

**NST21022 - Practical for  
Network Switching and  
Routing**

**Department of Information  
and Communication  
Technology  
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**Lab sheet :10  
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## **Title: IPv6 and IPv6 Subnetting**

### **Aim:**

IPv6 Subnetting Scheme  
Configure IPv6 Subnetting

### **Task:**

- Subnet the IPv6 address
- Assign IPv6 address to Network devices and verify connectivity

**Use “NST21022 Labsheet 10.pka” file Activities**

**Exercise 01: Subnet the 2001:db8:1::/48 network into the appropriate subnets.**

1. Discuss about link local address.
2. Based on the topology, how many subnets were needed?
  - 8 subnets

**Exercise 02: Fill the subnet table.**

Subnet Number	Network Address	First Usable Host Address
A	2001:db8:1:1:/64	2001:db8:1:1:0:0:0:1
B	2001:db8:1:2:/64	2001:db8:1:2:0:0:0:1
C	2001:db8:1:3:/64	2001:db8:1:3:0:0:0:1
D	2001:db8:1:4:/64	2001:db8:1:4:0:0:0:1
E	2001:db8:1:5:/64	2001:db8:1:5:0:0:0:1
F	2001:db8:1:6:/64	2001:db8:1:6:0:0:0:1
G	2001:db8:1:7:/64	2001:db8:1:7:0:0:0:1

H	2001:db8:1:8:/64	2001:db8:1:8:0:0:0:1
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### Exercise 03: Configure IPv6 address according to following criteria.

1. Fill the addressing table using following guidelines:

- a. Assign the first usable IPv6 addresses in each subnet to R1, R2, R3 for the LAN links and R1's WAN links.



```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ipv6 unicast-routing
Router(config)#interface g0/0/0
Router(config-if)#ipv6 address 2001:db8:1:1::1/64
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)#interface g0/0/1
Router(config-if)#ipv6 address 2001:db8:1:6::1/64
Router(config-if)#no shutdown

Router(config-if)#
*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

Router(config-if)#interface s0/1/0
Router(config-if)#ipv6 address 2001:db8:1:7::1/64
Router(config-if)#no shutdown

*LINK-5-CHANGED: Interface Serial0/1/0, changed state to down

Router(config-if)#interface s0/1/0
Router(config-if)#ipv6 address 2001:db8:1:7::1/64
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)#interface g0/0/0
Router(config-if)#ipv6 address 2001:db8:1:8::1/64
Router(config-if)#no shutdown

```

- b. Assign the second usable IPv6 addresses in subnet for the WAN links R2 and R3.



```

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#ipv6 unicast-routing
Router(config)#interface g0/0/0
Router(config-if)#ipv6 address 2001:db8:1:2::1/64
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)#interface g0/0/1
Router(config-if)#ipv6 address 2001:db8:1:3::1/64
Router(config-if)#no shutdown

Router(config-if)#
*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

Router(config-if)#interface s0/1/0
Router(config-if)#ipv6 address 2001:db8:1:7::1/64
Router(config-if)#no shutdown

Router(config-if)#
*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

```

The screenshot shows a Windows-style application window titled "R3". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a status bar that says "IOS Command Line Interface". The main area of the window is a text terminal window. It displays the following configuration commands:

```
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip v6 unicast-routing
Router(config)#interface g0/0/0
Router(config-if)#ipv6 address 2001:db8:1:4::1/64
Router(config-if)#no shutdown

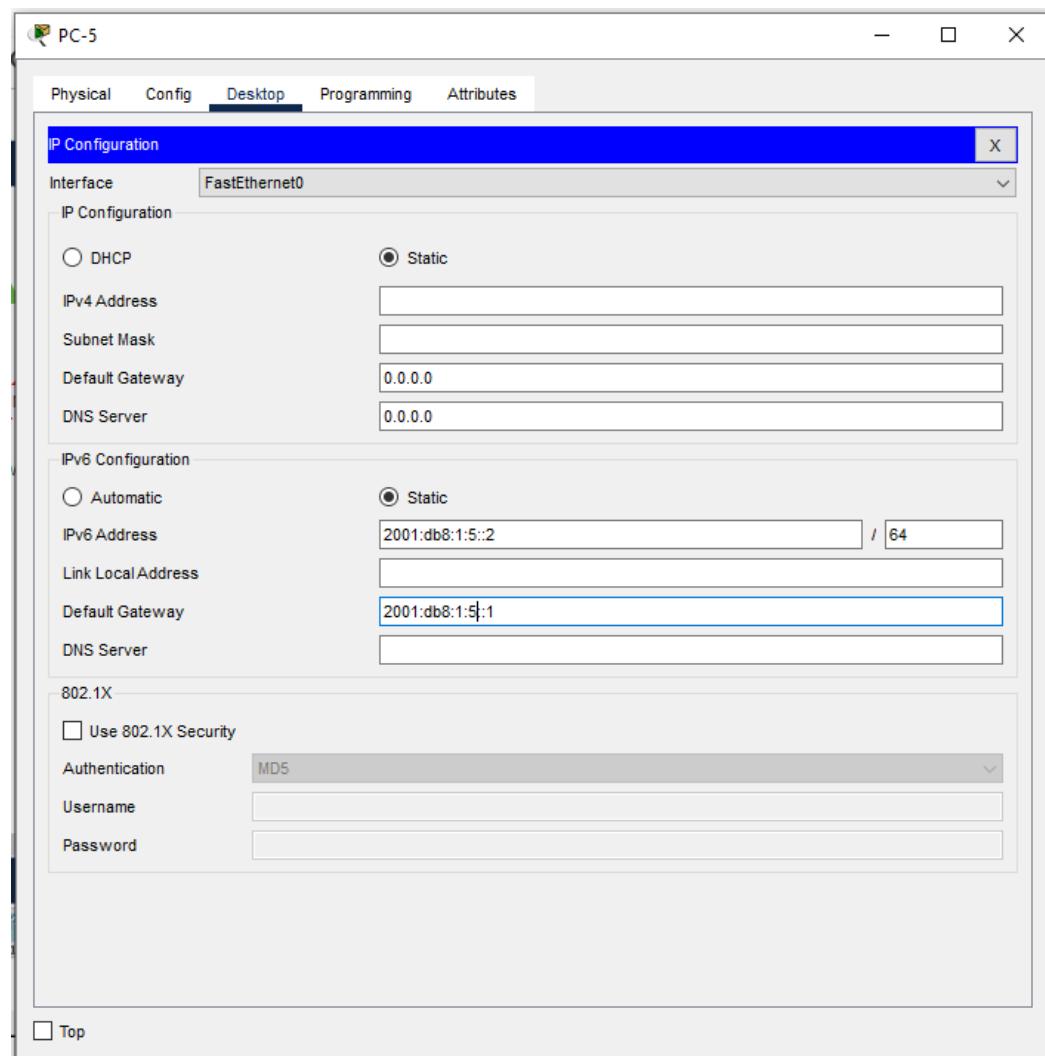
Router(config-if)#
$LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
$LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

Router(config-if)#
$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

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
```

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

c. Assign the second usable IPv6 address to the PCs in each subnet



PC-3

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:db8:1:3::2 / 64

Link LocalAddress:

Default Gateway:  2001:db8:1:3::1

DNS Server:

802.1X

Use 802.1X Security

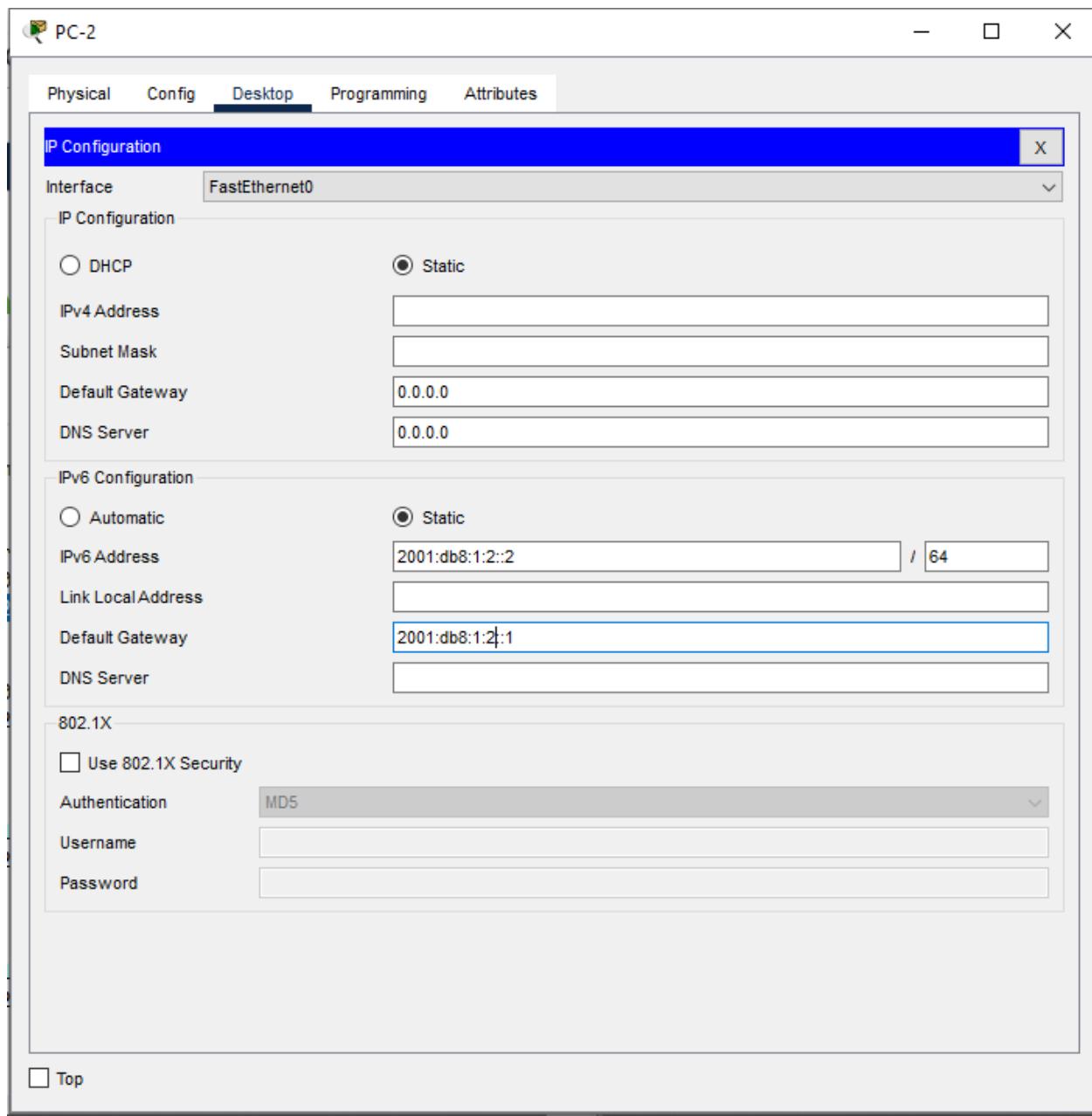
Authentication: MD5

Username:

Password:

Top

This screenshot shows a software interface for managing network configurations. The main window title is 'PC-3'. At the top, there are tabs: Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the tabs is a blue header bar labeled 'IP Configuration' with a close button ('X'). The configuration pane is divided into sections: 'IP Configuration' (FastEthernet0), 'IPv4 Configuration' (Static IP, 0.0.0.0/0.0.0.0), 'IPv6 Configuration' (Static IPv6, 2001:db8:1:3::2/64), and '802.1X' (disabled). Under '802.1X', there are fields for Authentication (MD5), Username, and Password. A 'Top' checkbox is located at the bottom left of the configuration area.



PC-1

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:db8:1:1::2 / 64

Link Local Address:

Default Gateway:  2001:db8:1:1::1

DNS Server:

802.1X

Use 802.1X Security

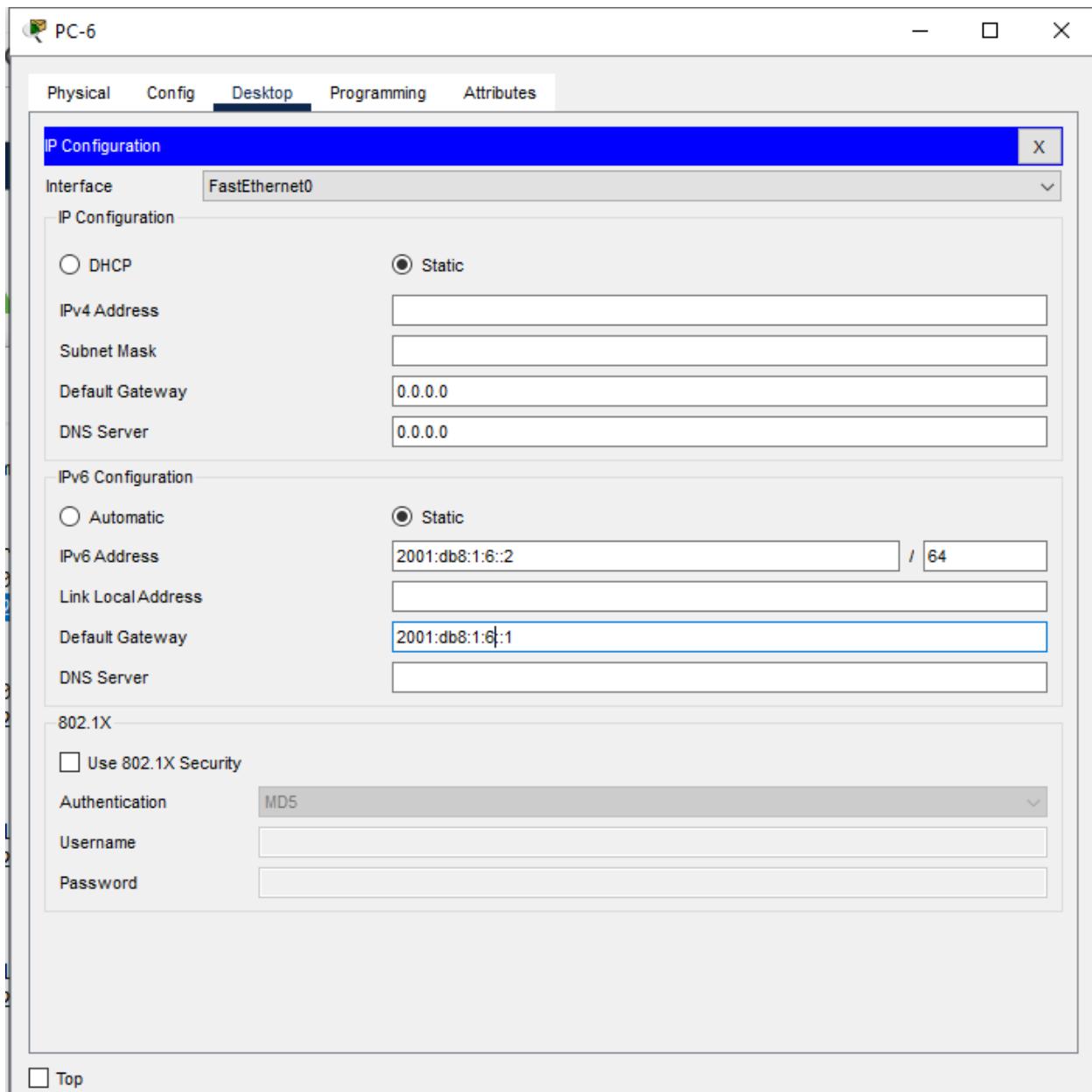
Authentication: MD5

Username:

Password:

Top

This screenshot shows the 'IP Configuration' dialog box for a device named 'PC-1'. The 'Desktop' tab is active. The 'Interface' dropdown is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' radio button is selected for both IPv4 and IPv6. The IPv6 address is set to 2001:db8:1:1::2 with a prefix length of 64. The '802.1X' section has the 'Use 802.1X Security' checkbox unchecked. Other fields like Subnet Mask, Default Gateway, and DNS Server are also visible.

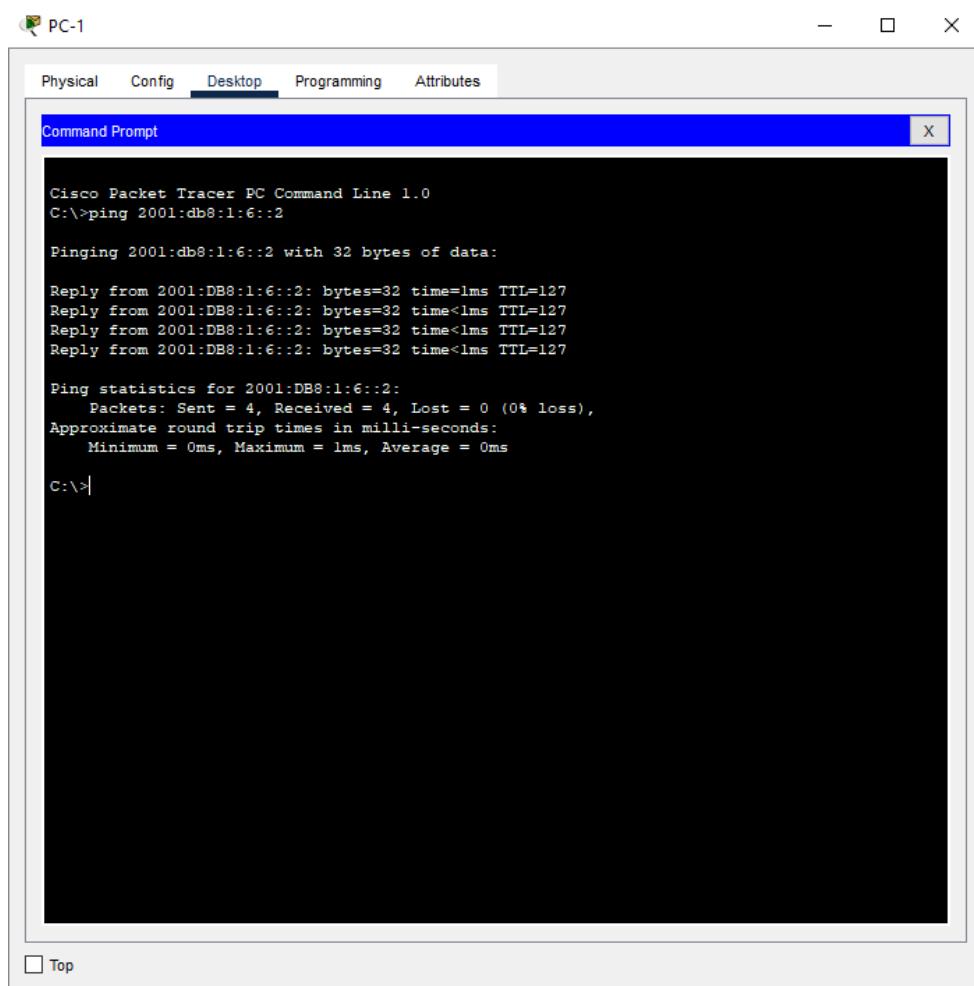


## Addressing Table

Devices	Interfaces	IPv6 Addresses/Prefix	Default Gateway
R1	G0/0/0	2001:db8:1:1:0:0:0:1/64	
	G0/0/1	2001:db8:1:6:0:0:0:1/64	
	S0/1/0	2001:db8:1:7:0:0:0:1/64	
	S0/1/1	2001:db8:1:8:0:0:0:1/64	
R2	G0/0/0	2001:db8:1:2:0:0:0:1/64	
	G0/0/1	2001:db8:1:3:0:0:0:1/64	

	<b>S0/1/0</b>	<b>2001:db8:1:7:0:0:0:2/64</b>	
<b>R3</b>	<b>G0/0/0</b>	<b>2001:db8:1:4:0:0:0:1/64</b>	
	<b>G0/0/1</b>	<b>2001:db8:1:5:0:0:0:1/64</b>	
	<b>S0/1/0</b>	<b>2001:db8:1:7:0:0:0:2/64</b>	
<b>PC-1</b>	<b>NIC</b>	<b>2001:db8:1::1:0:0:2/64</b>	<b>2001:db8:1:1:0:0:0:1</b>
<b>PC-2</b>	<b>NIC</b>	<b>2001:db8:1:6:0:0:0:2/64</b>	<b>2001:db8:1:6:0:0:0:1</b>
<b>PC-3</b>	<b>NIC</b>	<b>2001:db8:1::2:0:0:2/64</b>	<b>2001:db8:1:2:0:0:0:1</b>
<b>PC-4</b>	<b>NIC</b>	<b>2001:db8:1:3:0:0:0:2/64</b>	<b>2001:db8:1:3:0:0:0:1</b>
<b>PC-5</b>	<b>NIC</b>	<b>2001:db8:1:4:0:0:0:2/64</b>	<b>2001:db8:1:4:0:0:0:1</b>
<b>PC-6</b>	<b>NIC</b>	<b>2001:db8:1:5:0:0:0:2/64</b>	<b>2001:db8:1:5:0:0:0:1</b>

### 3. Assign IPv6 addresses to network devices and verify connectivity



PC-6

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 2001:db8:1:3::2

Pinging 2001:db8:1:3::2 with 32 bytes of data:

Reply from 2001:DB8:1:3::2: bytes=32 time=22ms TTL=126
Reply from 2001:DB8:1:3::2: bytes=32 time=16ms TTL=126
Reply from 2001:DB8:1:3::2: bytes=32 time=1ms TTL=126
Reply from 2001:DB8:1:3::2: bytes=32 time=1ms TTL=126

Ping statistics for 2001:DB8:1:3::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 22ms, Average = 10ms

C:>|
```

Top

## **Discussion**

- In this lab session, we focused on IPv6 subnetting and configuring IPv6 addresses on network devices. The main objective was to create an efficient IPv6 subnetting scheme. We began by subnetting the IPv6 address, dividing the network into smaller, manageable subnets based on the given requirements. After designing the subnets, we assigned IPv6 addresses to network devices such as routers, switches, and hosts. Finally, we verified the connectivity by testing communication between the devices within the same subnet and across different subnets. This session provided valuable hands-on experience in configuring and managing IPv6 networks, ensuring seamless communication across devices.