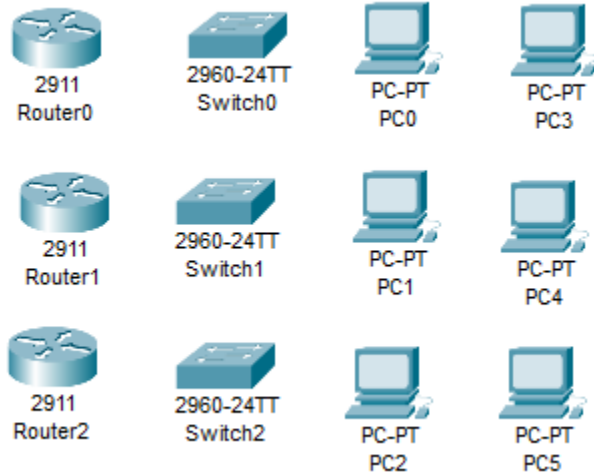


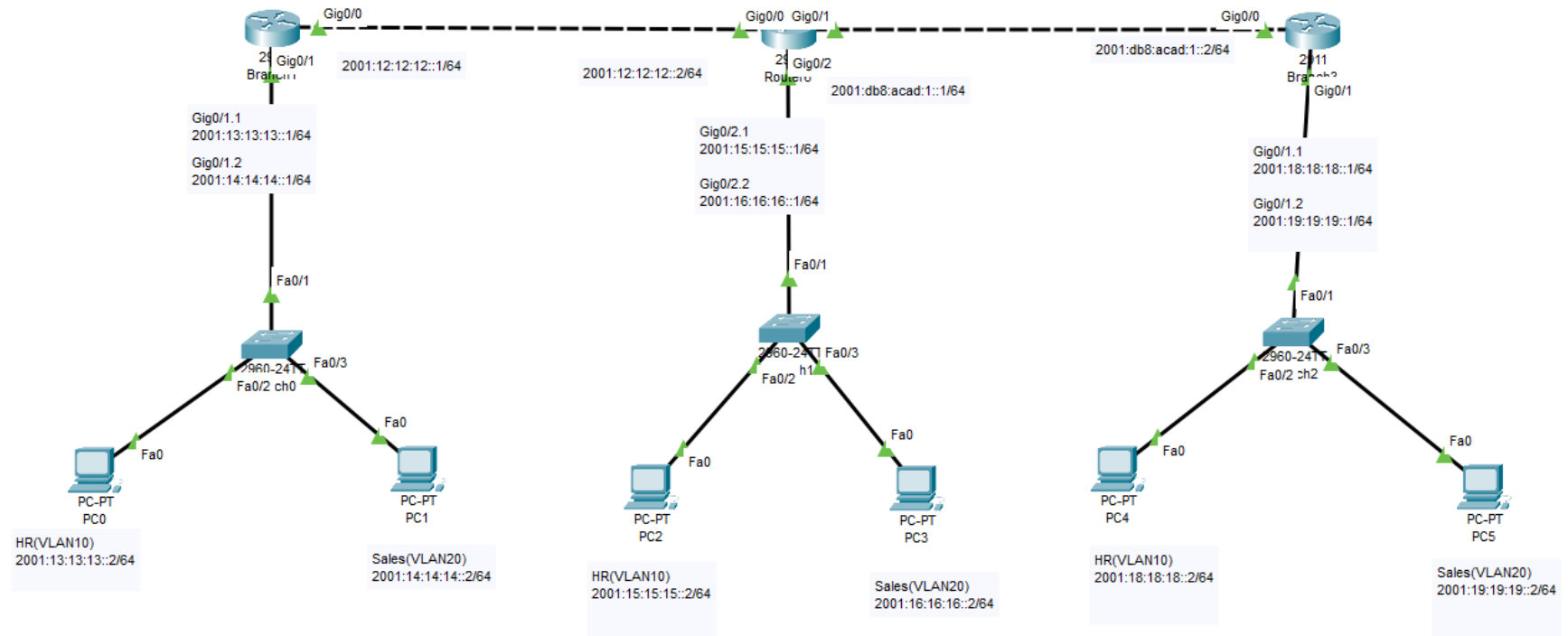
Static Routing with IPV6 address

In the previous lab, we created a network topology and configured all the devices with IPV4 addresses. In this lab, we have created a network topology with 3 branches. We have also created 2 different VIAN for HR department and Sales department. We will be configuring all the devices with IPV6 addresses. We are using 3 Cisco 2911 routers, 3 cisco 2960 switches and 6 desktop machines.

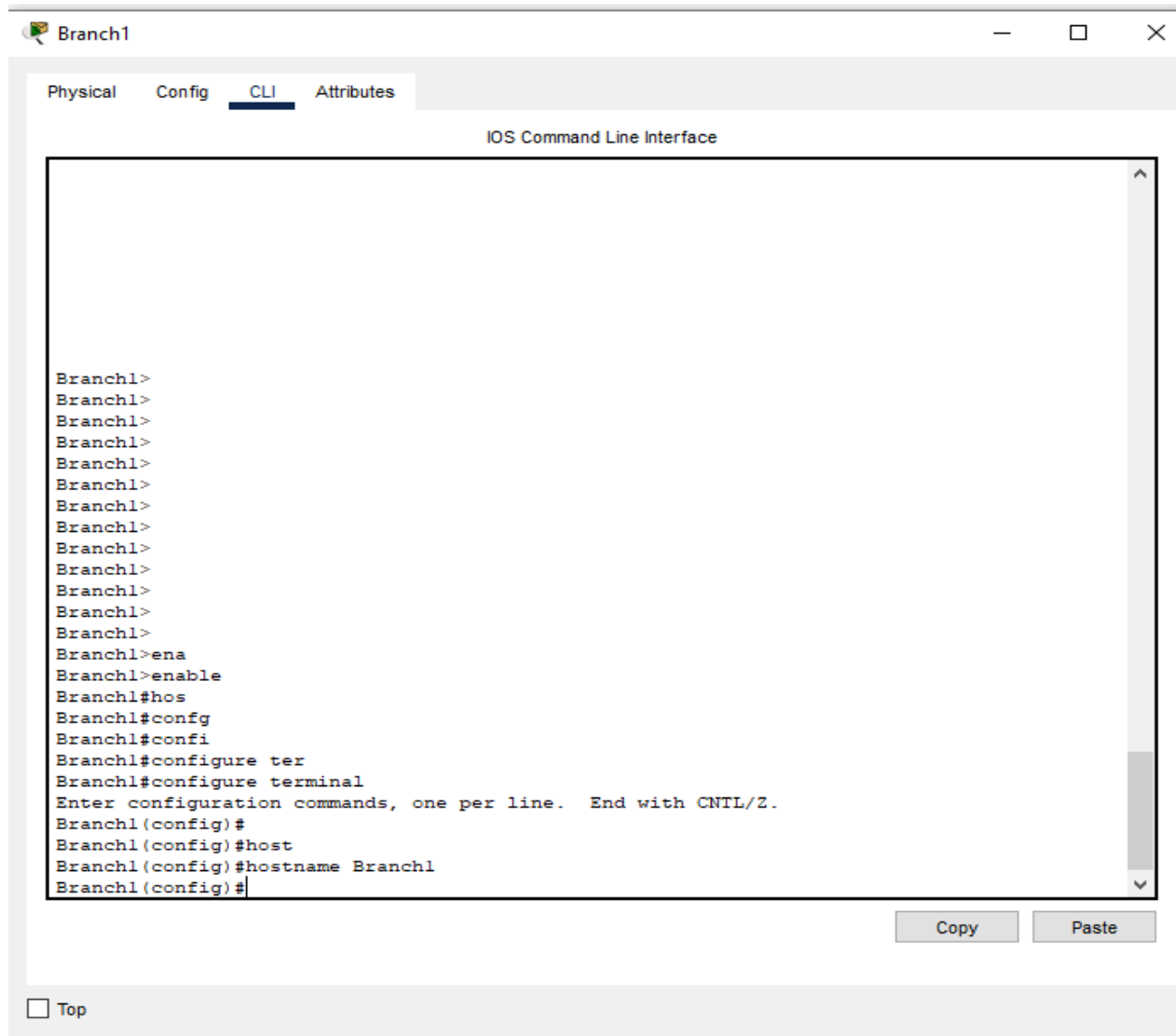
Drag and drop 3 routers, 3 switches and 6 Desktop machines:



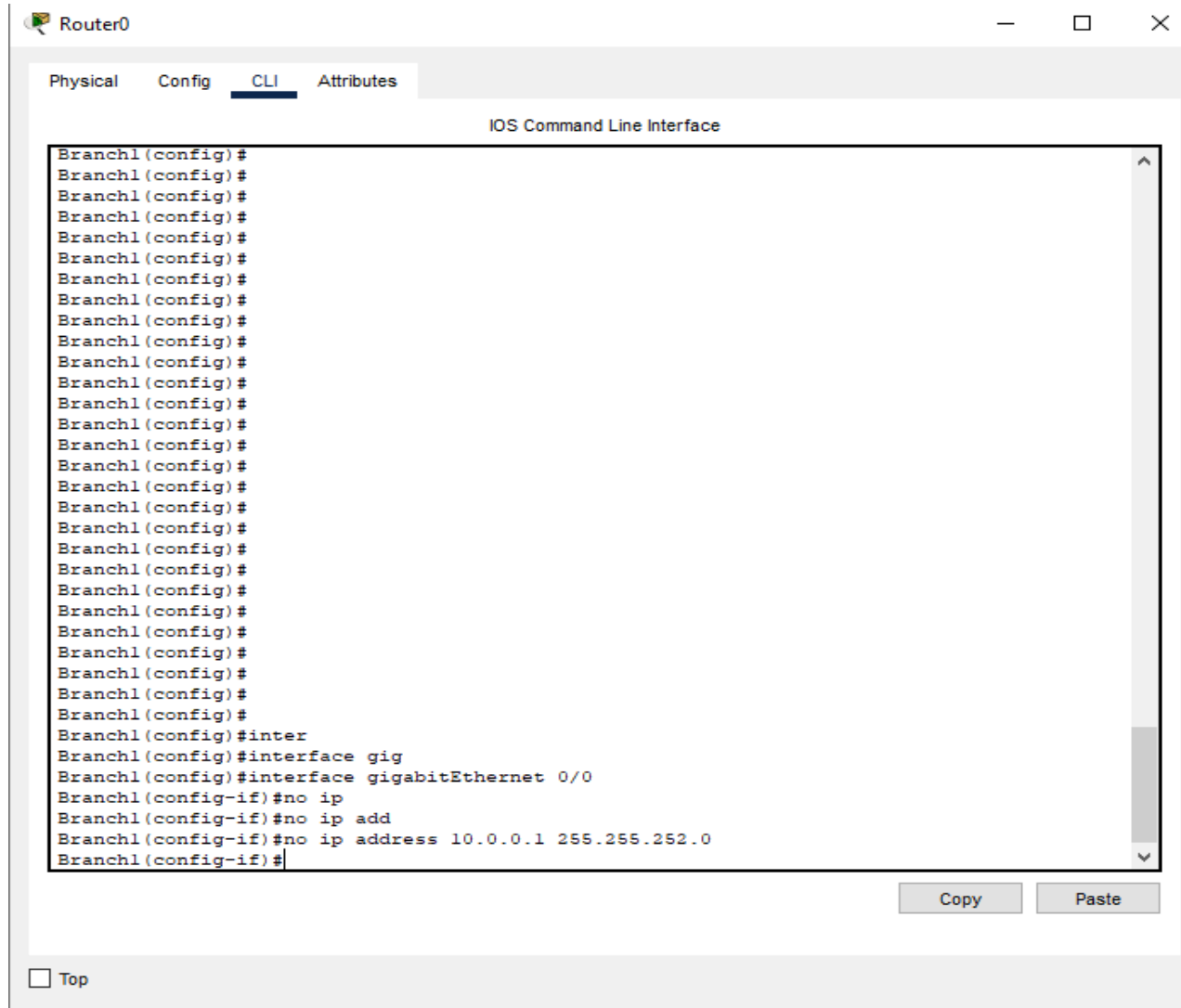
Using the fast Ethernet cables to connect the devices:



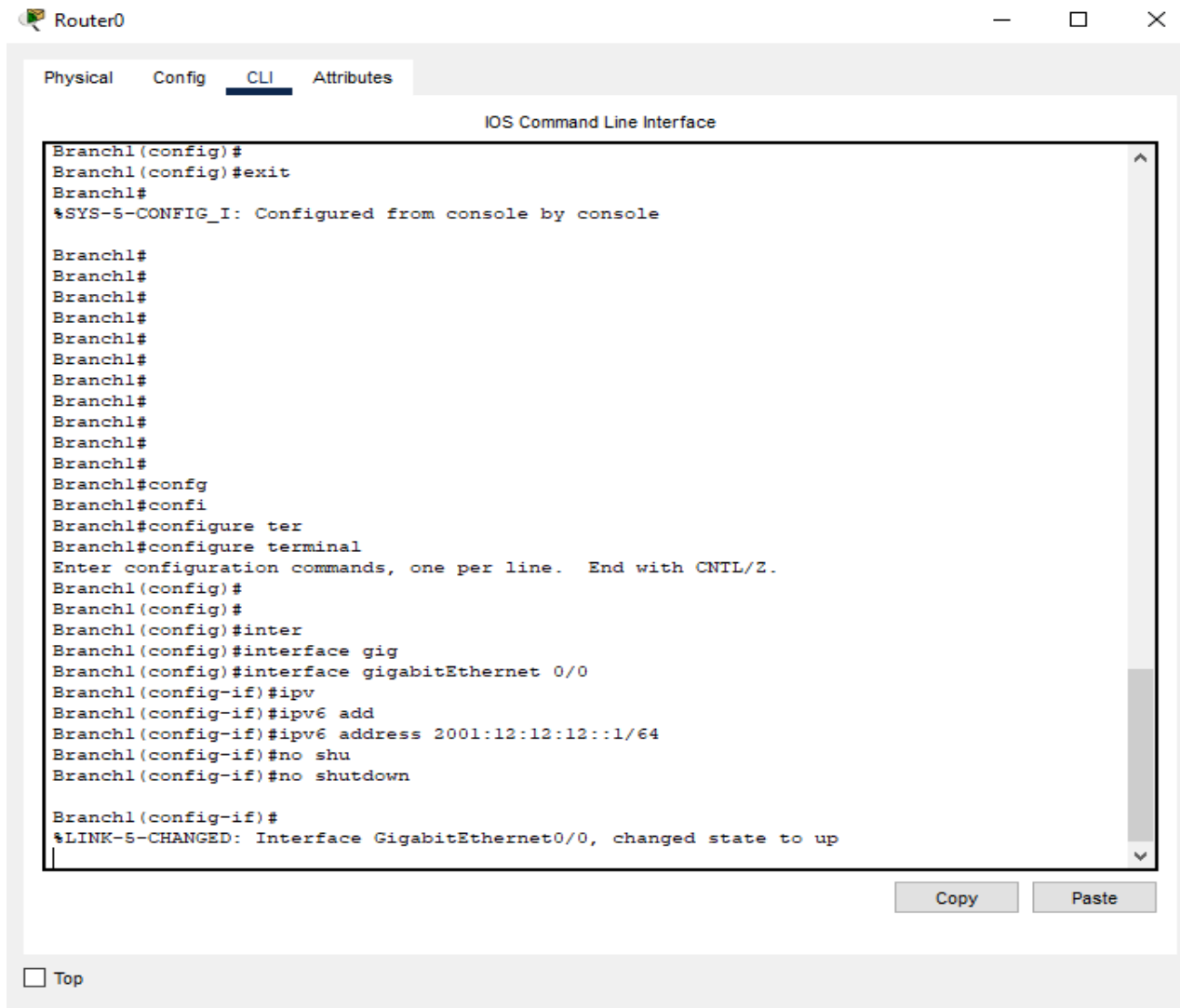
Using the Command line interface to change the router hostname:



Currently all the interfaces of the routers are configured with IPV4 addresses. First, we need to remove the IPV4 addresses:



Using the Command line interface to assign the IPV6 address to all the router interfaces:



The screenshot shows a web-based interface for a router named Router0. The 'CLI' tab is selected, displaying the 'IOS Command Line Interface'. The terminal output shows the following sequence of commands and responses:

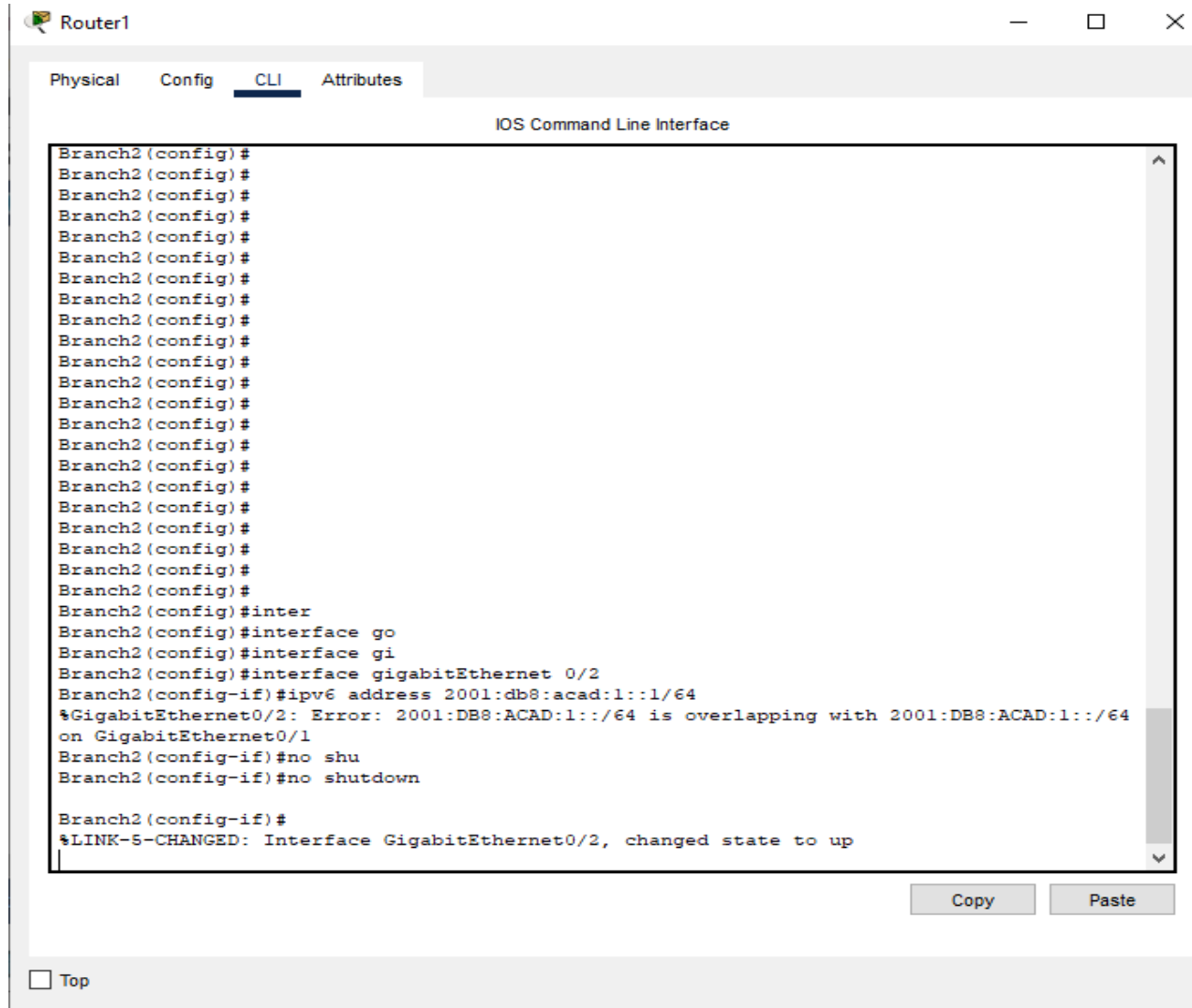
```
Branch1(config)#
Branch1(config)#exit
Branch1#
%SYS-5-CONFIG_I: Configured from console by console

Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#config
Branch1#confi
Branch1#configure ter
Branch1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Branch1(config)#
Branch1(config)#
Branch1(config)#inter
Branch1(config)#interface gig
Branch1(config)#interface gigabitEthernet 0/0
Branch1(config-if)#ipv
Branch1(config-if)#ipv6 add
Branch1(config-if)#ipv6 address 2001:12:12:12::1/64
Branch1(config-if)#no shu
Branch1(config-if)#no shutdown

Branch1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

At the bottom of the interface, there is a 'Top' button and a 'Copy' button.

We Will use the command line interface of each router to assign the interfaces of all 3 branches routers:



The screenshot shows a window titled "Router1" with a tabbed interface. The "CLI" tab is selected, displaying the "IOS Command Line Interface". The terminal window shows a series of commands entered in configuration mode for Branch2. The commands include multiple "Branch2(config)#" prompts, followed by "inter", "interface go", "interface gi", and "interface gigabitEthernet 0/2". An IPv6 address is assigned to the interface, but an error message is displayed: "%GigabitEthernet0/2: Error: 2001:DB8:ACAD:1::/64 is overlapping with 2001:DB8:ACAD:1::/64 on GigabitEthernet0/1". The user then enters "no shu" and "no shutdown". Finally, the interface state is reported as "up".

```
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#
Branch2(config)#inter
Branch2(config)#interface go
Branch2(config)#interface gi
Branch2(config)#interface gigabitEthernet 0/2
Branch2(config-if)#ipv6 address 2001:db8:acad:1::1/64
%GigabitEthernet0/2: Error: 2001:DB8:ACAD:1::/64 is overlapping with 2001:DB8:ACAD:1::/64
on GigabitEthernet0/1
Branch2(config-if)#no shu
Branch2(config-if)#no shutdown

Branch2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
```

Copy Paste

☐ Top

We will assign the IPV6 addresses to each desktop machines:

PC0

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address:

Subnet Mask:

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: 2001:13:13:13::2 / 64

Link Local Address: FE80::2D0:FFFF:FEA5:C393

Default Gateway: 2001:13:13:13::1

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

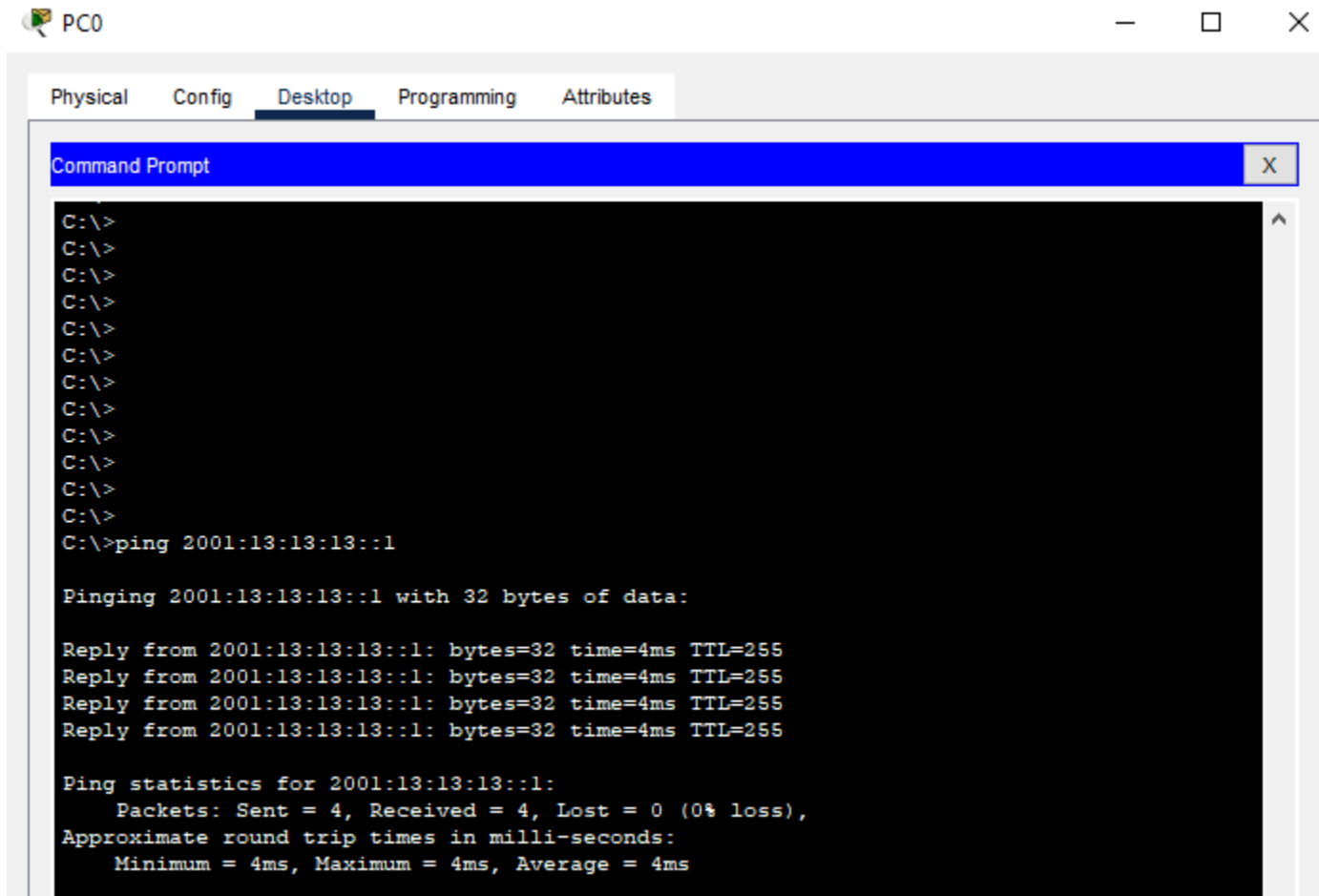
Username:

Password:

☐ Top

Now we have assigned the IPV6 addresses to all the router interfaces and desktop machines. All the machines are able to communicate within their LAN network.

PC0 is able to communicate to its default gateway(LAN network):



The screenshot shows a window titled "PC0" with a tabbed interface. The "Desktop" tab is selected, displaying a "Command Prompt" window. The Command Prompt shows a series of "C:\>" prompts, followed by the command "C:\>ping 2001:13:13:13::1". The output of the ping command is displayed, showing four successful replies with 32 bytes of data, a time of 4ms, and a TTL of 255. The ping statistics are also shown, indicating 4 packets sent, 4 received, and 0% loss.

```
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>ping 2001:13:13:13::1

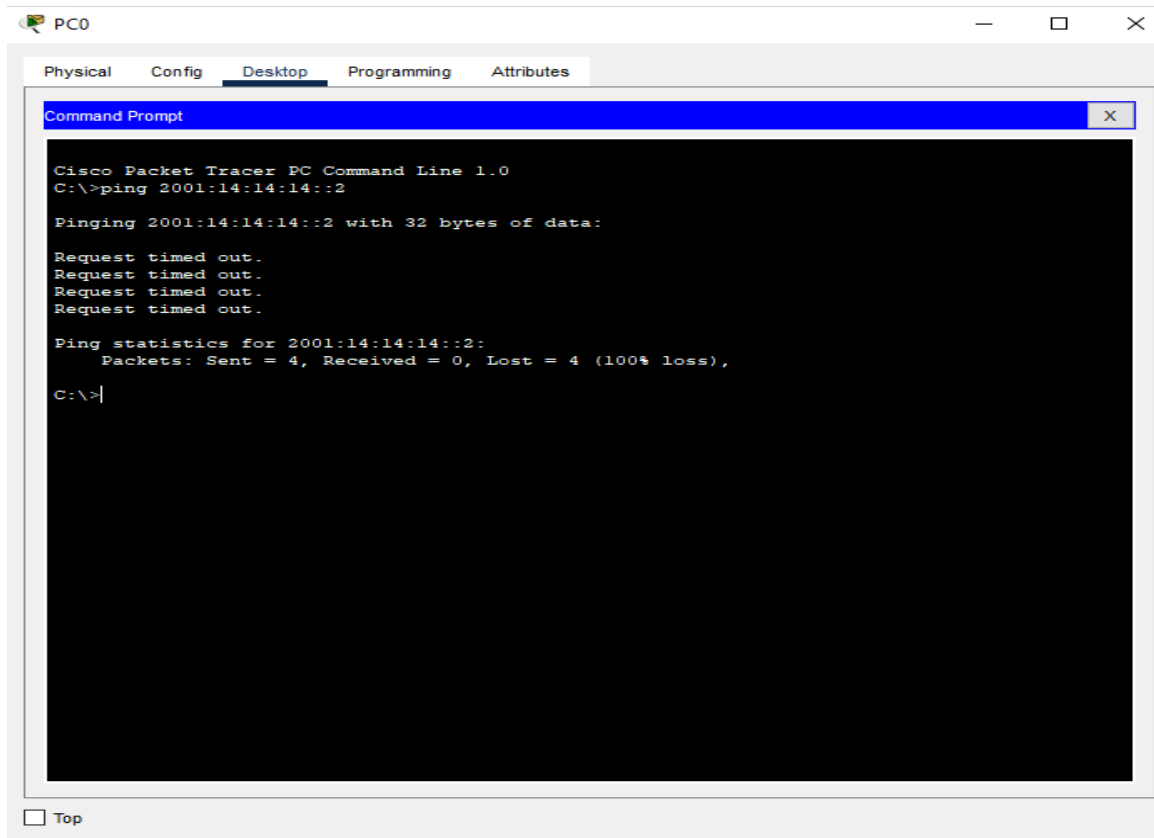
Pinging 2001:13:13:13::1 with 32 bytes of data:

Reply from 2001:13:13:13::1: bytes=32 time=4ms TTL=255
Reply from 2001:13:13:13::1: bytes=32 time=4ms TTL=255
Reply from 2001:13:13:13::1: bytes=32 time=4ms TTL=255
Reply from 2001:13:13:13::1: bytes=32 time=4ms TTL=255

Ping statistics for 2001:13:13:13::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 4ms, Average = 4ms
```


But it's unable communicate out of its LAN network:

Ping test from PC0 from VLAN 10 to PC1 from VLAN20:



```
PC0
Physical  Config  Desktop  Programming  Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:14:14:14::2

Pinging 2001:14:14:14::2 with 32 bytes of data:

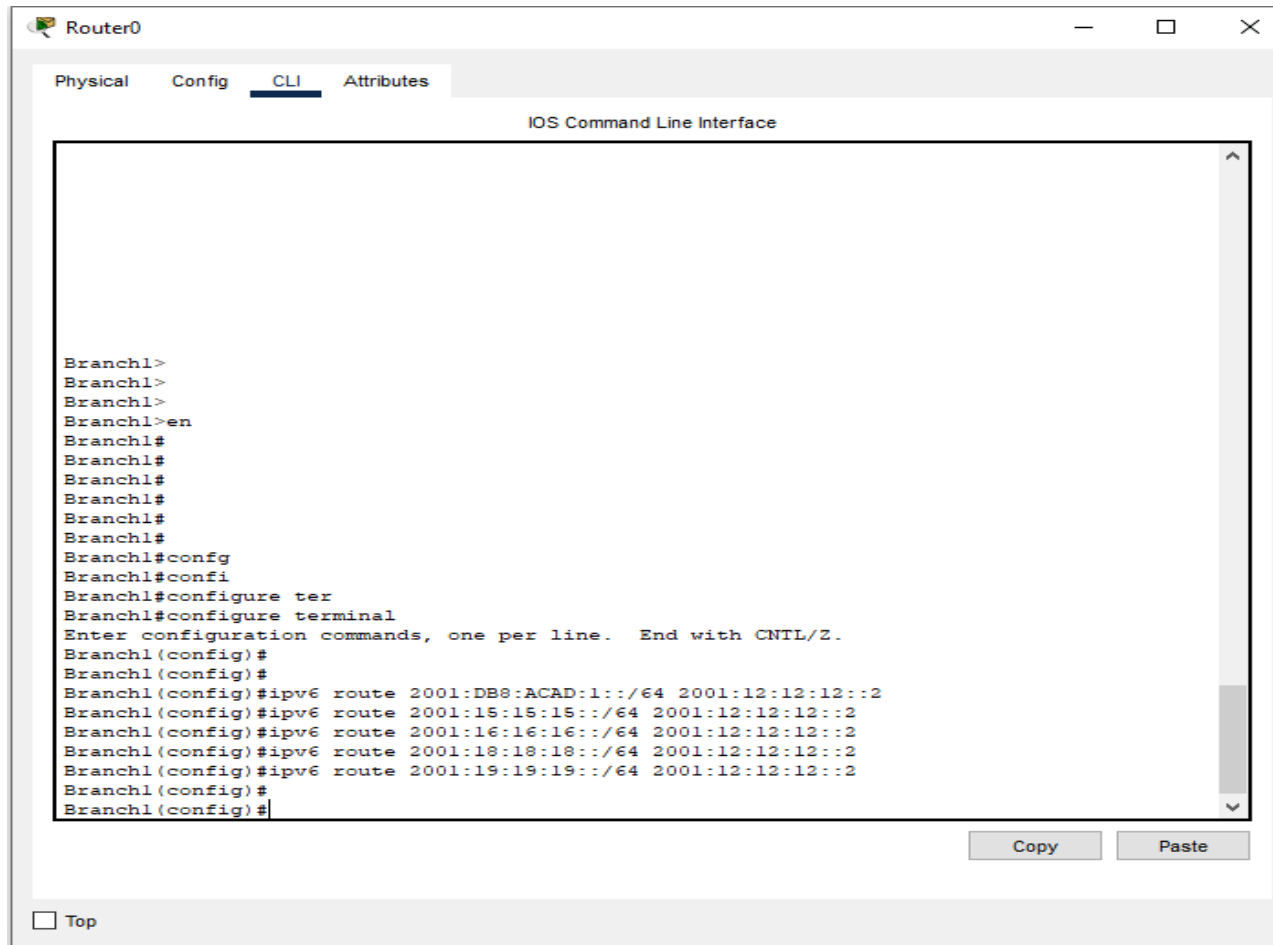
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 2001:14:14:14::2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

☐ Top

We must need to configure the Static routing on each router to communicate the device to other networks:



Router0

Physical Config CLI Attributes

IOS Command Line Interface

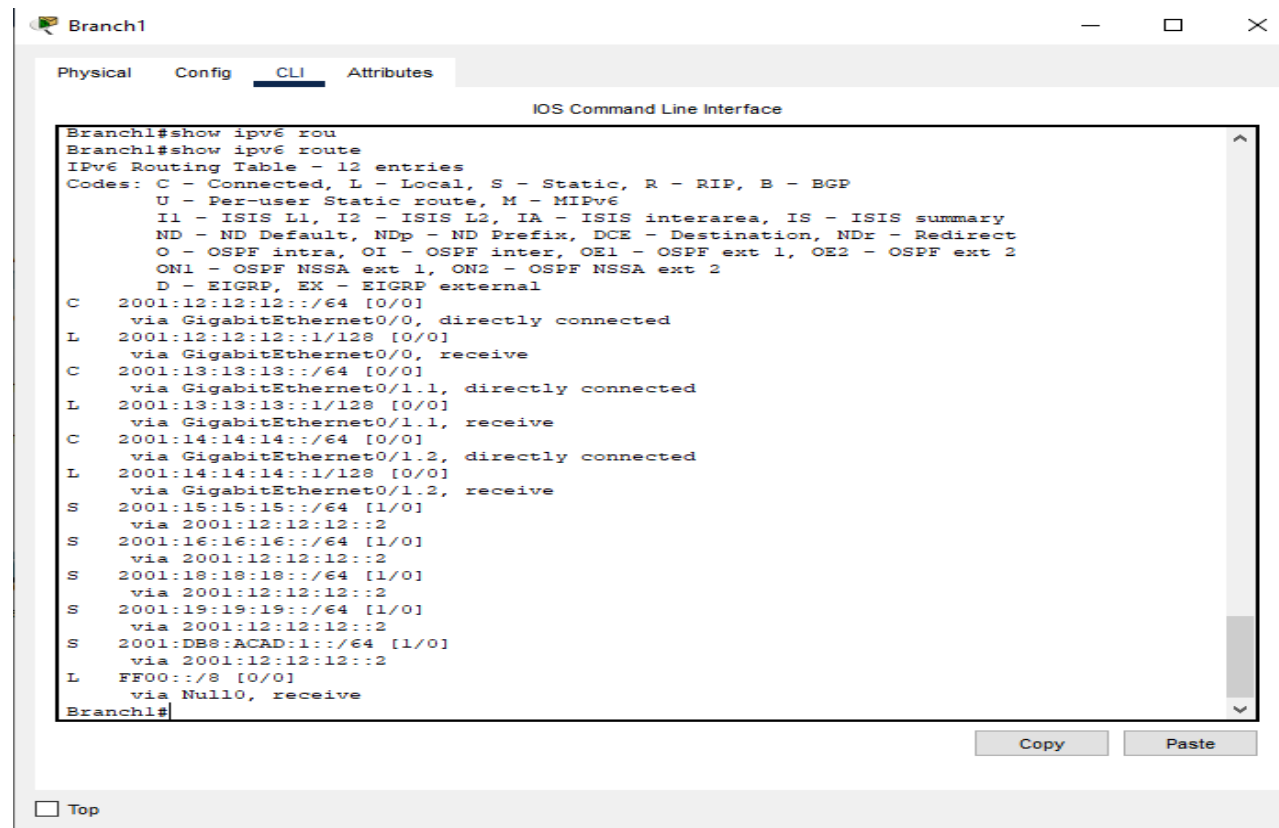
```
Branch1>
Branch1>
Branch1>
Branch1>en
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#
Branch1#config
Branch1#confi
Branch1#configure ter
Branch1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Branch1(config)#
Branch1(config)#
Branch1(config)#ipv6 route 2001:DB8:ACAD:1::/64 2001:12:12:12::2
Branch1(config)#ipv6 route 2001:15:15:15::/64 2001:12:12:12::2
Branch1(config)#ipv6 route 2001:16:16:16::/64 2001:12:12:12::2
Branch1(config)#ipv6 route 2001:18:18:18::/64 2001:12:12:12::2
Branch1(config)#ipv6 route 2001:19:19:19::/64 2001:12:12:12::2
Branch1(config)#
Branch1(config)#
```

Copy Paste

☐ Top

Routing table of each router, after configuring the static routes:

Branch1:



```
Branch1#show ipv6 rou
Branch1#show ipv6 route
IPv6 Routing Table - 12 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
        U - Per-user Static route, M - MIPv6
        I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
        ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
        O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
        D - EIGRP, EX - EIGRP external
C   2001:12:12:12::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L   2001:12:12:12::1/128 [0/0]
    via GigabitEthernet0/0, receive
C   2001:13:13:13::/64 [0/0]
    via GigabitEthernet0/1.1, directly connected
L   2001:13:13:13::1/128 [0/0]
    via GigabitEthernet0/1.1, receive
C   2001:14:14:14::/64 [0/0]
    via GigabitEthernet0/1.2, directly connected
L   2001:14:14:14::1/128 [0/0]
    via GigabitEthernet0/1.2, receive
S   2001:15:15:15::/64 [1/0]
    via 2001:12:12:12::2
S   2001:16:16:16::/64 [1/0]
    via 2001:12:12:12::2
S   2001:18:18:18::/64 [1/0]
    via 2001:12:12:12::2
S   2001:19:19:19::/64 [1/0]
    via 2001:12:12:12::2
S   2001:DB8:ACAD:1::/64 [1/0]
    via 2001:12:12:12::2
L   FF00::/8 [0/0]
    via Null0, receive
Branch1#
```

Top

Copy Paste

Branch2:

Router6

Physical Config CLI Attributes

IOS Command Line Interface

```
IPv6 Routing Table - 13 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C    2001:12:12:12::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L    2001:12:12:12::2/128 [0/0]
    via GigabitEthernet0/0, receive
S    2001:13:13:13::/64 [1/0]
    via 2001:12:12:12::1
S    2001:14:14:14::/64 [1/0]
    via 2001:12:12:12::1
C    2001:15:15:15::/64 [0/0]
    via GigabitEthernet0/2.1, directly connected
L    2001:15:15:15::1/128 [0/0]
    via GigabitEthernet0/2.1, receive
C    2001:16:16:16::/64 [0/0]
    via GigabitEthernet0/2.2, directly connected
L    2001:16:16:16::1/128 [0/0]
    via GigabitEthernet0/2.2, receive
S    2001:18:18:18::/64 [1/0]
    via 2001:DB8:ACAD:1::2
S    2001:19:19:19::/64 [1/0]
    via 2001:DB8:ACAD:1::2
C    2001:DB8:ACAD:1::/64 [0/0]
    via GigabitEthernet0/1, directly connected
L    2001:DB8:ACAD:1::1/128 [0/0]
    via GigabitEthernet0/1, receive
L    FF00::/8 [0/0]
    via Null0, receive
Branch2#
```

Copy Paste

☐ Top

Branch3:

Branch3

Physical Config CLI Attributes

IOS Command Line Interface

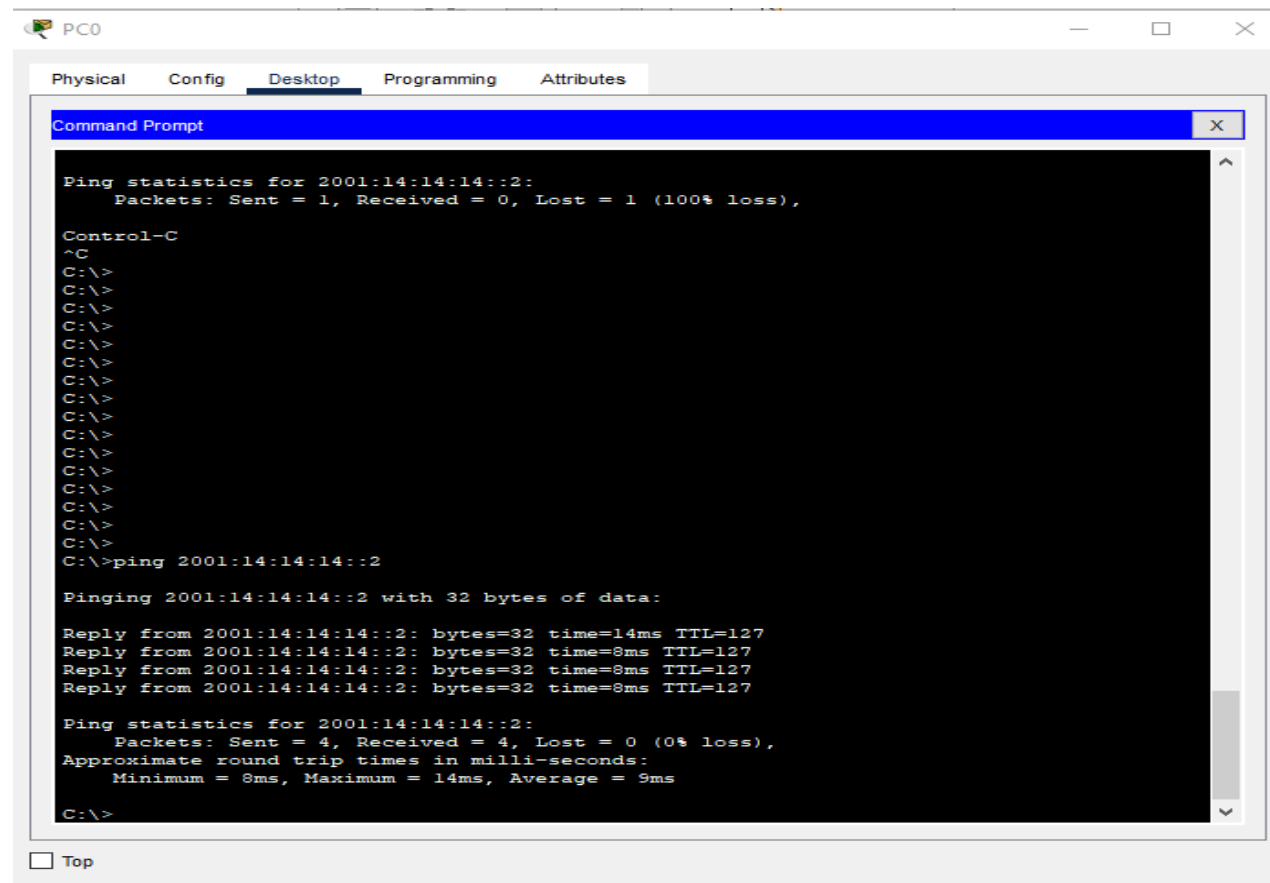
```
Branch3#show ipv6 rou
Branch3#show ipv6 route
IPv6 Routing Table - 12 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
S   2001:12:12:12::/64 [1/0]
    via 2001:DB8:ACAD:1::1
S   2001:13:13:13::/64 [1/0]
    via 2001:DB8:ACAD:1::1
S   2001:14:14:14::/64 [1/0]
    via 2001:DB8:ACAD:1::1
S   2001:15:15:15::/64 [1/0]
    via 2001:DB8:ACAD:1::1
S   2001:16:16:16::/64 [1/0]
    via 2001:DB8:ACAD:1::1
C   2001:18:18:18::/64 [0/0]
    via GigabitEthernet0/1.1, directly connected
L   2001:18:18:18::1/128 [0/0]
    via GigabitEthernet0/1.1, receive
C   2001:19:19:19::/64 [0/0]
    via GigabitEthernet0/1.2, directly connected
L   2001:19:19:19::1/128 [0/0]
    via GigabitEthernet0/1.2, receive
C   2001:DB8:ACAD:1::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L   2001:DB8:ACAD:1::2/128 [0/0]
    via GigabitEthernet0/0, receive
L   FF00::/8 [0/0]
    via Null0, receive
Branch3#
```

Copy Paste

☐ Top

Now we have the static routing configured on all 3 branches, All the devices should be communicated to each other's:

Ping Test PC-0 from VLAN10 to PC-1 from VLAN 20:



The screenshot shows a desktop window titled "PC0" with a taskbar at the top. The window has four tabs: "Physical", "Config", "Desktop", and "Attributes". The "Desktop" tab is active. Inside the window is a "Command Prompt" window with a black background and white text. The text in the Command Prompt shows the results of a ping test from PC-0 to PC-1. It starts with "Ping statistics for 2001:14:14:14::2:" followed by "Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),". Then, after a "Control-C" and several "^C" characters, it shows "C:\>ping 2001:14:14:14::2". The output shows "Pinging 2001:14:14:14::2 with 32 bytes of data:" followed by four successful replies, each showing "bytes=32 time=8ms TTL=127". Finally, it shows "Ping statistics for 2001:14:14:14::2:" followed by "Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),", "Approximate round trip times in milli-seconds:", "Minimum = 8ms, Maximum = 14ms, Average = 9ms", and ends with "C:\>".

```
Command Prompt
Ping statistics for 2001:14:14:14::2:
  Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),

Control-C
^C
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>ping 2001:14:14:14::2

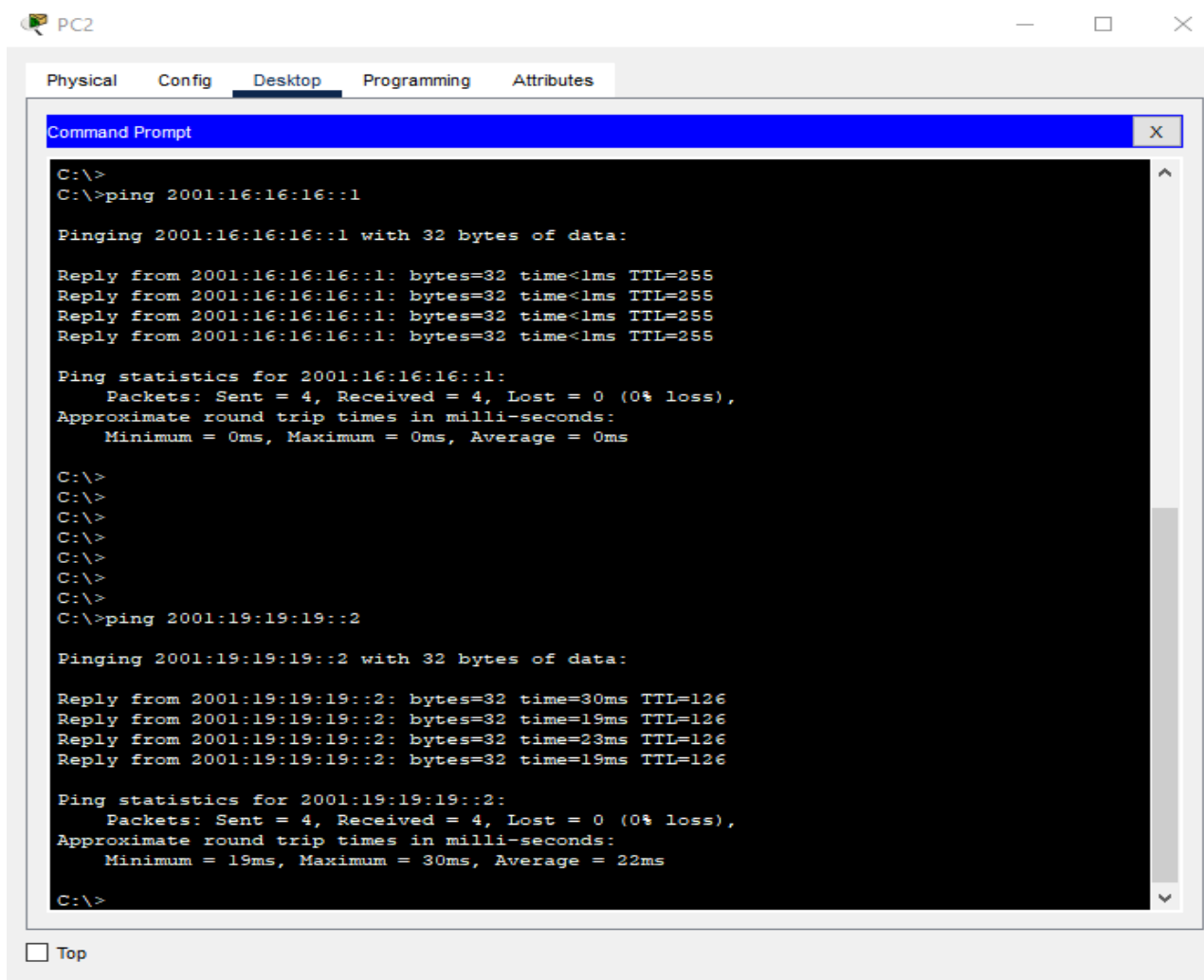
Pinging 2001:14:14:14::2 with 32 bytes of data:

Reply from 2001:14:14:14::2: bytes=32 time=14ms TTL=127
Reply from 2001:14:14:14::2: bytes=32 time=8ms TTL=127
Reply from 2001:14:14:14::2: bytes=32 time=8ms TTL=127
Reply from 2001:14:14:14::2: bytes=32 time=8ms TTL=127

Ping statistics for 2001:14:14:14::2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 14ms, Average = 9ms

C:\>
```

Ping Test PC-2 from VLAN10 to PC-5 from VLAN 20:



The screenshot shows a window titled "PC2" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the execution of two ping commands. The first command is "ping 2001:16:16:16::1", which results in four successful replies with 0ms round trip times. The second command is "ping 2001:19:19:19::2", which results in four successful replies with round trip times ranging from 19ms to 30ms. The Command Prompt window has a blue title bar and a scroll bar on the right. Below the Command Prompt window, there is a "Top" button.

```
C:\>
C:\>ping 2001:16:16:16::1

Pinging 2001:16:16:16::1 with 32 bytes of data:

Reply from 2001:16:16:16::1: bytes=32 time<1ms TTL=255
Reply from 2001:16:16:16::1: bytes=32 time<1ms TTL=255
Reply from 2001:16:16:16::1: bytes=32 time<1ms TTL=255
Reply from 2001:16:16:16::1: bytes=32 time<1ms TTL=255

Ping statistics for 2001:16:16:16::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>ping 2001:19:19:19::2

Pinging 2001:19:19:19::2 with 32 bytes of data:

Reply from 2001:19:19:19::2: bytes=32 time=30ms TTL=126
Reply from 2001:19:19:19::2: bytes=32 time=19ms TTL=126
Reply from 2001:19:19:19::2: bytes=32 time=23ms TTL=126
Reply from 2001:19:19:19::2: bytes=32 time=19ms TTL=126

Ping statistics for 2001:19:19:19::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 30ms, Average = 22ms

C:\>
```

☐ Top