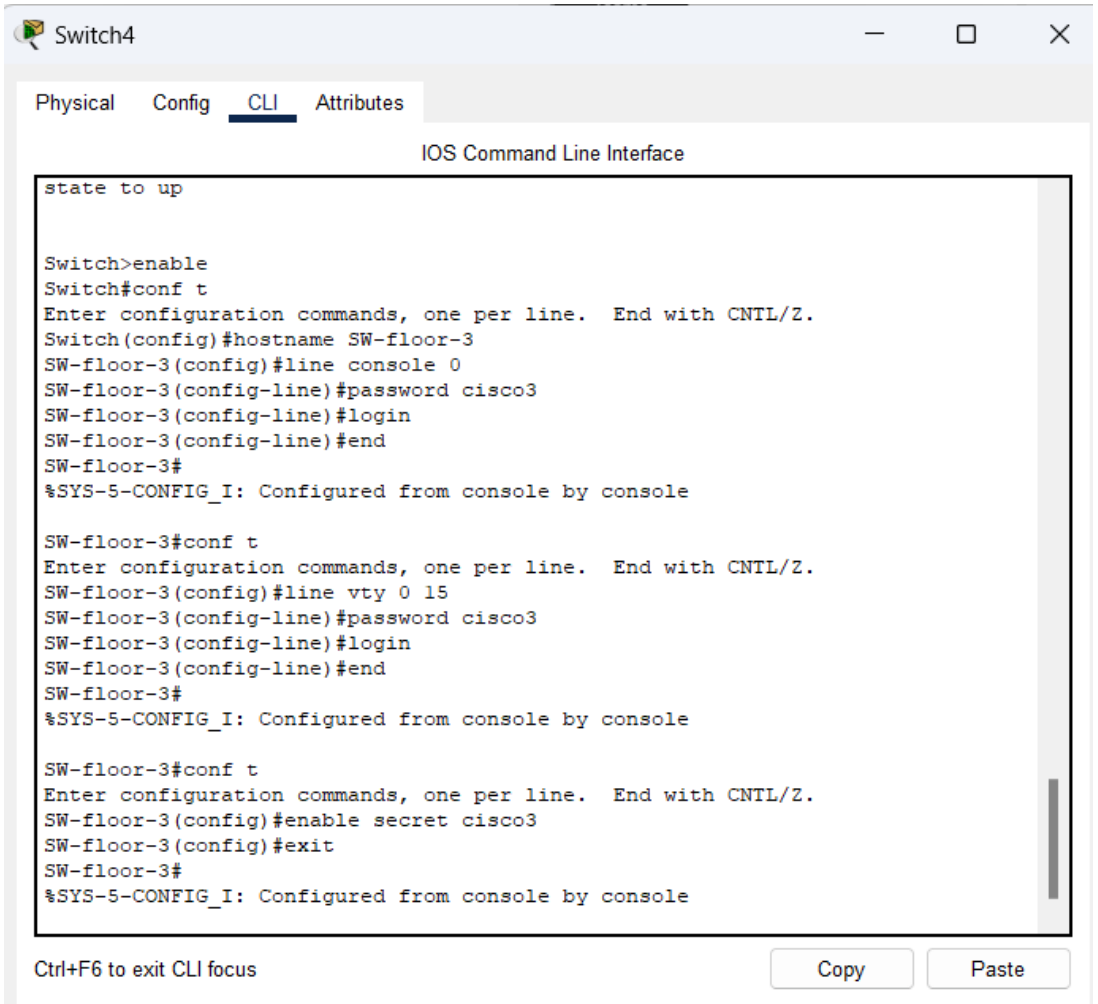

## Switch2 configuration for mesh topology:



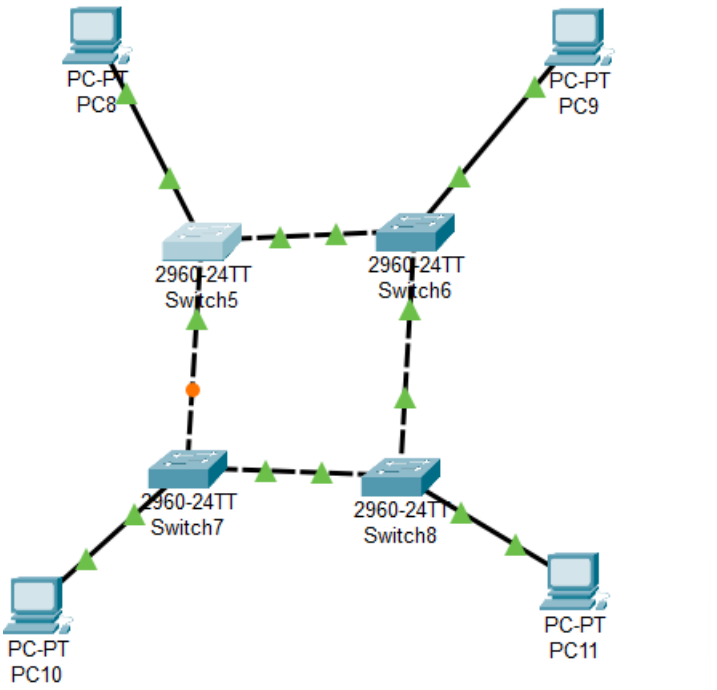
## Switch3 configuration for mesh topology:



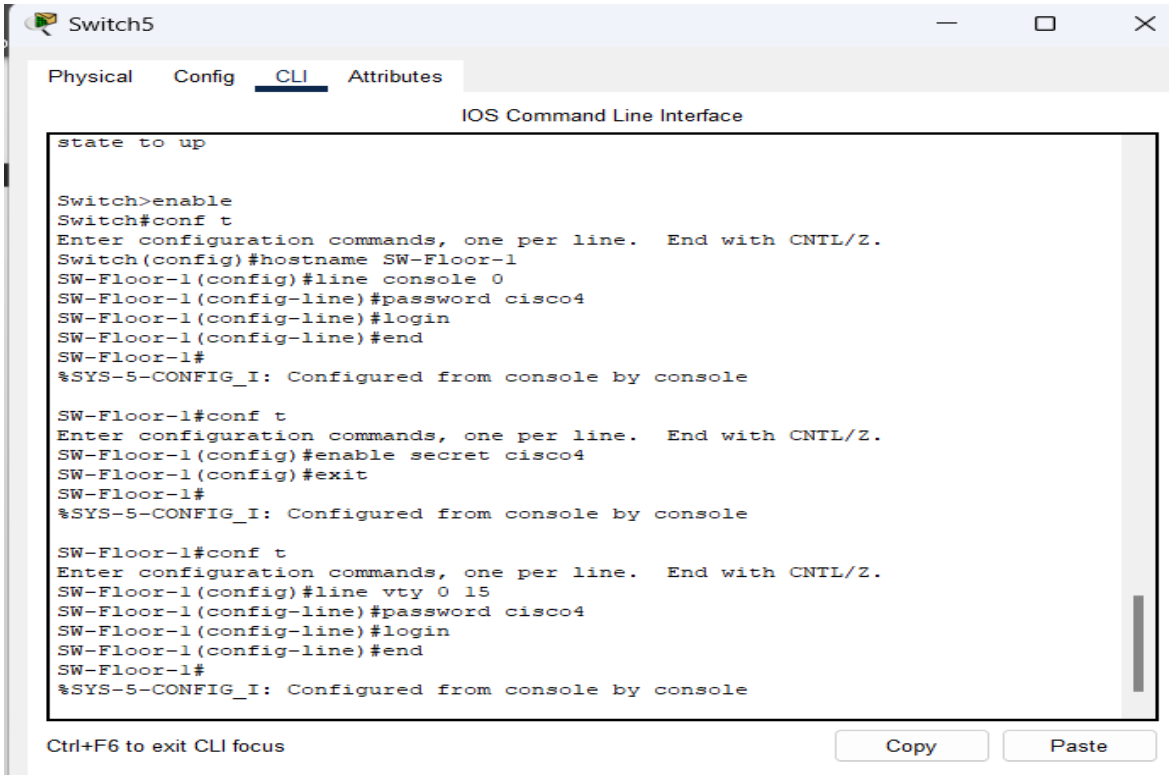

## Switch4 configuration for mesh topology:



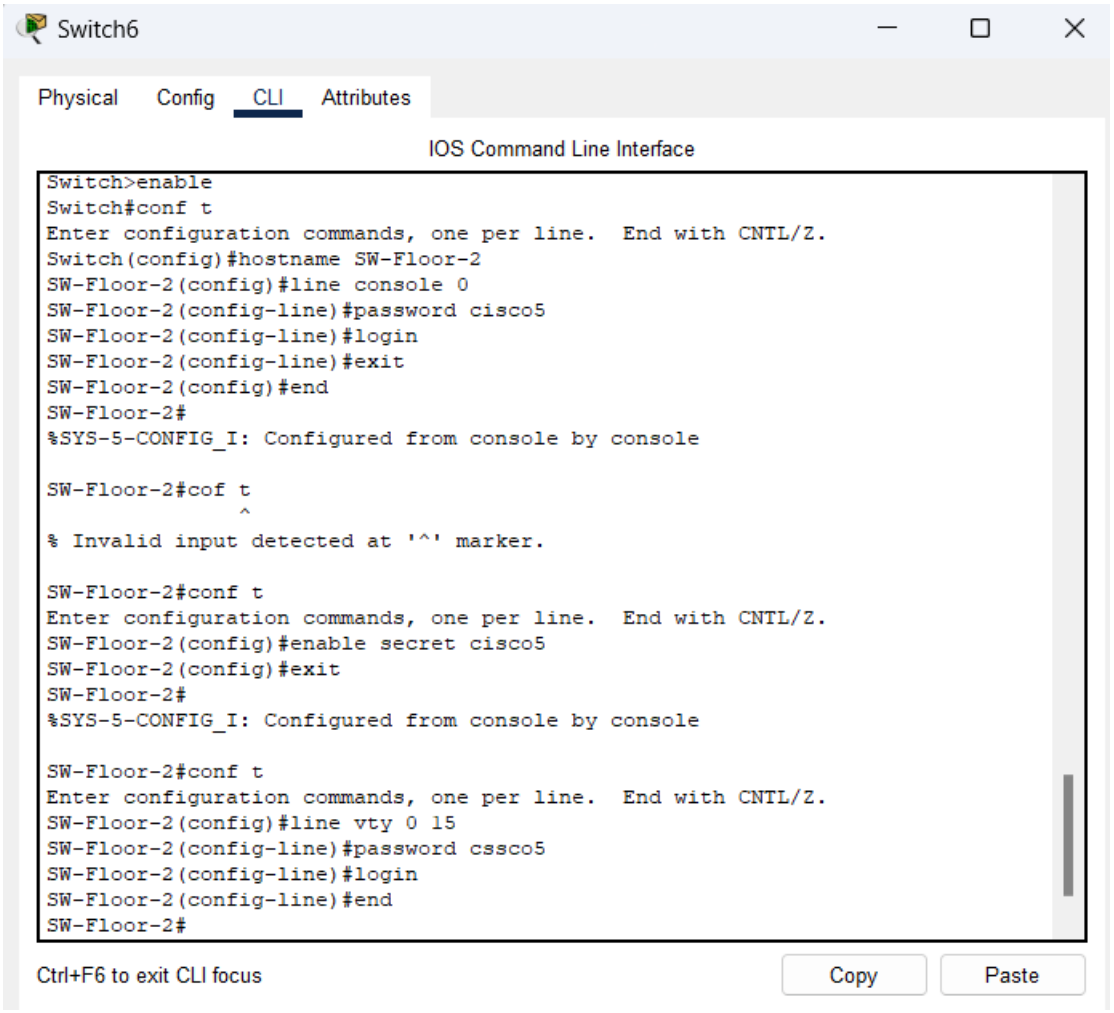
- RING topology



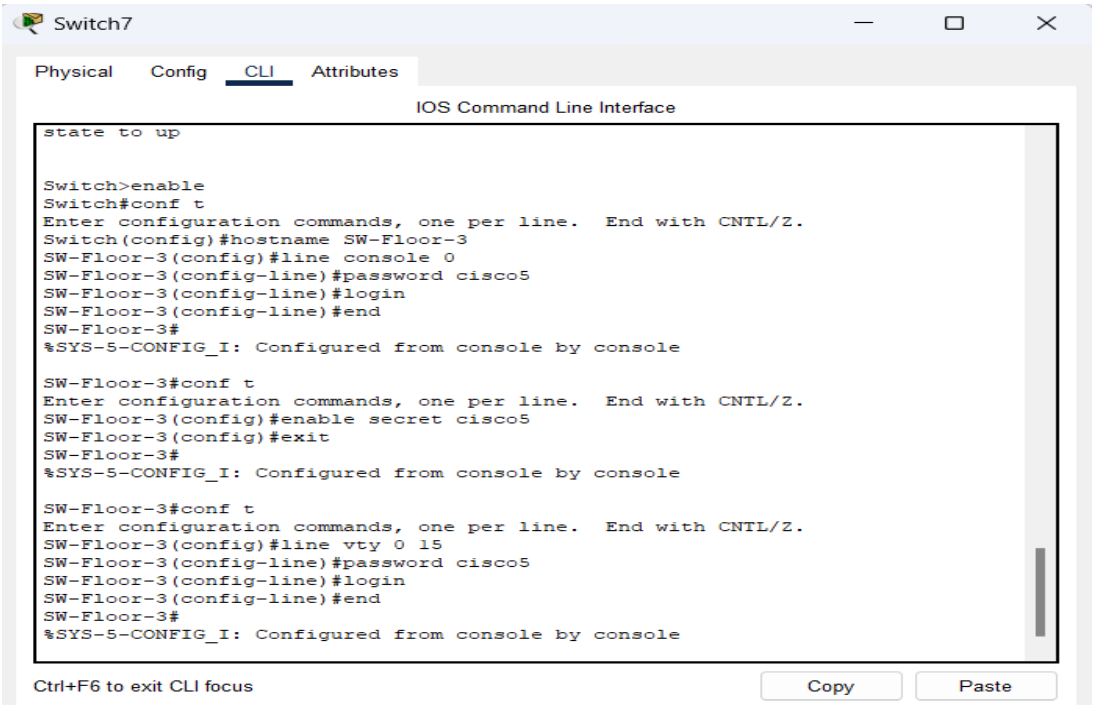

**Switch5 configuration for ring topology**



**Switch6 configuration for ring topology:**




**Switch7 configuration for ring topology:**



**Switch8 configuration for ring topology:**

Switch8

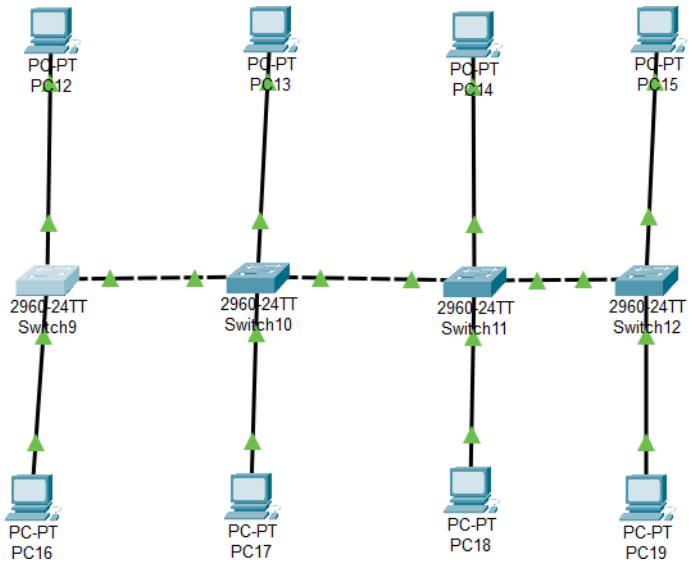
Physical Config CLI Attributes

IOS Command Line Interface

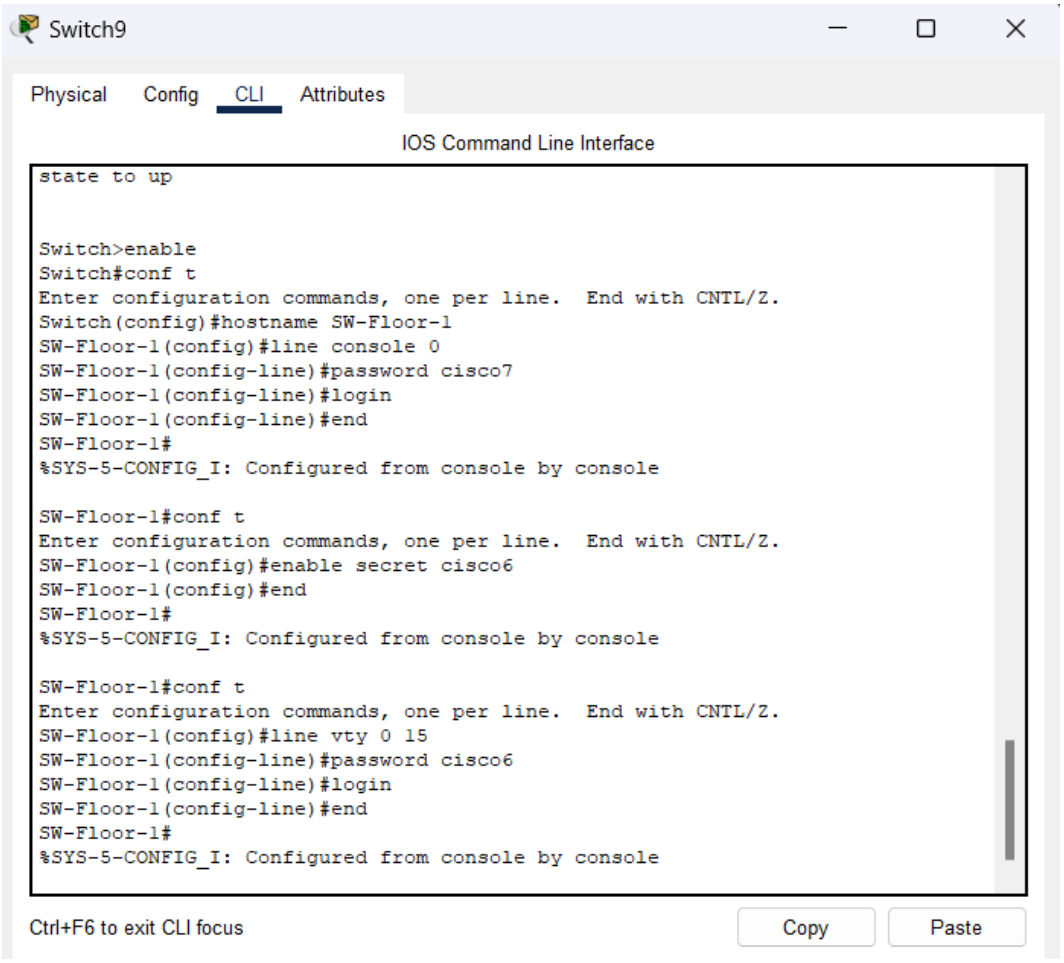
```
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW-Floor-4
SW-Floor-4(config)#line console 0
SW-Floor-4(config-line)#password cisco6
SW-Floor-4(config-line)#login
SW-Floor-4(config-line)#end
SW-Floor-4#
%SYS-5-CONFIG_I: Configured from console by console
\
Translating "\"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

SW-Floor-4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW-Floor-4(config)#enable secret cisco6
SW-Floor-4(config)#exit
SW-Floor-4#
%SYS-5-CONFIG_I: Configured from console by console

SW-Floor-4#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW-Floor-4(config)#line vty 0 15
SW-Floor-4(config-line)#password cisco6
SW-Floor-4(config-line)#login
SW-Floor-4(config-line)#end
SW-Floor-4#
%SYS-5-CONFIG_I: Configured from console by console
```

Ctrl+F6 to exit CLI focus  Copy  Paste

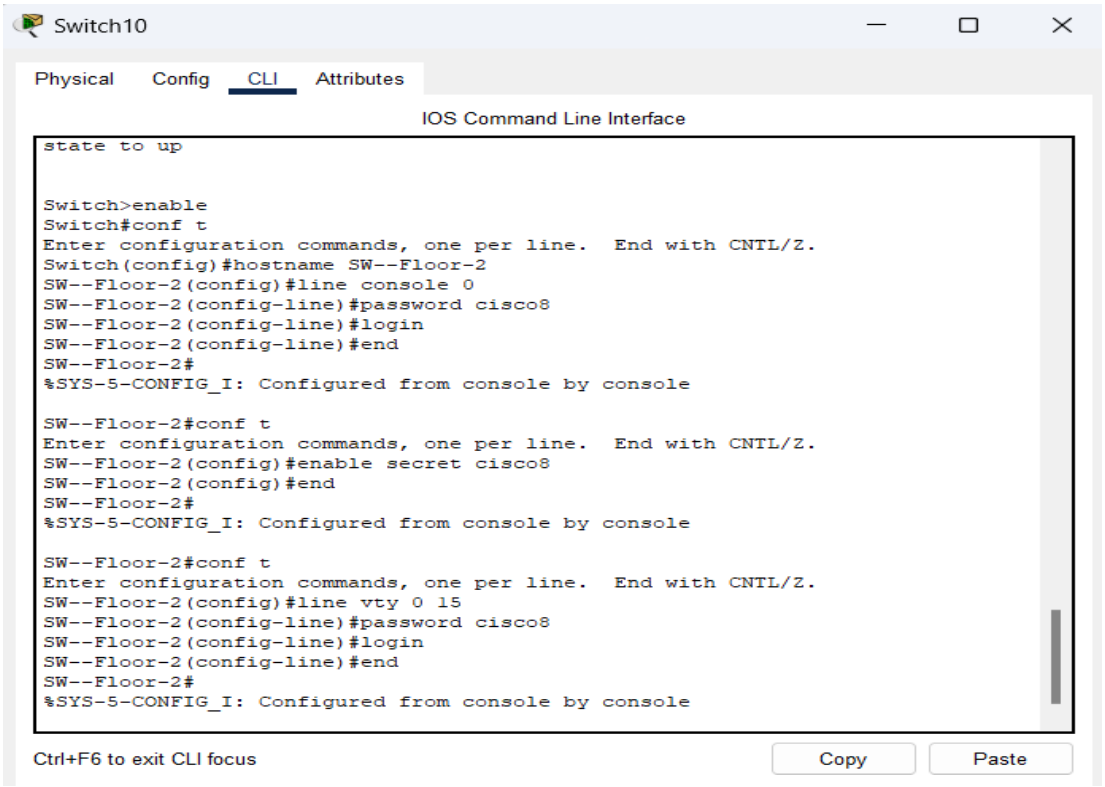
- BUS toplogy



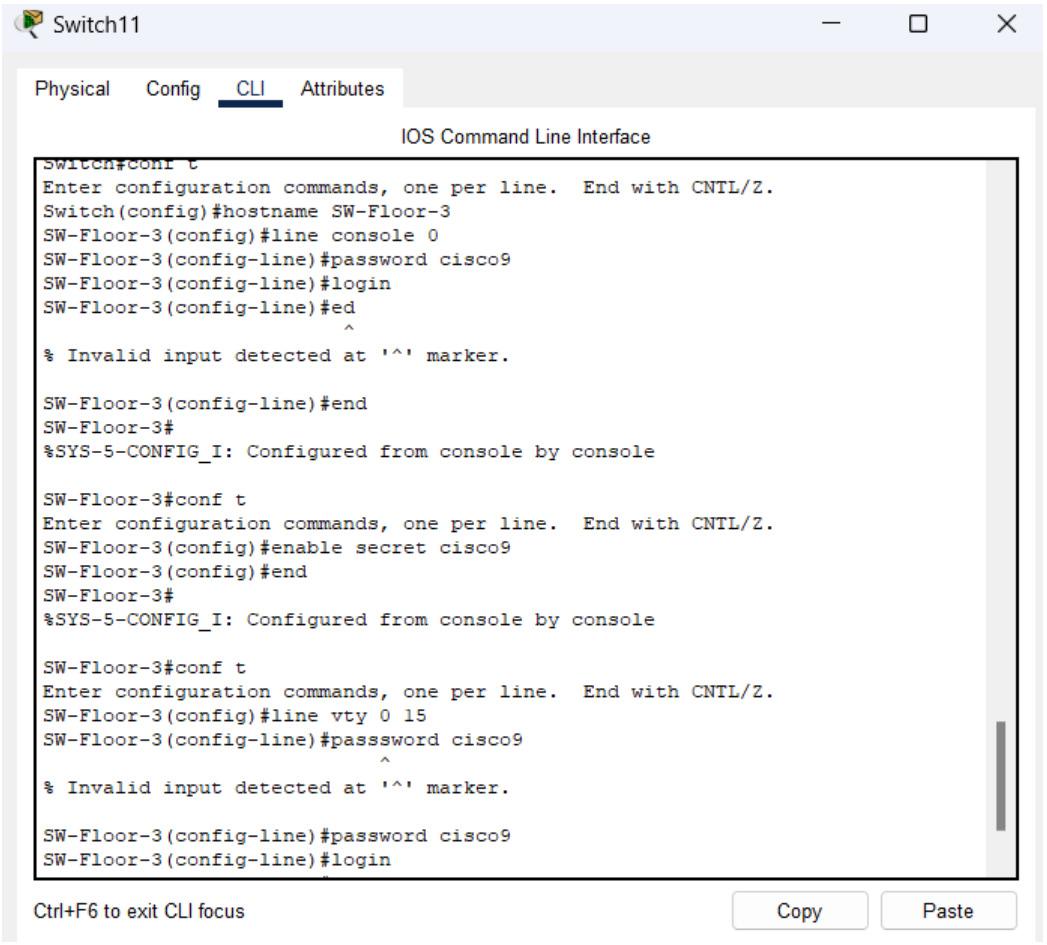
## Switch9 configuration for bus topology:



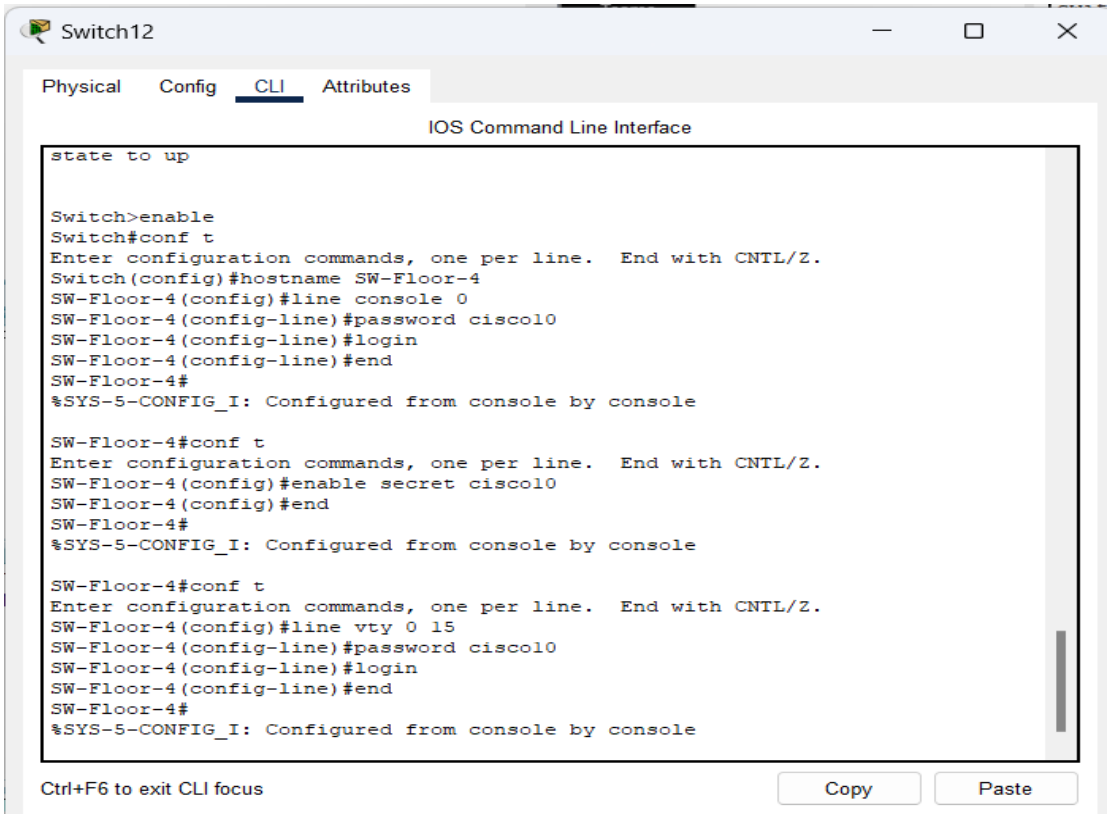

## Switch10 configuration for bus topology:



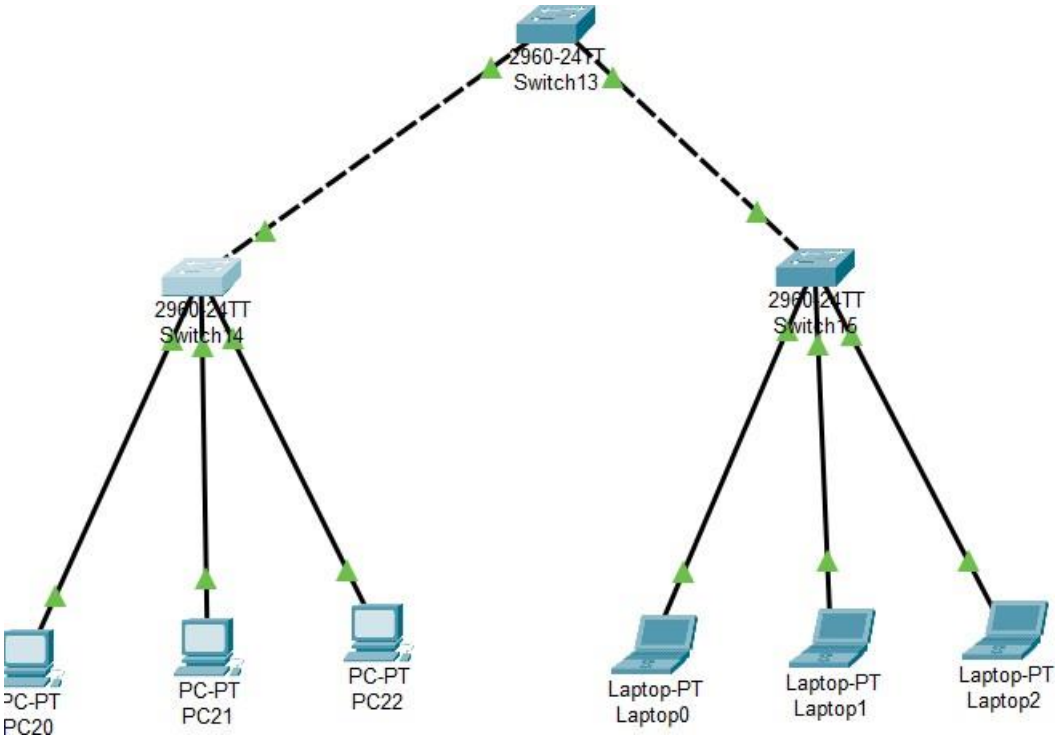
## Switch11 configuration for bus topology:



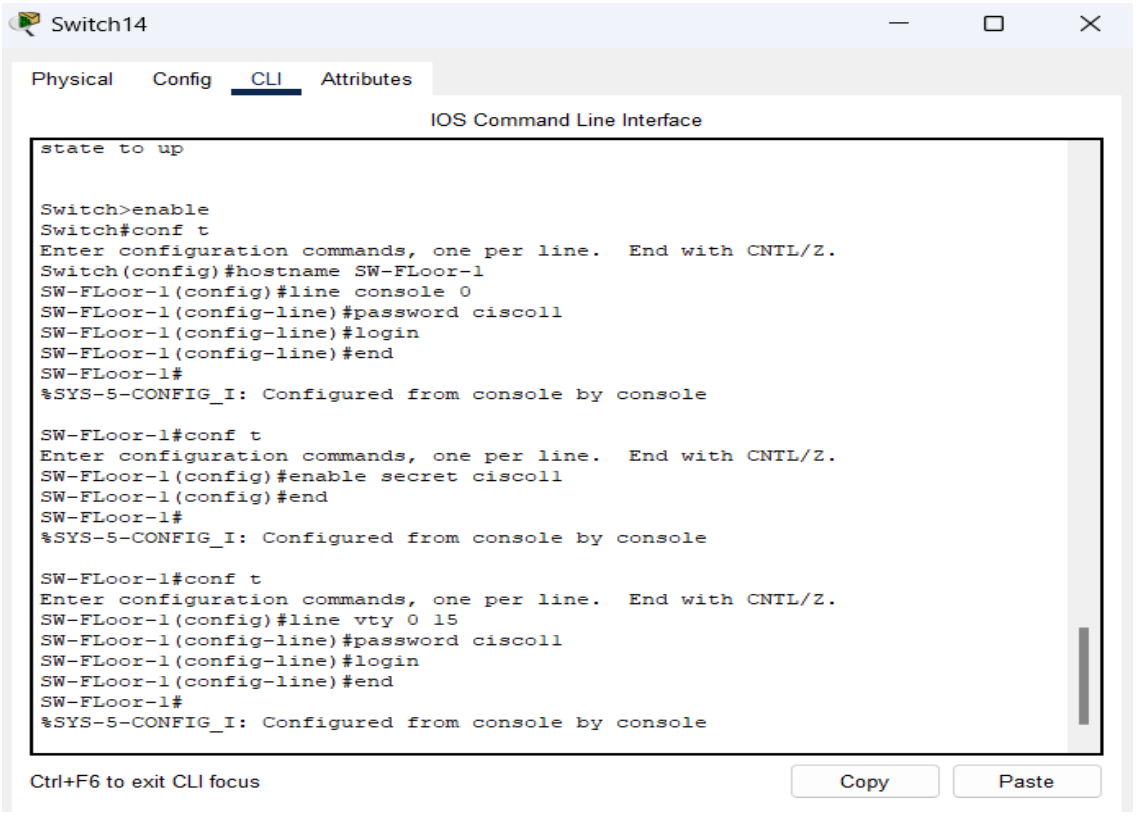

## Switch12 configuration for bus topology:



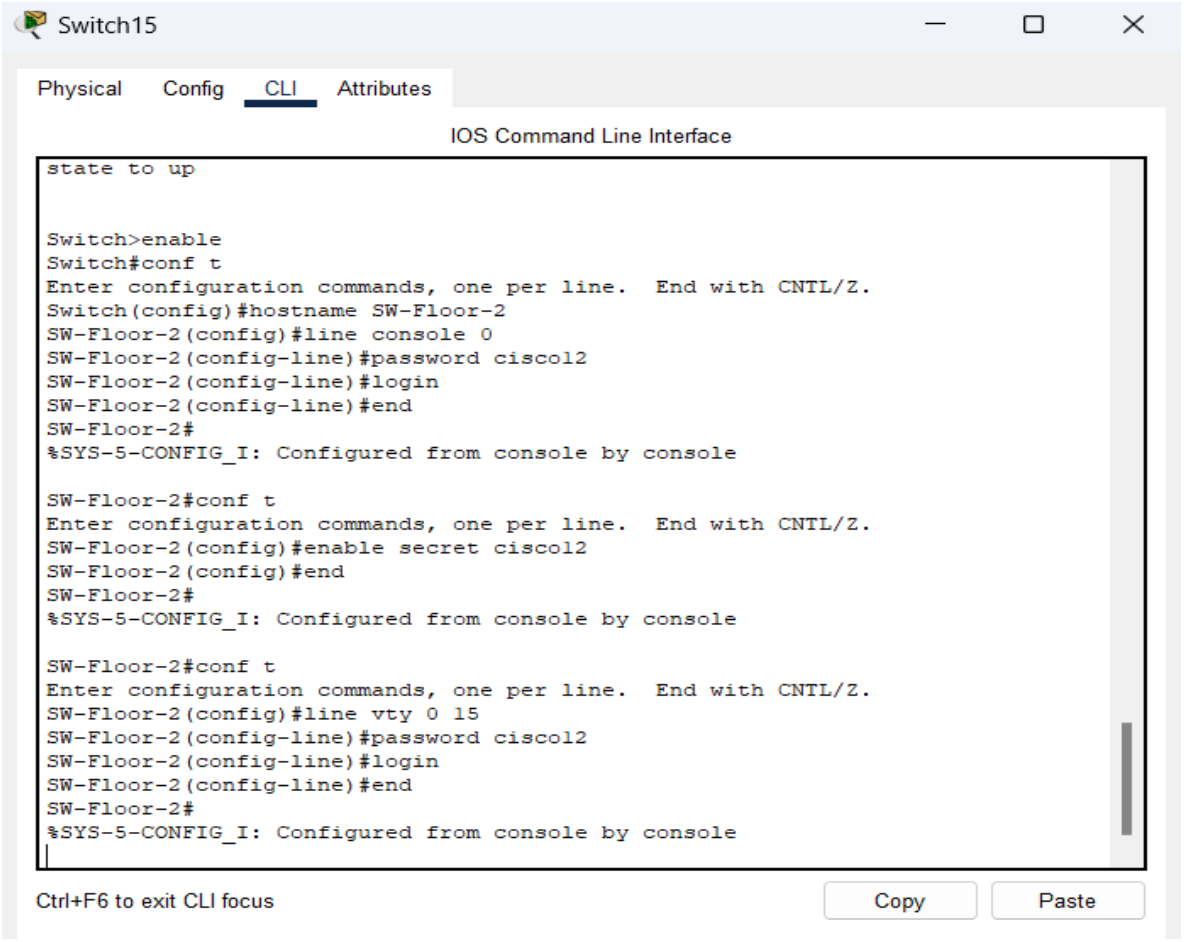
- TREE topology



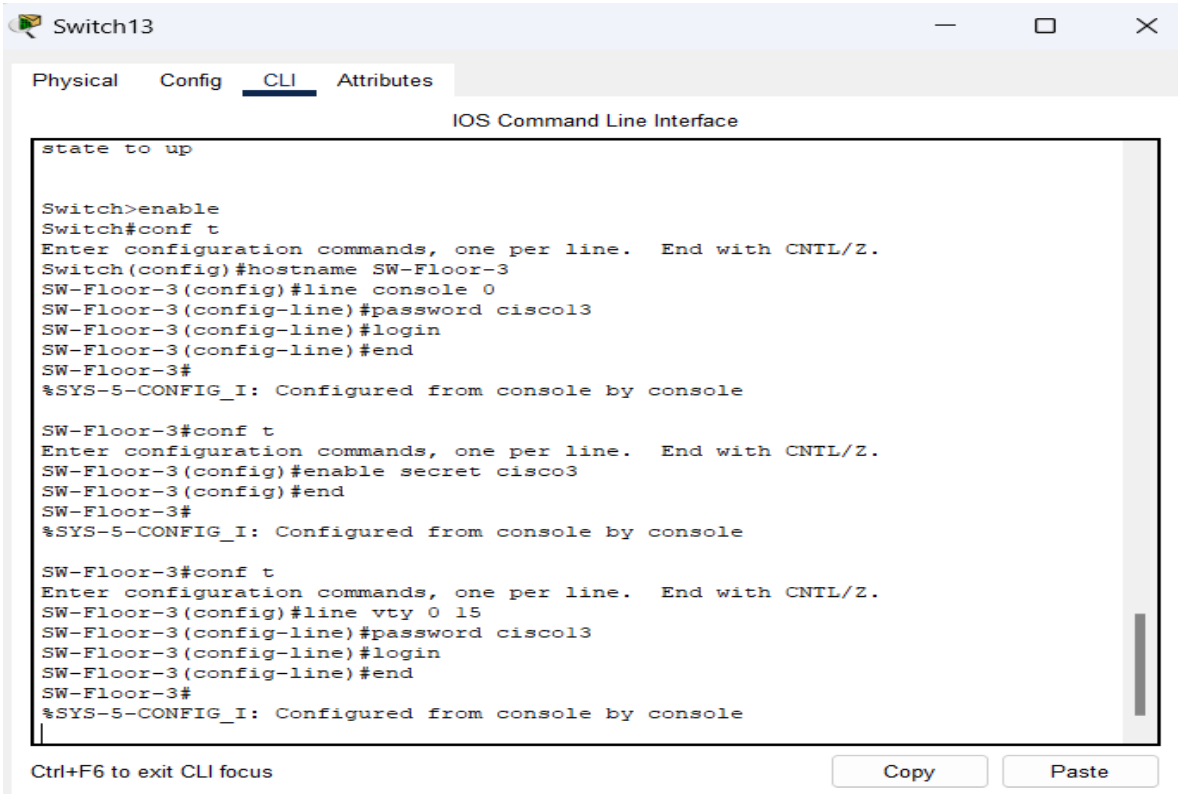

**Switch14 configuration for tree topology:**



**Switch15 configuration for tree topology:**




**Switch13 configuration for tree topology:**



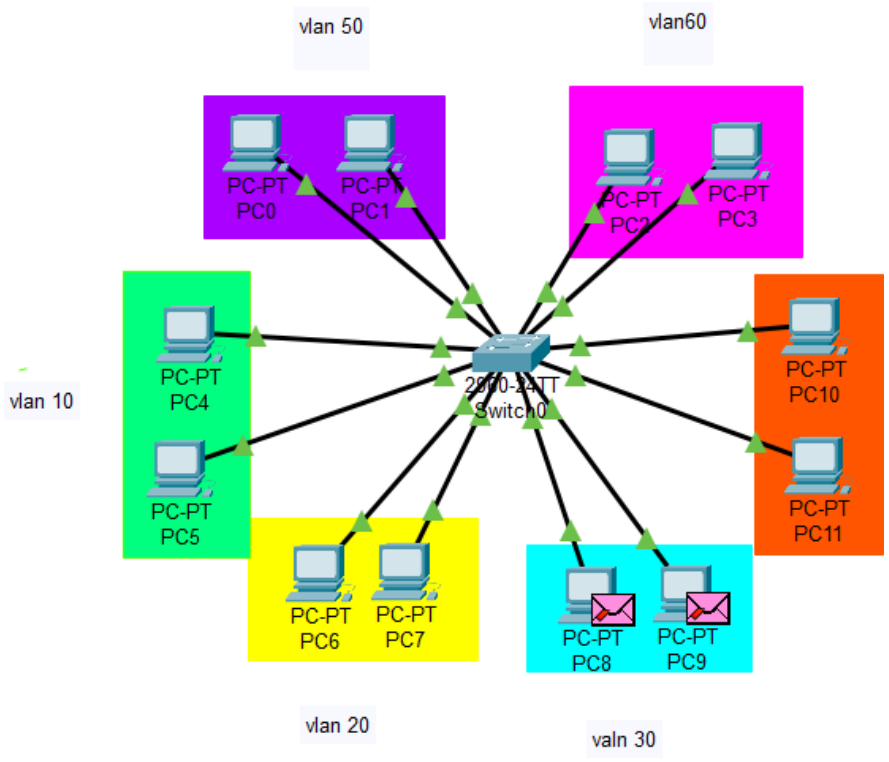
# Lab-4

**Aim:** To explore and configure VLANs.

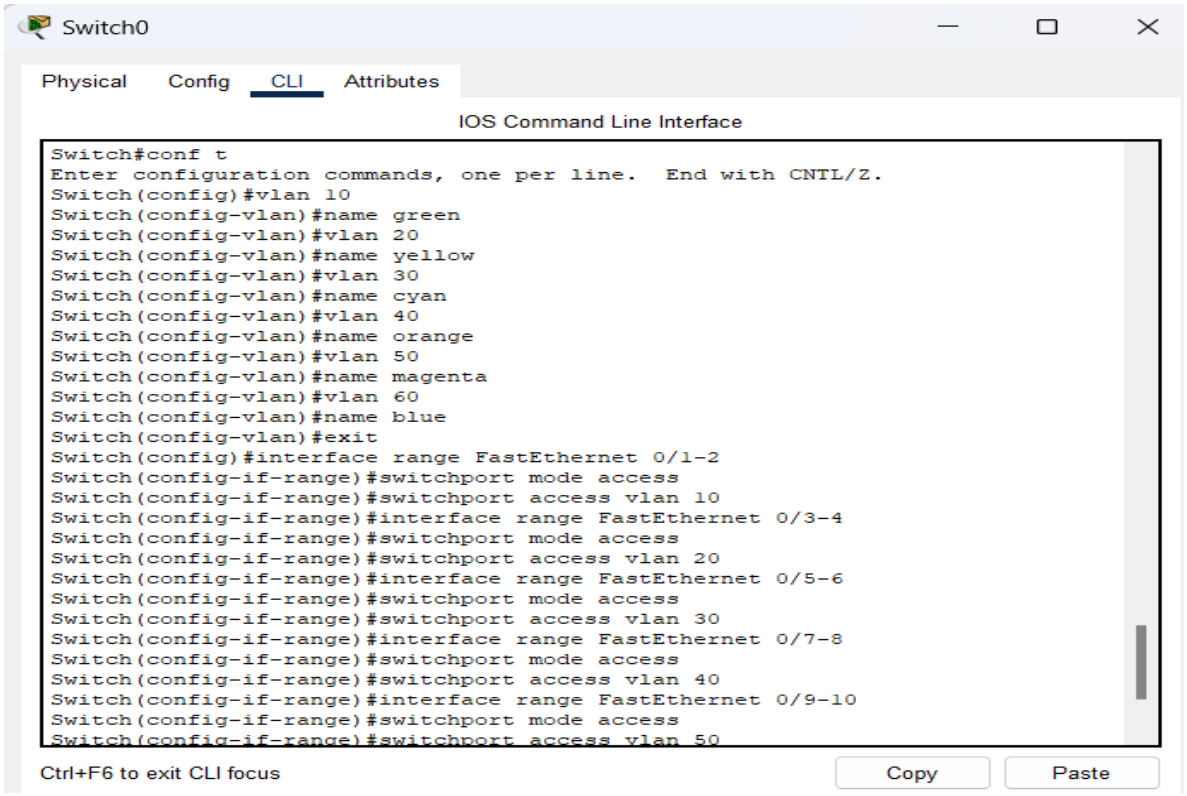
**Theory:**
A network switch connects devices within a network and forwards data packets to and from those devices. Unlike a router, a switch only sends data to the single device it is intended for (which may be another switch, a router, or a user's computer), not to networks of multiple devices.

**Output:**

**Network Diagram:**



Switch configuration:




```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::20B:BEFF:FEE5:2845
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.1.1
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>192.168.1.2
Invalid Command.

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=4ms TTL=128
```

```
C:\>192.168.1.2
Invalid Command.

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=4ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128
Reply from 192.168.1.2: bytes=32 time=10ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 4ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

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

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
Device Name: Switch0
Custom Device Model: 2960 IOS15
Hostname: Switch

Port                Link   VLAN   IP Address         MAC Address
FastEthernet0/1     Up     10     --                 000C.CF63.6401
FastEthernet0/2     Up     10     --                 000C.CF63.6402
FastEthernet0/3     Up     20     --                 000C.CF63.6403
FastEthernet0/4     Up     20     --                 000C.CF63.6404
FastEthernet0/5     Up     30     --                 000C.CF63.6405
FastEthernet0/6     Up     30     --                 000C.CF63.6406
FastEthernet0/7     Up     40     --                 000C.CF63.6407
FastEthernet0/8     Up     40     --                 000C.CF63.6408
FastEthernet0/9     Up     50     --                 000C.CF63.6409
FastEthernet0/10    Up     50     --                 000C.CF63.640A
FastEthernet0/11    Up     60     --                 000C.CF63.640B
FastEthernet0/12    Up     60     --                 000C.CF63.640C
FastEthernet0/13    Down   1      --                 000C.CF63.640D
FastEthernet0/14    Down   1      --                 000C.CF63.640E
FastEthernet0/15    Down   1      --                 000C.CF63.640F
FastEthernet0/16    Down   1      --                 000C.CF63.6410
FastEthernet0/17    Down   1      --                 000C.CF63.6411
FastEthernet0/18    Down   1      --                 000C.CF63.6412
FastEthernet0/19    Down   1      --                 000C.CF63.6413
FastEthernet0/20    Down   1      --                 000C.CF63.6414
FastEthernet0/21    Down   1      --                 000C.CF63.6415
FastEthernet0/22    Down   1      --                 000C.CF63.6416
FastEthernet0/23    Down   1      --                 000C.CF63.6417
FastEthernet0/24    Down   1      --                 000C.CF63.6418
GigabitEthernet0/1  Down   1      --                 000C.CF63.6419
GigabitEthernet0/2  Down   1      --                 000C.CF63.641A
Vlan1               Down   1      <not set>          0006.2A31.EB3E

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch0
```

PDU List Window

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|---|---|---|---|---|---|---|---|---|---|---|
| | Successful | PC0 | PC1 | ICMP | | 0.000 | N | 0 | (edit) | (delete) |
| | Failed | PC0 | PC8 | ICMP | | 1.211 | N | 1 | (edit) | (delete) |

# Lab-5

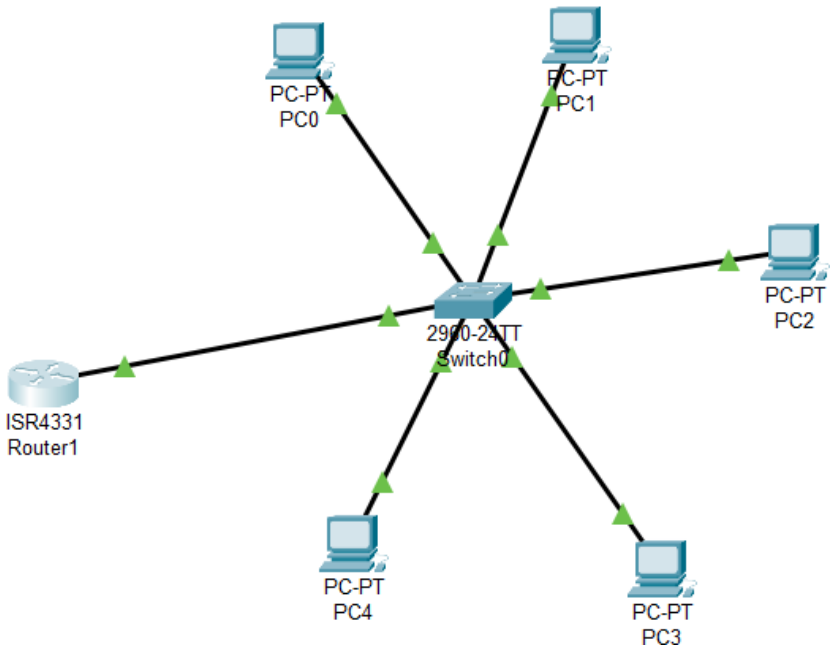
**Aim:** To configure Router

**Software Used: -** Packet Tracer by Cisco

## THEORY

A **router** is a device that connects two or more packet-switched networks or subnetworks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses and allowing multiple devices to use the same Internet connection.
A network **switch** forwards data packets between groups of devices in the same network, whereas a router forwards data between different networks.

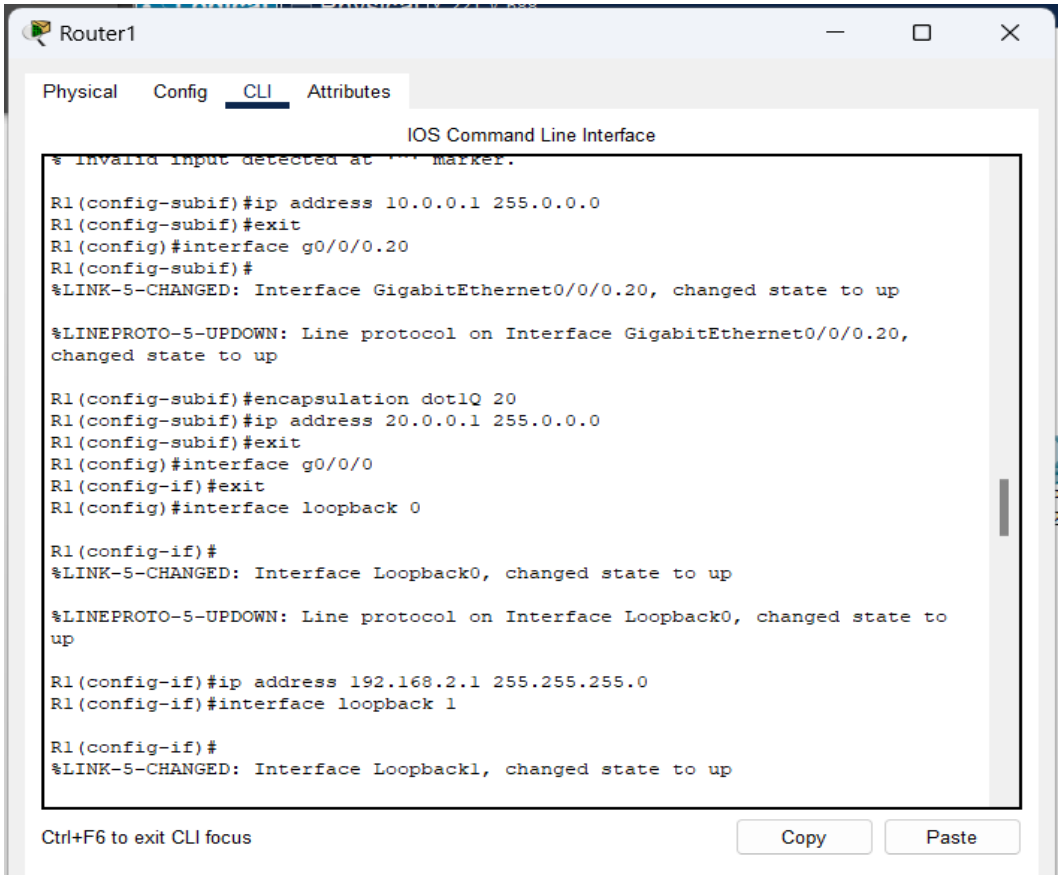
## Output:



## Router configuration:

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#interface g0/0/0
R1(config-if)#ip address 192.168.1.2 255.255.255.0
R1(config-if)#no shutdown

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

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

R1(config-if)#exit
R1(config)#interface g0/0/0.10
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.10,
changed state to up

R1(config-subif)#enacapsulation dot1Q 10
                 ^
% Invalid input detected at '^' marker.

R1(config-subif)#encapsulation dot1Q 10
R1(config-subif)#ip address 10
                            ^
```

Ctrl+F6 to exit CLI focus  Copy  Paste



Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
R1(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to
up

R1(config-if)#ip address 192.168.3.1 255.255.255.0
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#copy running-config startup-config
Destination filename [startup-config]? jaswanth
%Error copying nvram:jaswanth (Invalid argument)
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#show run
Building configuration...

Current configuration : 1100 bytes
!
version 16.6.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
```

Ctrl+F6 to exit CLI focus

Copy Paste

Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
!
!
interface Loopback0
 ip address 192.168.2.1 255.255.255.0
!
interface Loopback1
 ip address 192.168.3.1 255.255.255.0
!
interface GigabitEthernet0/0/0
 ip address 192.168.1.2 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/0.10
 encapsulation dot1Q 10
 ip address 10.0.0.1 255.0.0.0
!
interface GigabitEthernet0/0/0.20
 encapsulation dot1Q 20
 ip address 20.0.0.1 255.0.0.0
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/2
 no ip address
 duplex auto
```

Ctrl+F6 to exit CLI focus

Copy Paste

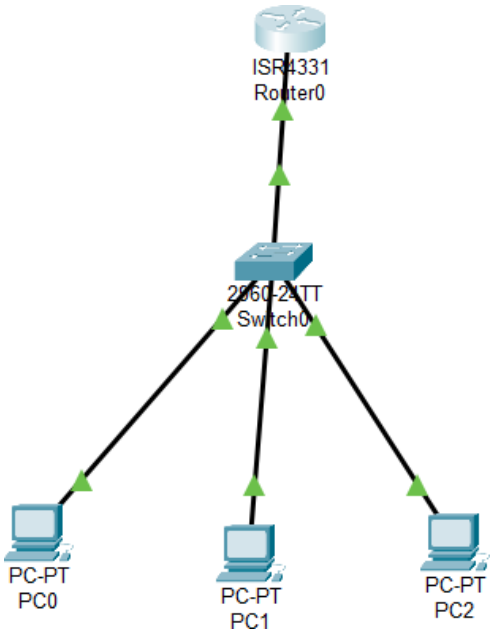
# Lab-6

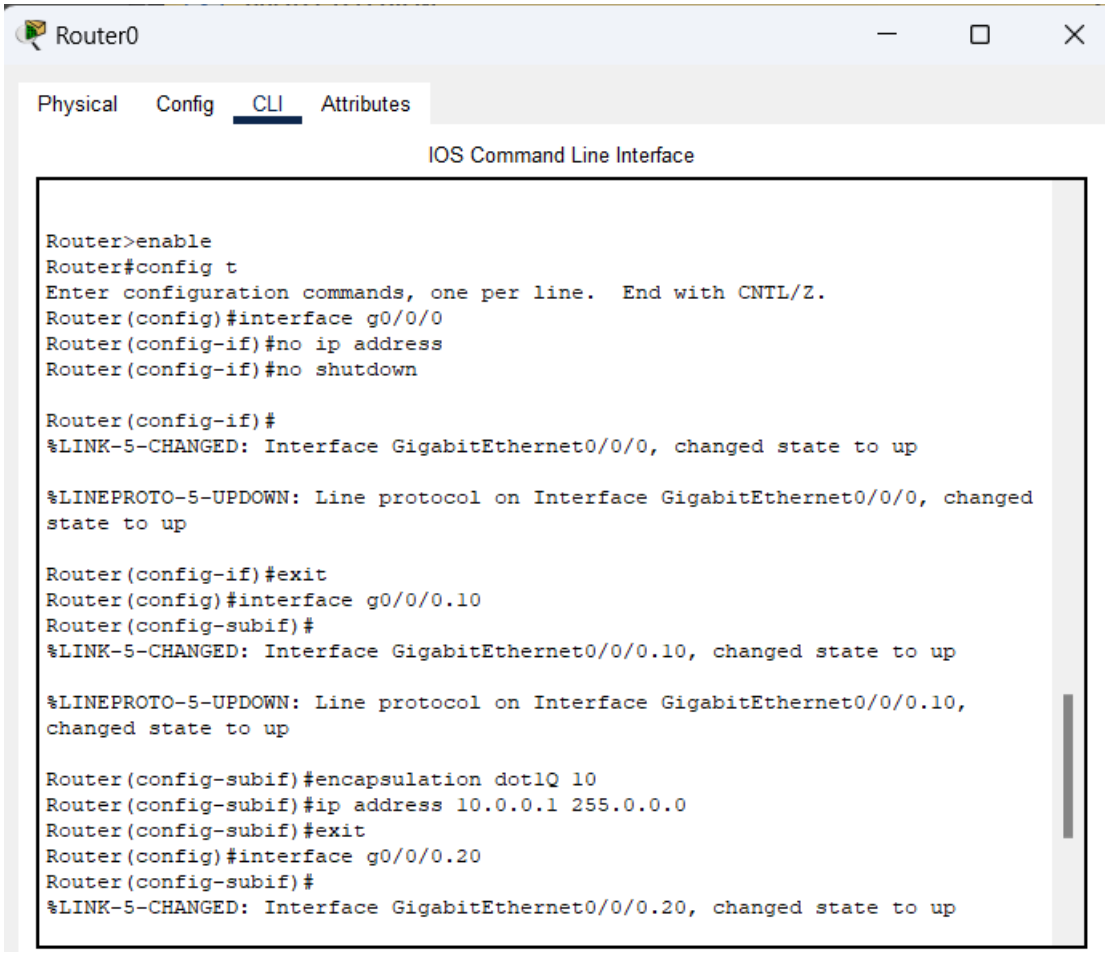
**Aim:** configuring router and learn about 802.11 protocol

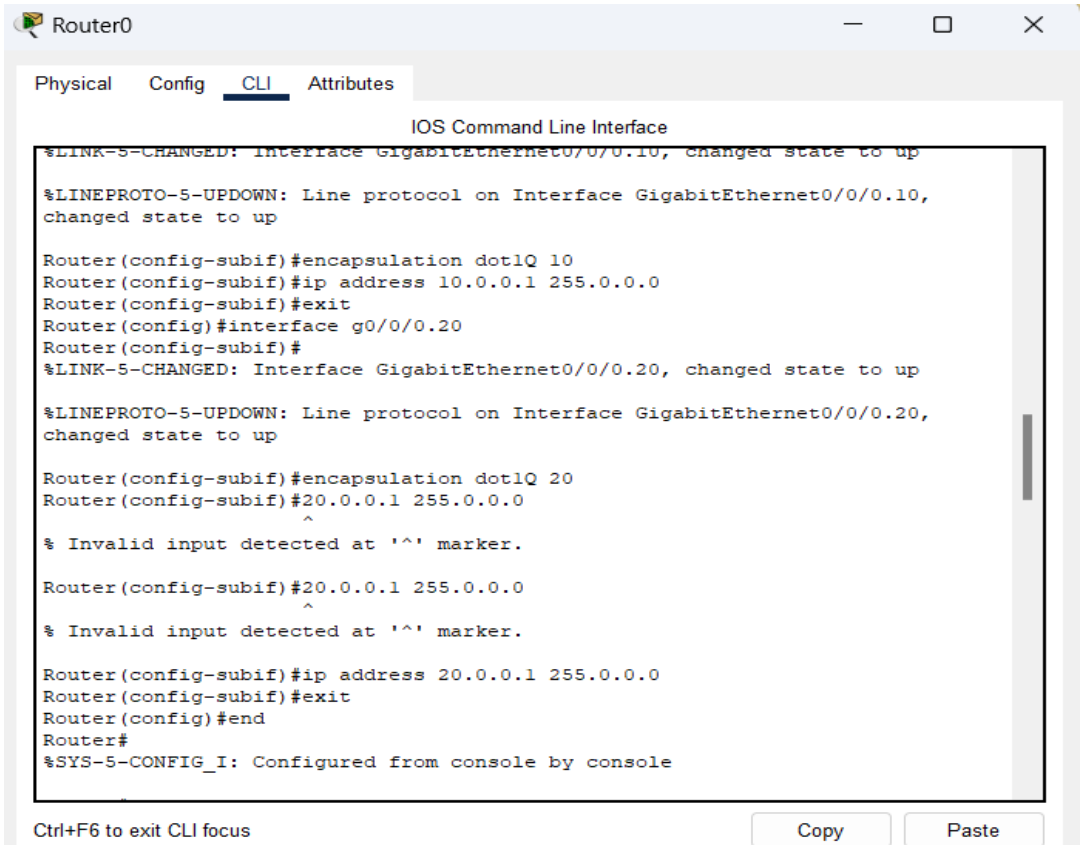
**Theory:**

The 802.11 protocol consists of a series of half-duplex over-the-air modulation techniques that use the same basic protocol. The 802.11 protocol family employs carrier-sense multiple access with collision avoidance whereby equipment listens to a channel for other users before transmitting each frame.

**Output:**




Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface g0/0/0
Router(config-if)#no ip address
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
Router(config-if)#exit
Router(config)#interface g0/0/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.10, changed state to up
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 10.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#interface g0/0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.20, changed state to up

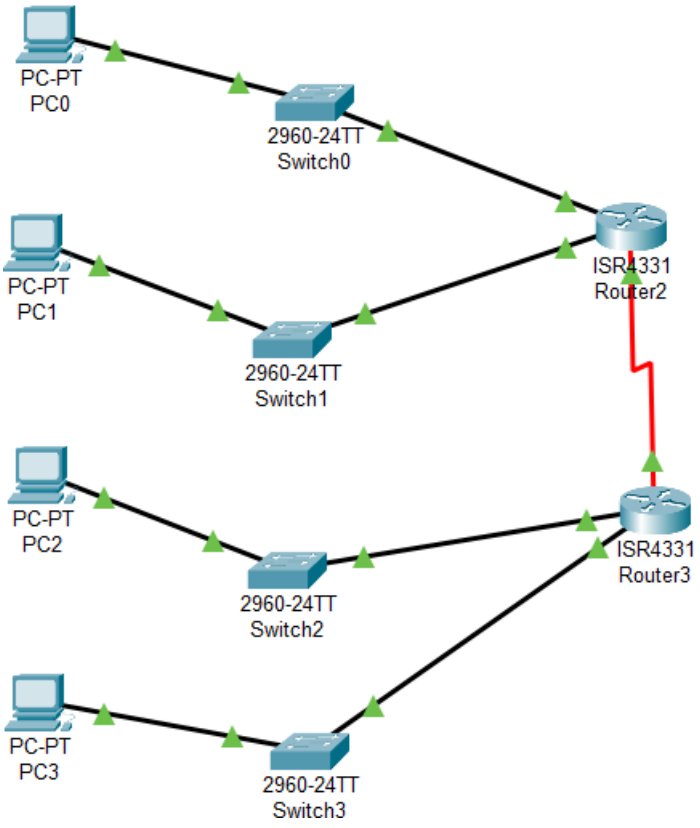

Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.10, changed state to up
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 10.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#interface g0/0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.20, changed state to up
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#20.0.0.1 255.0.0.0
^
% Invalid input detected at '^' marker.
Router(config-subif)#20.0.0.1 255.0.0.0
^
% Invalid input detected at '^' marker.
Router(config-subif)#ip address 20.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Ctrl+F6 to exit CLI focus
Copy
Paste

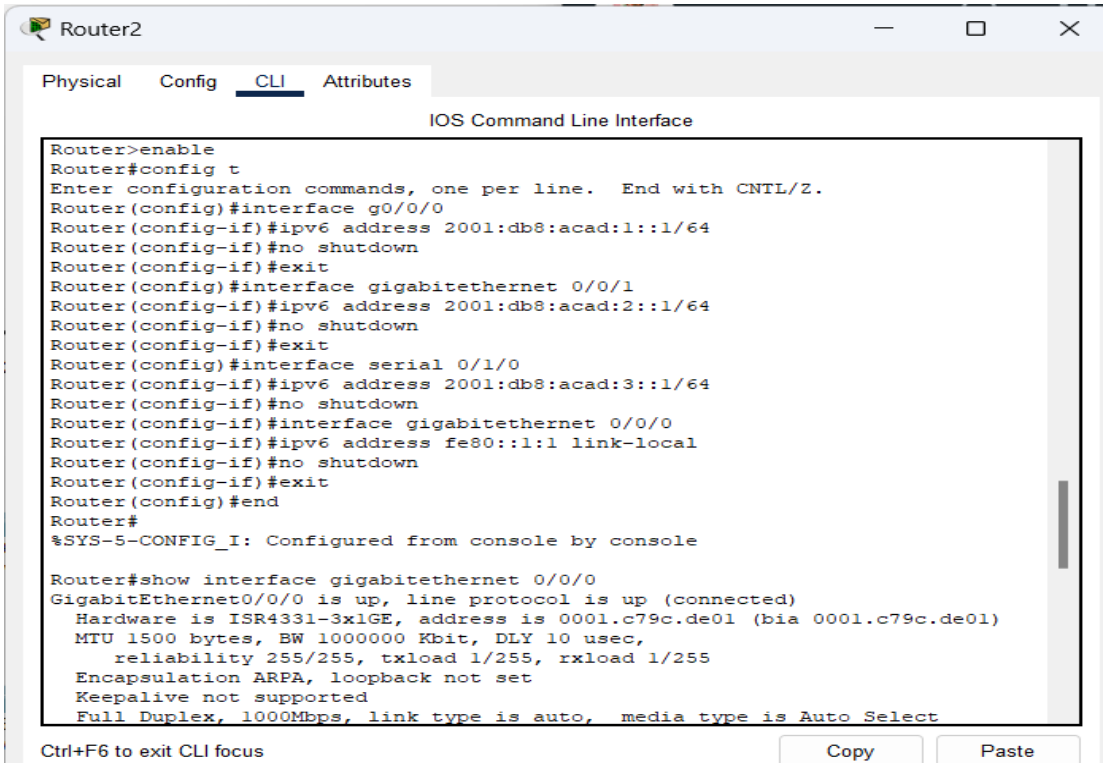
# Lab-7

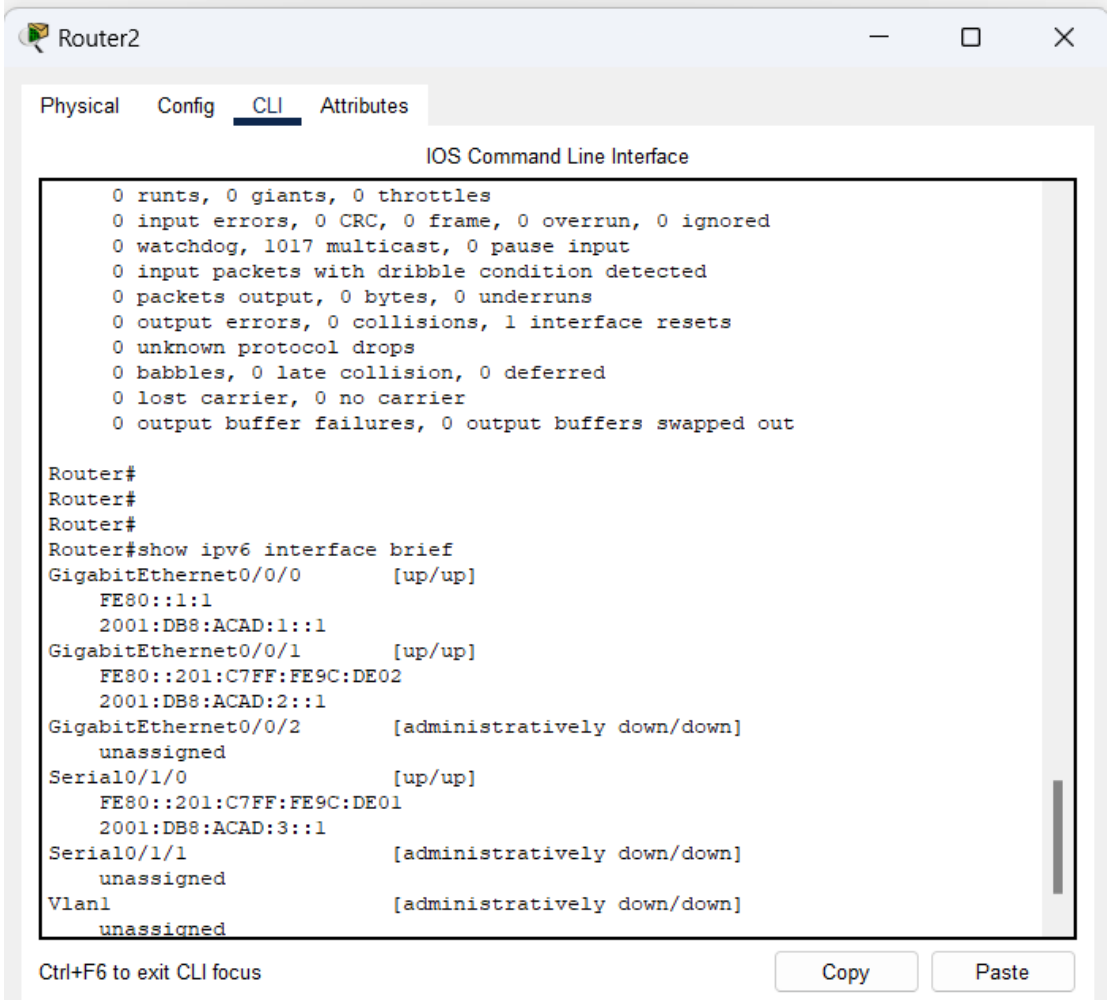
**Aim:** To configure ipv6 address on a router

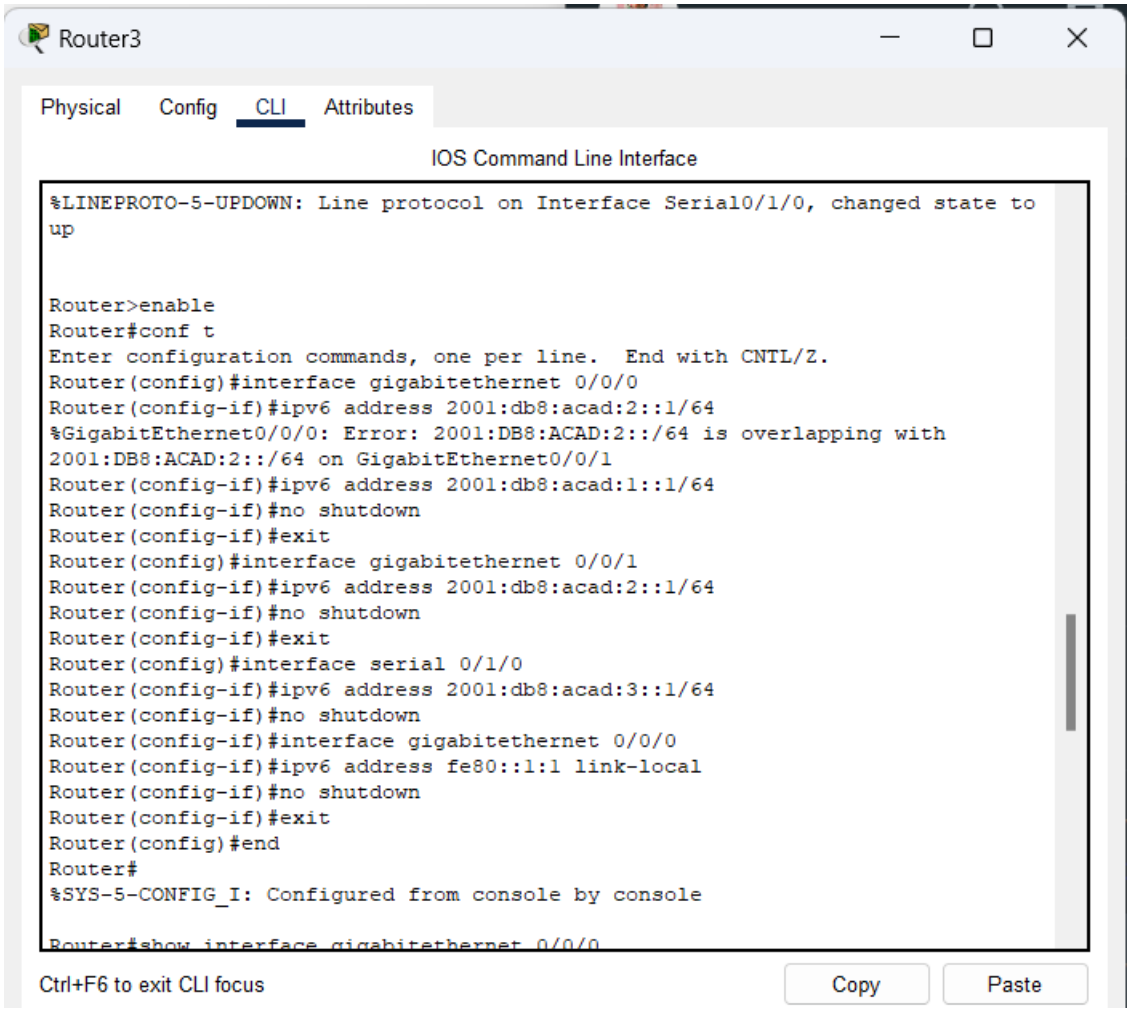
**Theory:** IPv4 users can move to IPv6 and receive services such as exit-to-exit security, quality of service (QoS), and globally unique addresses.
In the ipv6 address interface configuration command, you must enter the ipv6-address and ipv6-prefix variables with the address specified in hexadecimal using 16-bit values between colons.

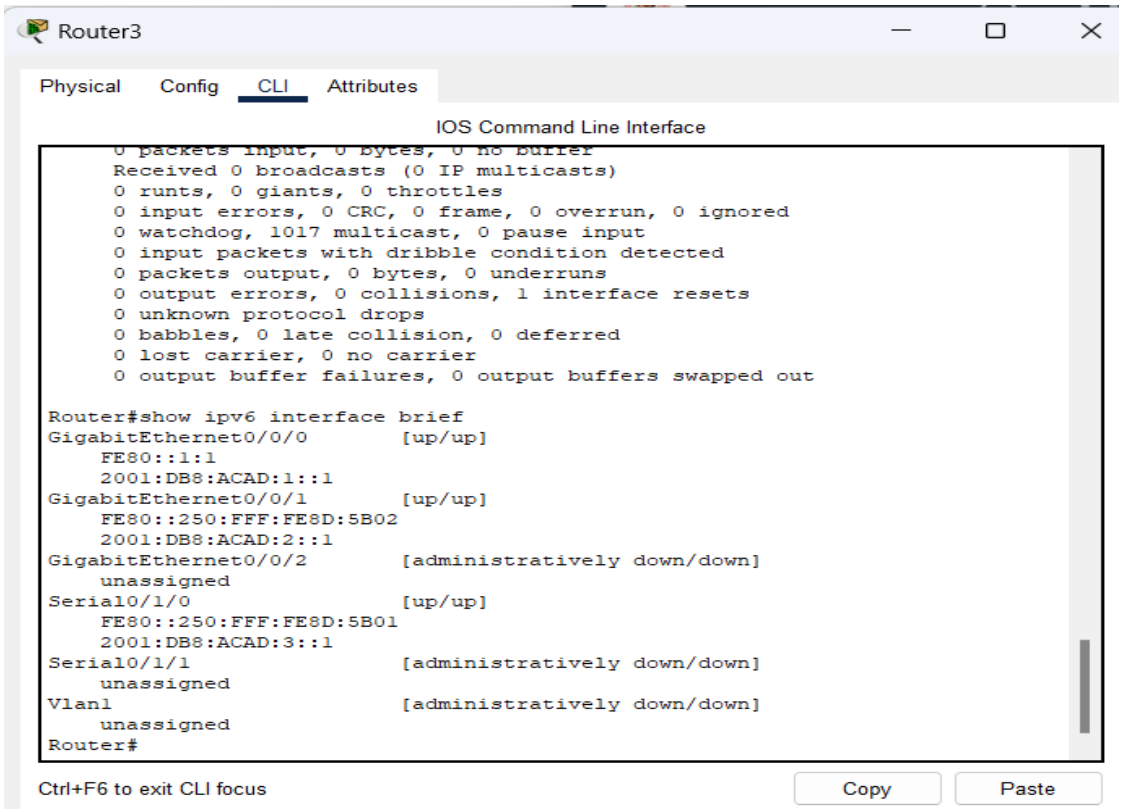
**Output:**




Router2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface g0/0/0
Router(config-if)#ipv6 address 2001:db8:acad:1::1/64
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface gigabitethernet 0/0/1
Router(config-if)#ipv6 address 2001:db8:acad:2::1/64
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial 0/1/0
Router(config-if)#ipv6 address 2001:db8:acad:3::1/64
Router(config-if)#no shutdown
Router(config-if)#interface gigabitethernet 0/0/0
Router(config-if)#ipv6 address fe80::1:1 link-local
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show interface gigabitethernet 0/0/0
GigabitEthernet0/0/0 is up, line protocol is up (connected)
  Hardware is ISR4331-3x1GE, address is 0001.c79c.de01 (bia 0001.c79c.de01)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not supported
  Full Duplex, 1000Mbps, link type is auto,  media type is Auto Select
Ctrl+F6 to exit CLI focus
Copy
Paste


Router2
Physical
Config
CLI
Attributes
IOS Command Line Interface
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 1017 multicast, 0 pause input
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Router#
Router#
Router#
Router#show ipv6 interface brief
GigabitEthernet0/0/0       [up/up]
    FE80::1:1
    2001:DB8:ACAD:1::1
GigabitEthernet0/0/1       [up/up]
    FE80::201:C7FF:FE9C:DE02
    2001:DB8:ACAD:2::1
GigabitEthernet0/0/2       [administratively down/down]
    unassigned
Serial0/1/0                [up/up]
    FE80::201:C7FF:FE9C:DE01
    2001:DB8:ACAD:3::1
Serial0/1/1                [administratively down/down]
    unassigned
Vlan1                      [administratively down/down]
    unassigned
Ctrl+F6 to exit CLI focus
Copy
Paste


Router3
Physical
Config
CLI
Attributes
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitethernet 0/0/0
Router(config-if)#ipv6 address 2001:db8:acad:2::1/64
%GigabitEthernet0/0/0: Error: 2001:DB8:ACAD:2::/64 is overlapping with 2001:DB8:ACAD:2::/64 on GigabitEthernet0/0/1
Router(config-if)#ipv6 address 2001:db8:acad:1::1/64
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface gigabitethernet 0/0/1
Router(config-if)#ipv6 address 2001:db8:acad:2::1/64
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial 0/1/0
Router(config-if)#ipv6 address 2001:db8:acad:3::1/64
Router(config-if)#no shutdown
Router(config-if)#interface gigabitethernet 0/0/0
Router(config-if)#ipv6 address fe80::1:1 link-local
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show interface gigabitethernet 0/0/0
Ctrl+F6 to exit CLI focus
Copy
Paste


Router3
Physical
Config
CLI
Attributes
IOS Command Line Interface
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts (0 IP multicasts)
0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
0 watchdog, 1017 multicast, 0 pause input
0 input packets with dribble condition detected
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 1 interface resets
0 unknown protocol drops
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
Router#show ipv6 interface brief
GigabitEthernet0/0/0 [up/up]
FE80::1:1
2001:DB8:ACAD:1::1
GigabitEthernet0/0/1 [up/up]
FE80::250:FFF:FE8D:5B02
2001:DB8:ACAD:2::1
GigabitEthernet0/0/2 [administratively down/down]
unassigned
Serial0/1/0 [up/up]
FE80::250:FFF:FE8D:5B01
2001:DB8:ACAD:3::1
Serial0/1/1 [administratively down/down]
unassigned
Vlan1 [administratively down/down]
unassigned
Router#
Ctrl+F6 to exit CLI focus
Copy
Paste

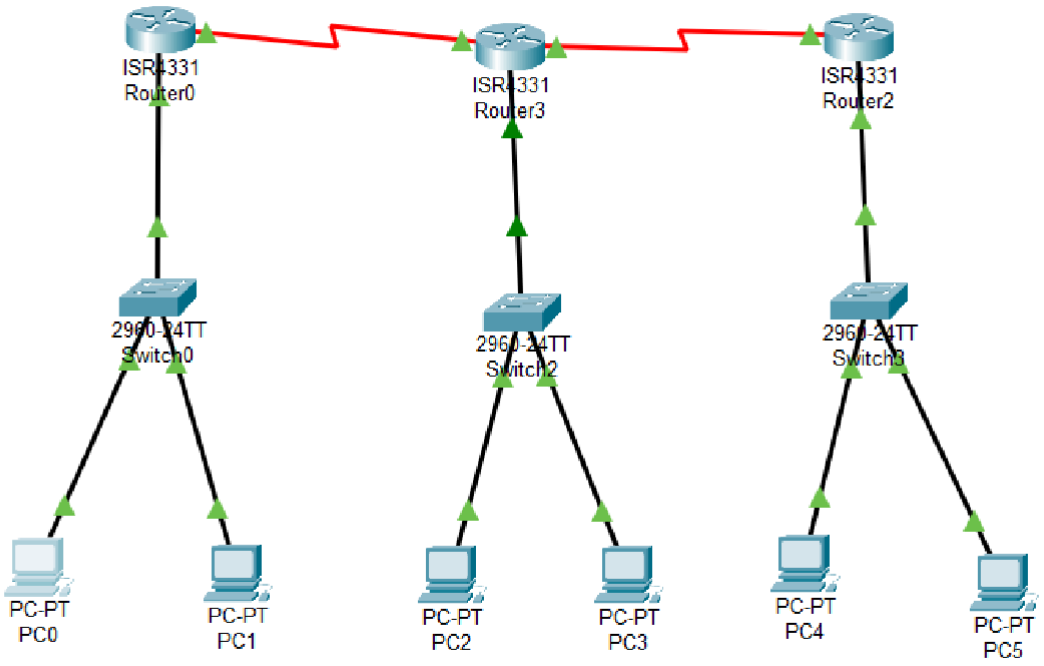
# LAB-8

**Aim:** To learn static routing of the routers

## Theory:

The routing table has the information of path to send the data to different network. Static routing refers to set the path manually instead of automatic generation of the path by the DHCP protocol.

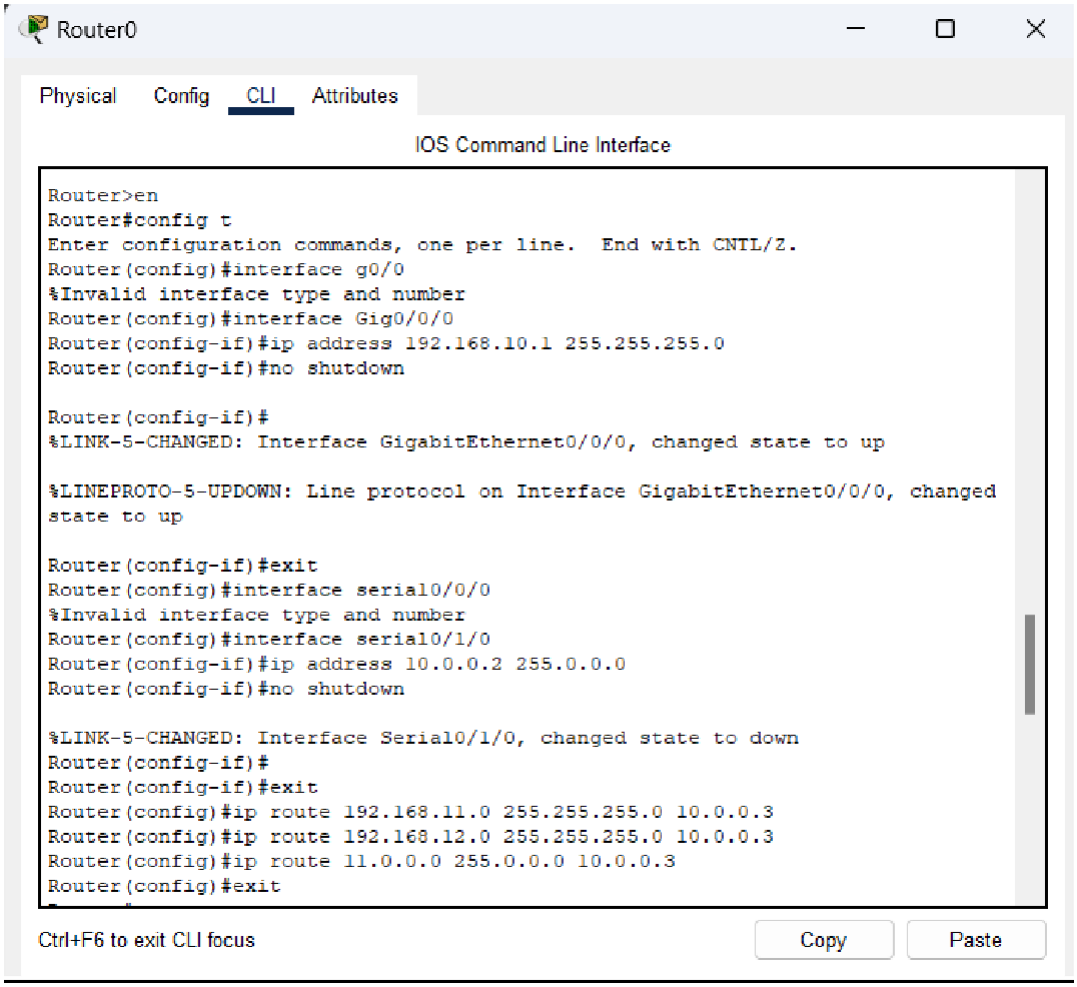
## Topology:



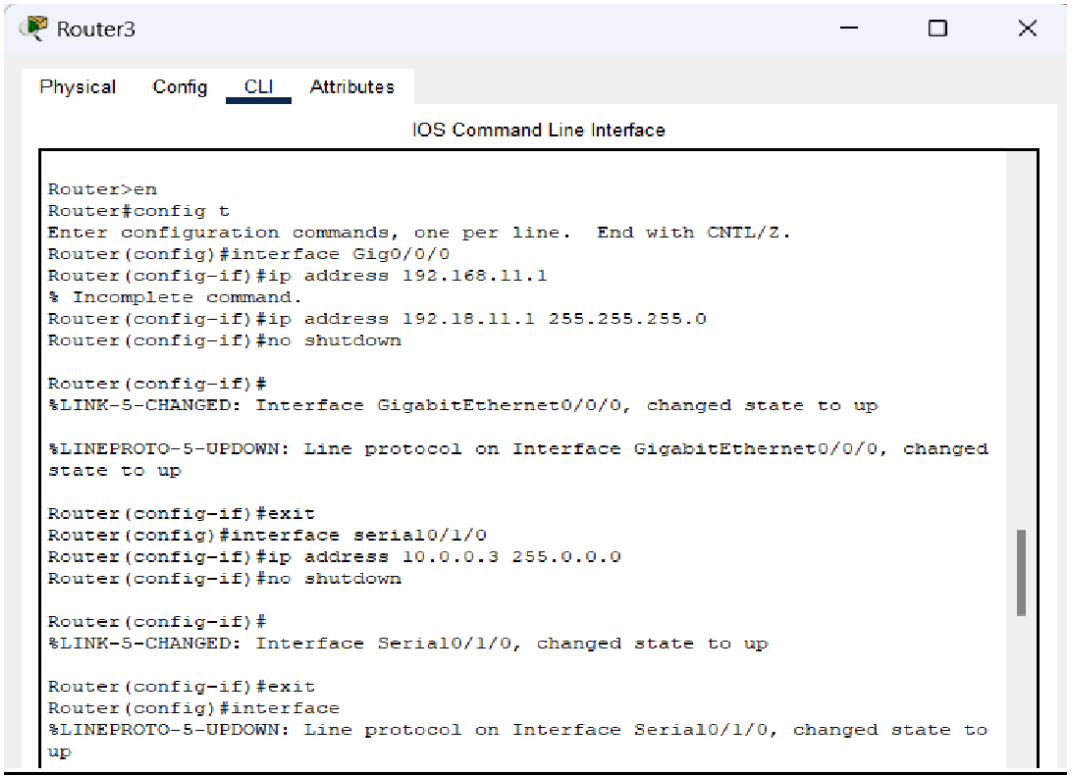

---

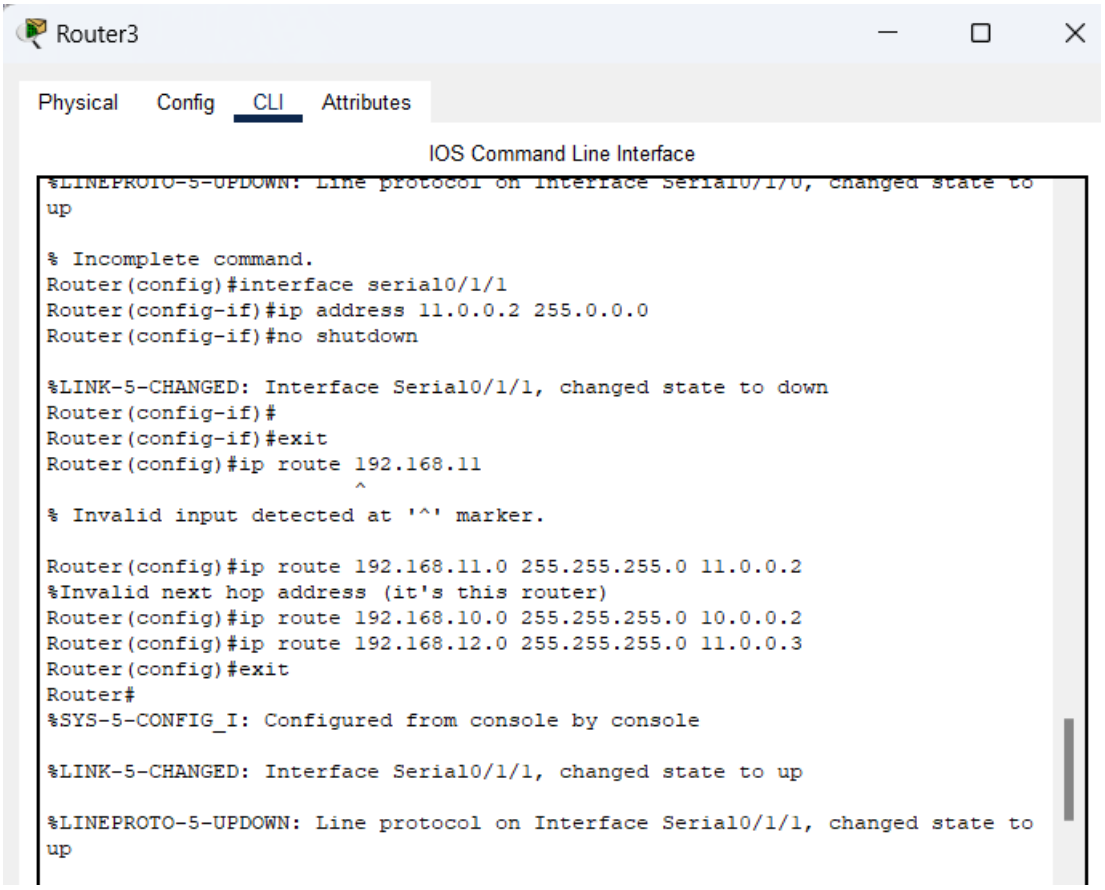
## Output:

## Router0 configuration:

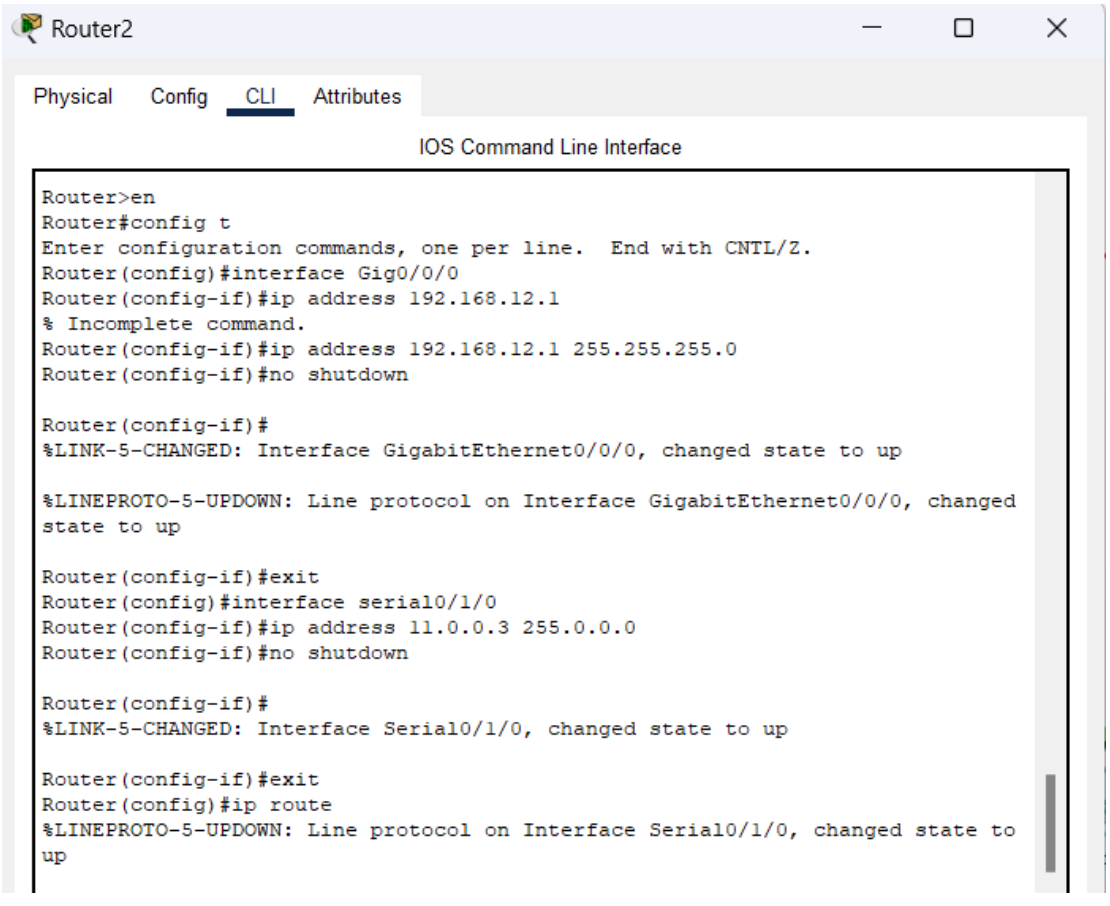


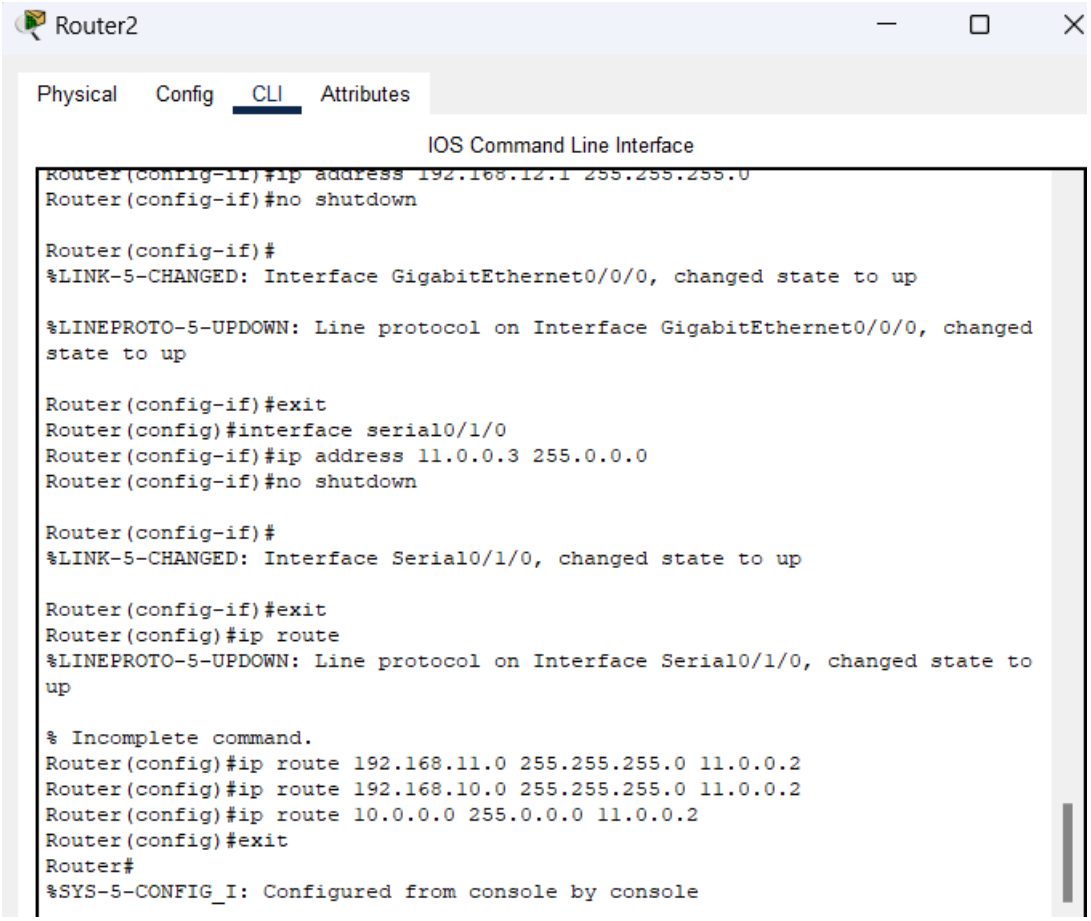

## Router3 configuration:



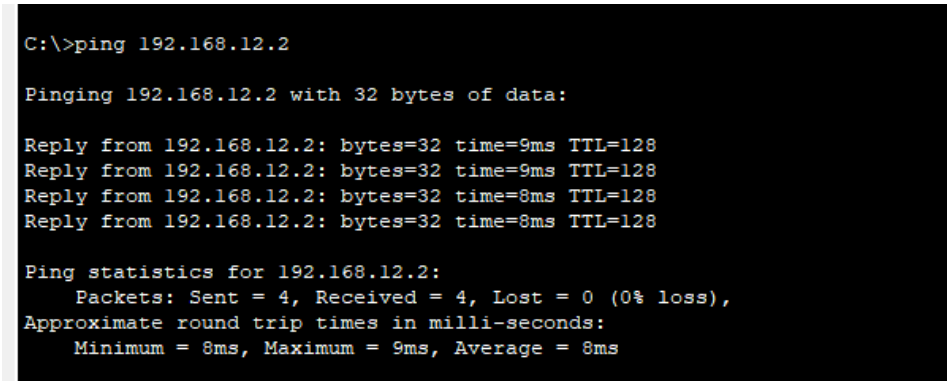



**Router2 configuration:**




Router2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router(config-if)#ip address 192.168.12.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
Router(config-if)#exit
Router(config)#interface serial0/1/0
Router(config-if)#ip address 11.0.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
Router(config-if)#exit
Router(config)#ip route
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
% Incomplete command.
Router(config)#ip route 192.168.11.0 255.255.255.0 11.0.0.2
Router(config)#ip route 192.168.10.0 255.255.255.0 11.0.0.2
Router(config)#ip route 10.0.0.0 255.0.0.0 11.0.0.2
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

testing


C:\>ping 192.168.12.2
Pinging 192.168.12.2 with 32 bytes of data:
Reply from 192.168.12.2: bytes=32 time=9ms TTL=128
Reply from 192.168.12.2: bytes=32 time=9ms TTL=128
Reply from 192.168.12.2: bytes=32 time=8ms TTL=128
Reply from 192.168.12.2: bytes=32 time=8ms TTL=128
Ping statistics for 192.168.12.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 8ms, Maximum = 9ms, Average = 8ms

# Lab-9

## Aim:

To use DHCP, DNS & WEB services using servers.

## Theory:

1. **DHCP server:** It is used to assign IP address to the client machines automatically.

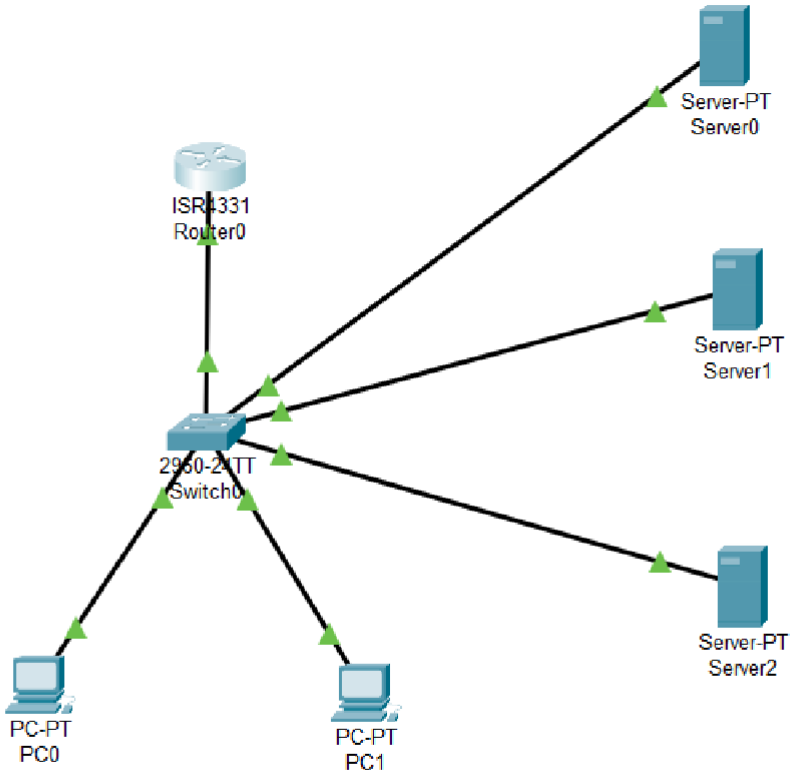
2. **DNS server:** It is used to resolve the domain name to IP address. It is also used to resolve the IP address to domain name.

3. **WEB server:** It is used to host the web pages. It is also used to host the web applications.

## Code:

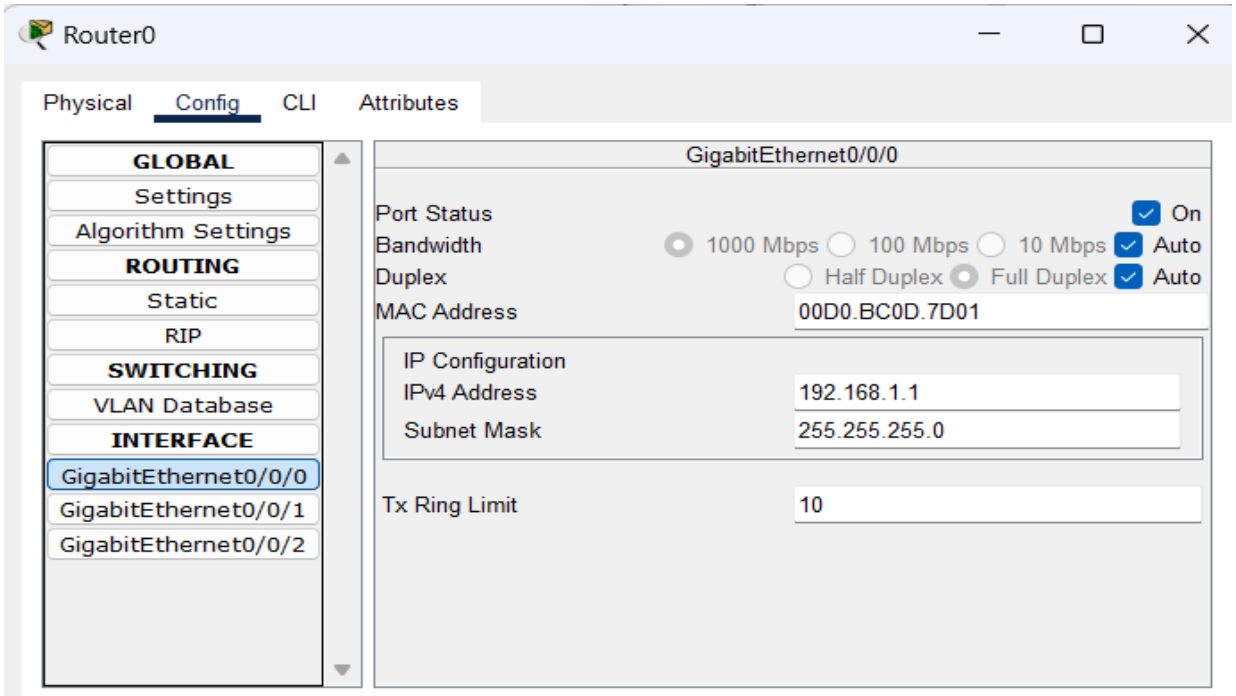
```
R1#disable
R1>enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int gig0/0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#exit
R1(config)#
```

## OUTPUTS:




---

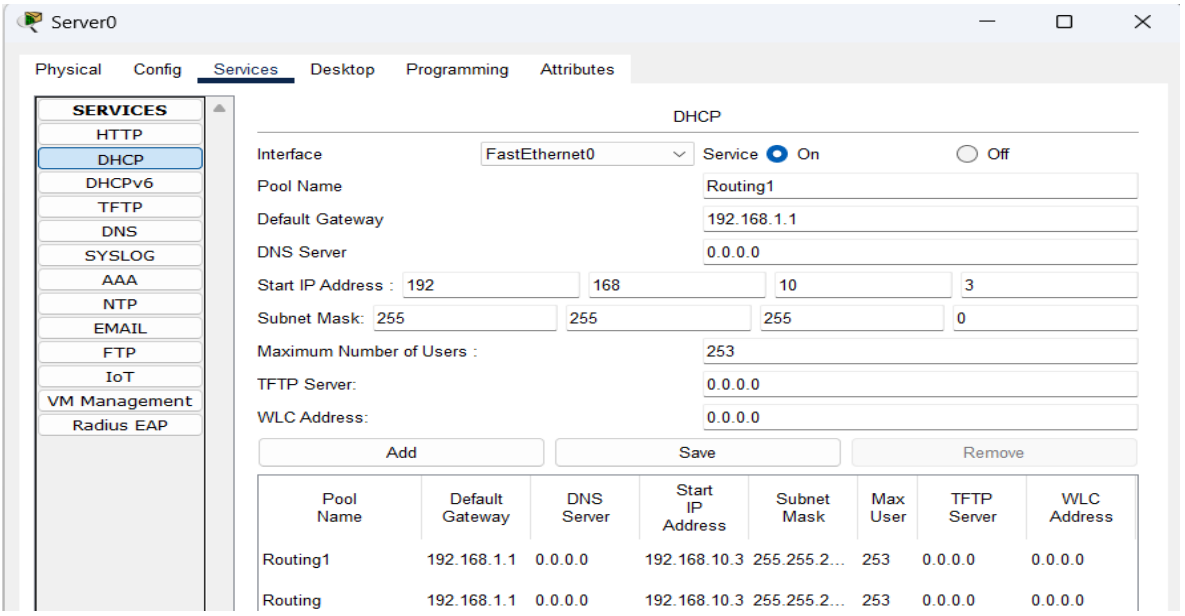
**1.ON the router port**



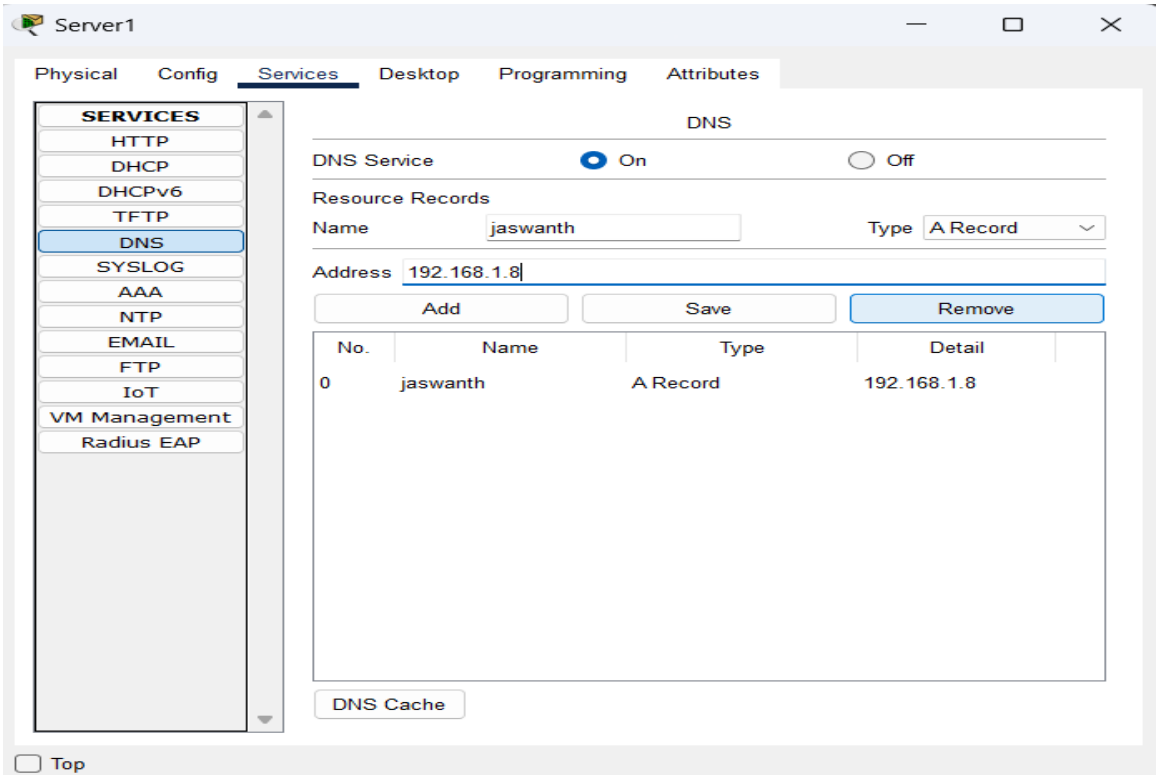
## 2. Apply configuration settings to router to assign it IP address

```
R1#disable
R1>enable
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int gig0/0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#exit
R1(config)#
```

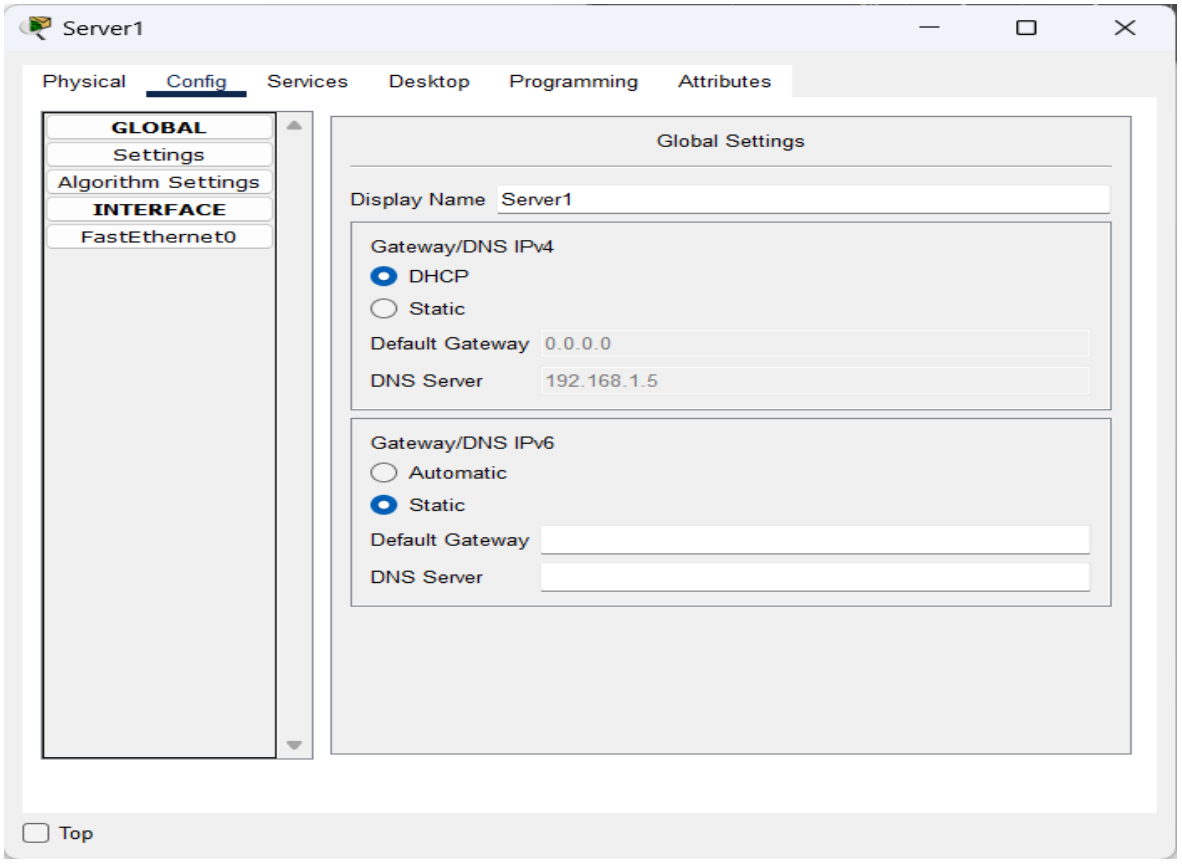
## 3. Change server 0 services to apply it DHCP



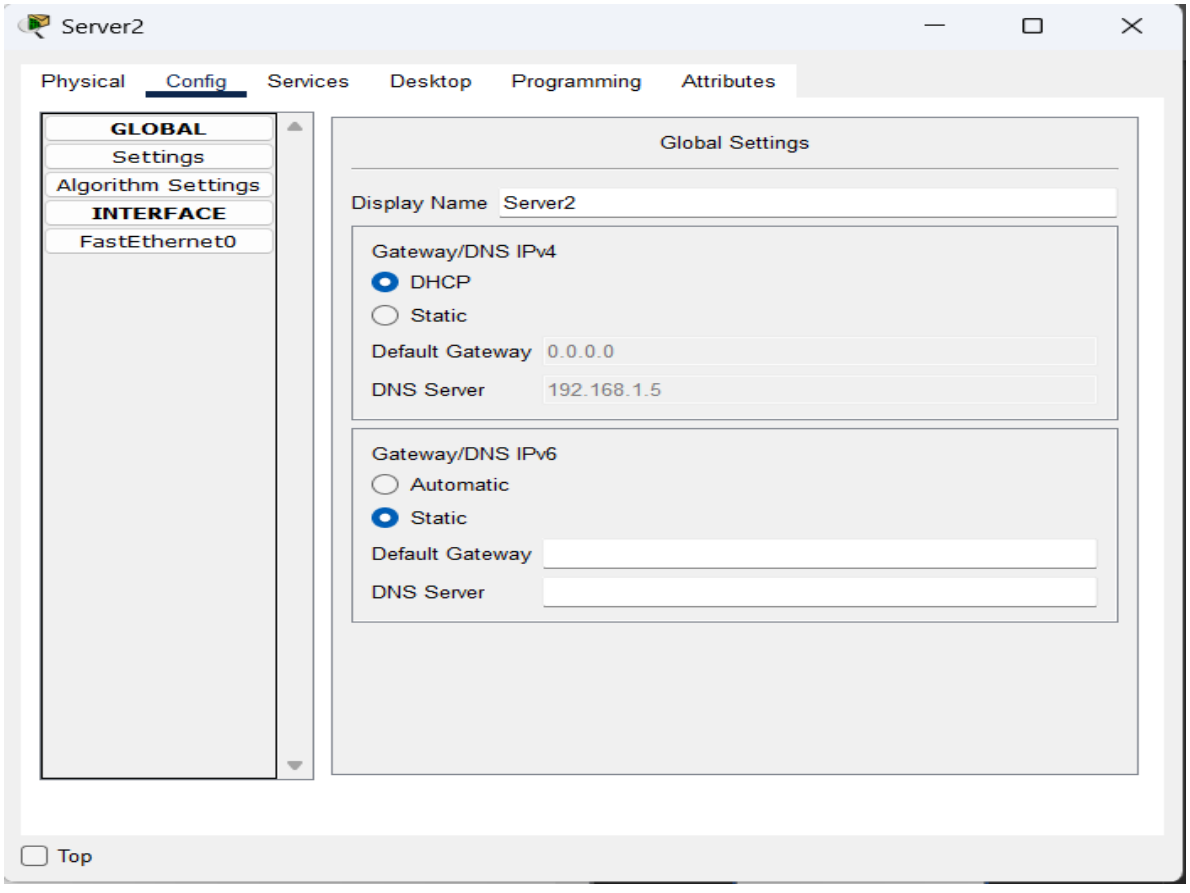

## 4. Change server 1 services to ON DNS



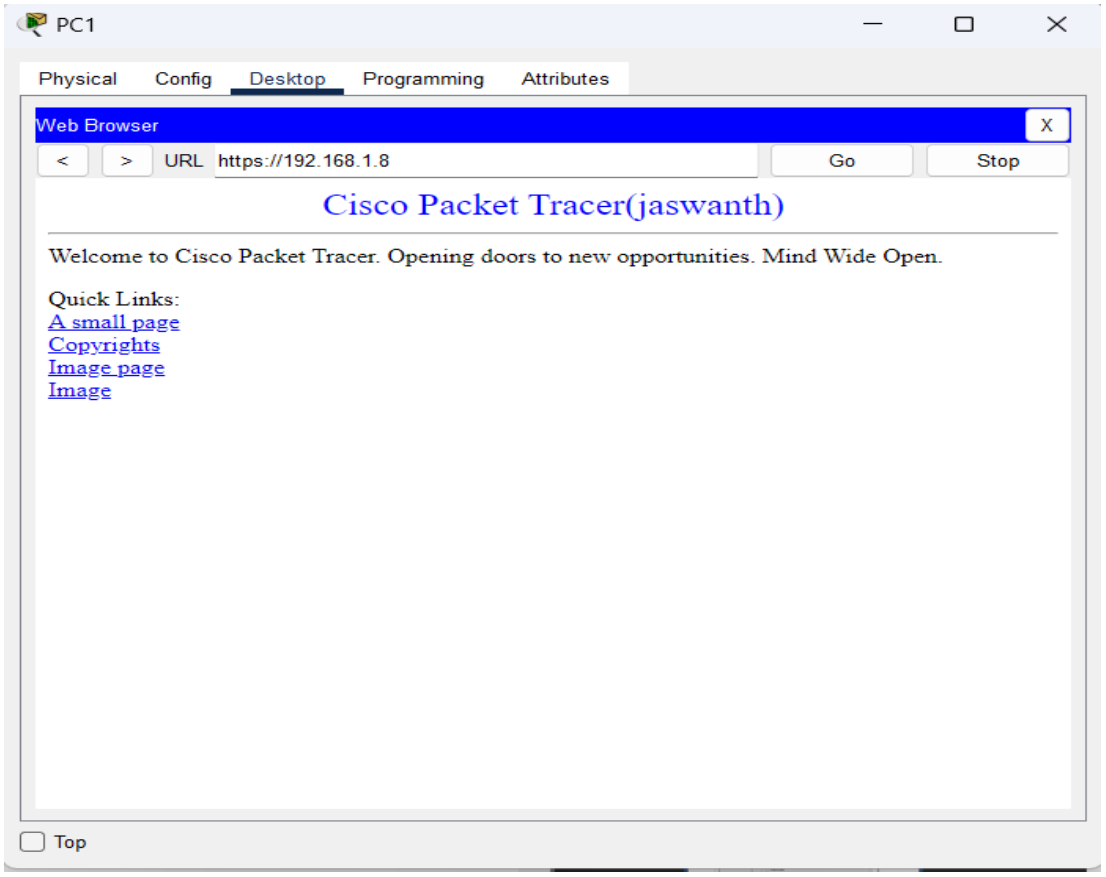
## 5. Change server 1 services to ON DHCP




## 6. Change server 2 services to ON DHCP



## 7.Change HTML page to server 2




## 10.Checking the connection across different PC's

| Fire | Last Status | Source | Destination | Type | Color | Time(sec) | Periodic | Num | Edit | Delete |
|---|---|---|---|---|---|---|---|---|---|---|
| | Successful | PC1 | PC0 | ICMP | | 0.000 | N | 0 | (edit) | (delete) |
| | Successful | PC0 | PC1 | ICMP | | 0.000 | N | 1 | (edit) | (delete) |