

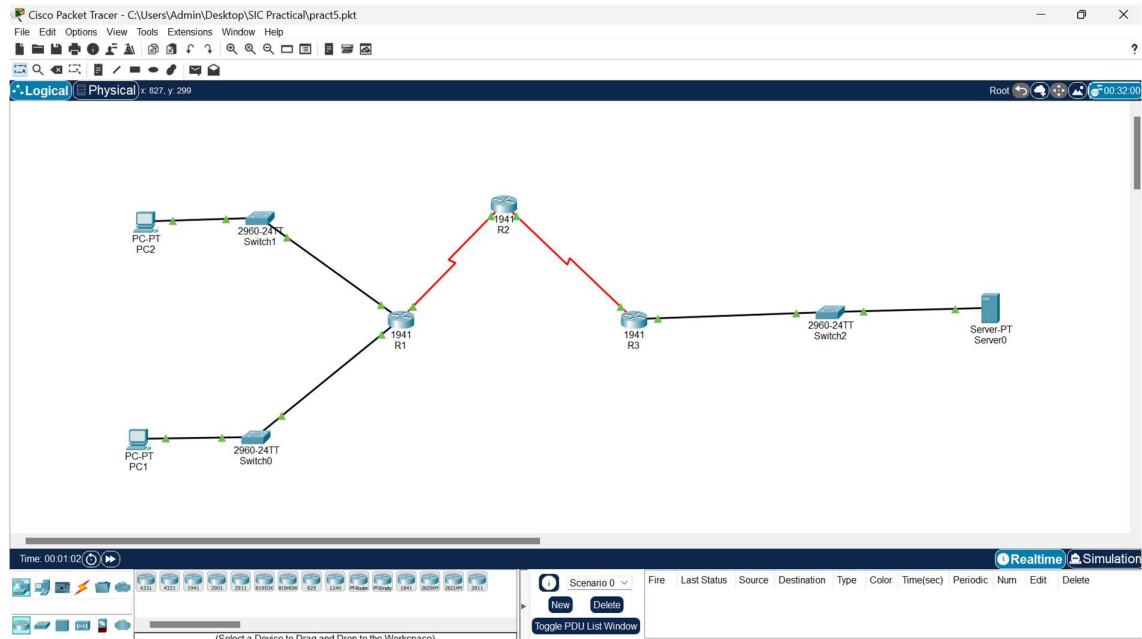
**Date:** 11/02/2024

## Security in Computing

### **Practical 5:**

#### **Aim:** Configuring IPv6 ACLs

#### ➤ **Topology Diagram:**



#### ➤ **Assign IP Address**

The screenshot shows the configuration window for PC1 in Cisco Packet Tracer. The 'Desktop' tab is selected. The 'IP Configuration' section is expanded, showing the configuration for the 'FastEthernet0' interface. The 'IP Configuration' section has two radio buttons: 'DHCP' and 'Static'. The 'Static' radio button is selected. Below the radio buttons are four input fields: 'IPv4 Address', 'Subnet Mask', 'Default Gateway', and 'DNS Server'. The 'IPv6 Configuration' section is also expanded, showing the configuration for the 'FastEthernet0' interface. The 'IPv6 Configuration' section has two radio buttons: 'Automatic' and 'Static'. The 'Static' radio button is selected. Below the radio buttons are four input fields: 'IPv6 Address' (2001:DB8:1:10::2), 'Link Local Address' (FE80::20C:FFFF:FE27:22D8), 'Default Gateway' (2001:DB8:1:10::1), and 'DNS Server'.

PC2

Physical Config Desktop Programming Attributes

IP Configuration X

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:DB8:1:11::2 / 64

Link Local Address FE80::290:CFF:FEDA:B8EE

Default Gateway 2001:DB8:1:11::1

DNS Server

Server0

Physical Config Services Desktop Programming Attributes

IP Configuration X

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:DB8:1:30::30 / 64


Link Local Address FE80::205:5EFF:FE72:6C96

Default Gateway 2001:DB8:1:30::1


DNS Server

 R1  
Physical Config CLI Attributes  
IOS Command Line Interface  

```
R1>en
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#host R1
R1(config)#ipv6 unicast-routing
R1(config)#interface GigabitEthernet0/0
R1(config-if)#ipv6 enable
R1(config-if)#ipv6 address 2001:DB8:1:10::1/64
R1(config-if)#no shut
R1(config-if)#interface GigabitEthernet0/1
R1(config-if)#ipv6 enable
R1(config-if)#ipv6 address 2001:DB8:1:11::1/64
R1(config-if)#no shut
R1(config-if)#interface Serial0/0/0
R1(config-if)#ipv6 enable
R1(config-if)#ipv6 address 2001:DB8:1:28::1/64
R1(config-if)#no shut
R1(config-if)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

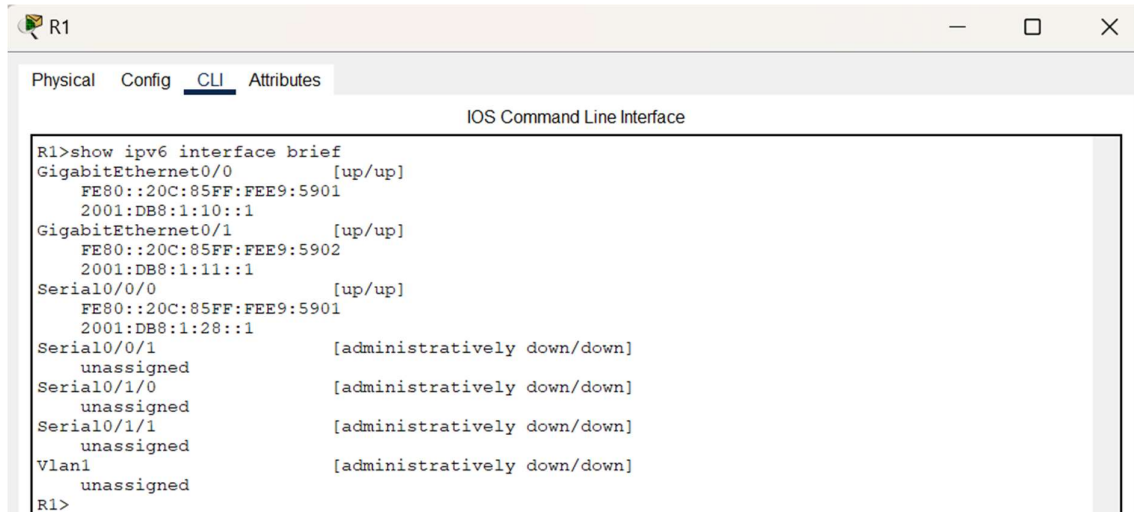
 R2  
Physical Config CLI Attributes  
IOS Command Line Interface  

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#host R2
R2(config)#ipv6 unicast-routing
R2(config)#interface Serial0/0/0
R2(config-if)#ipv6 enable
R2(config-if)#ipv6 address 2001:DB8:1:28::2/64
R2(config-if)#no shut
R2(config-if)#interface Serial0/0/1
R2(config-if)#ipv6 enable
R2(config-if)#ipv6 address 2001:DB8:1:29::2/64
R2(config-if)#no shut
R2(config-if)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

 R3  
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)#host R3
R3(config)#ipv6 unicast-routing
R3(config)#interface GigabitEthernet0/0
R3(config-if)#ipv6 enable
R3(config-if)#ipv6 address 2001:DB8:1:30::1/64
R3(config-if)#no shut
R3(config-if)#interface Serial0/0/0
R3(config-if)#ipv6 enable
R3(config-if)#ipv6 address 2001:DB8:1:29::1/64
R3(config-if)#no shut
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

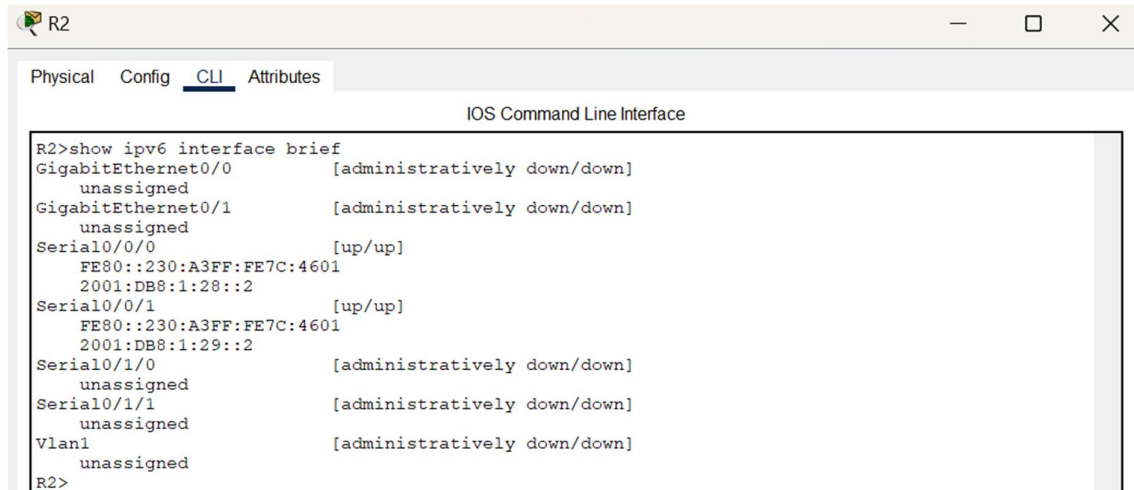
## ➤ Displaying IP Address Details of Routers



Physical Config CLI Attributes

IOS Command Line Interface

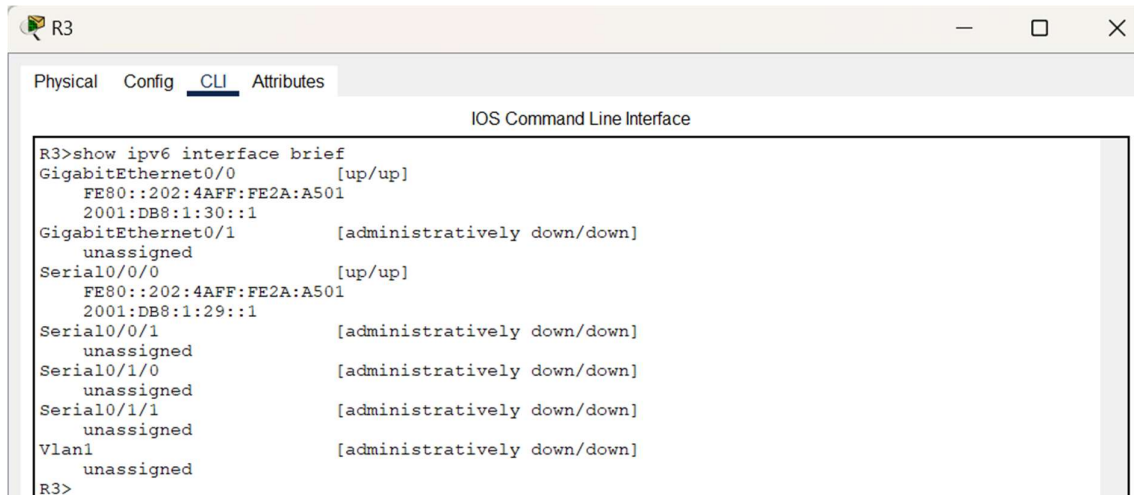
```
R1>show ipv6 interface brief
GigabitEthernet0/0      [up/up]
    FE80::20C:85FF:FEE9:5901
    2001:DB8:1:10::1
GigabitEthernet0/1      [up/up]
    FE80::20C:85FF:FEE9:5902
    2001:DB8:1:11::1
Serial0/0/0             [up/up]
    FE80::20C:85FF:FEE9:5901
    2001:DB8:1:28::1
Serial0/0/1             [administratively down/down]
    unassigned
Serial0/1/0             [administratively down/down]
    unassigned
Serial0/1/1             [administratively down/down]
    unassigned
Vlan1                   [administratively down/down]
    unassigned
R1>
```



Physical Config CLI Attributes

IOS Command Line Interface

```
R2>show ipv6 interface brief
GigabitEthernet0/0      [administratively down/down]
    unassigned
GigabitEthernet0/1      [administratively down/down]
    unassigned
Serial0/0/0             [up/up]
    FE80::230:A3FF:FE7C:4601
    2001:DB8:1:28::2
Serial0/0/1             [up/up]
    FE80::230:A3FF:FE7C:4601
    2001:DB8:1:29::2
Serial0/1/0             [administratively down/down]
    unassigned
Serial0/1/1             [administratively down/down]
    unassigned
Vlan1                   [administratively down/down]
    unassigned
R2>
```

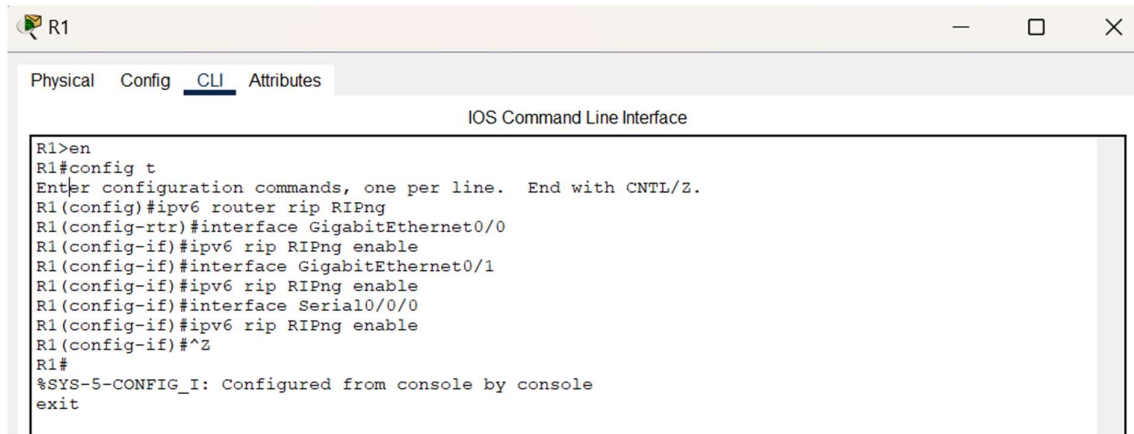


Physical Config CLI Attributes

IOS Command Line Interface

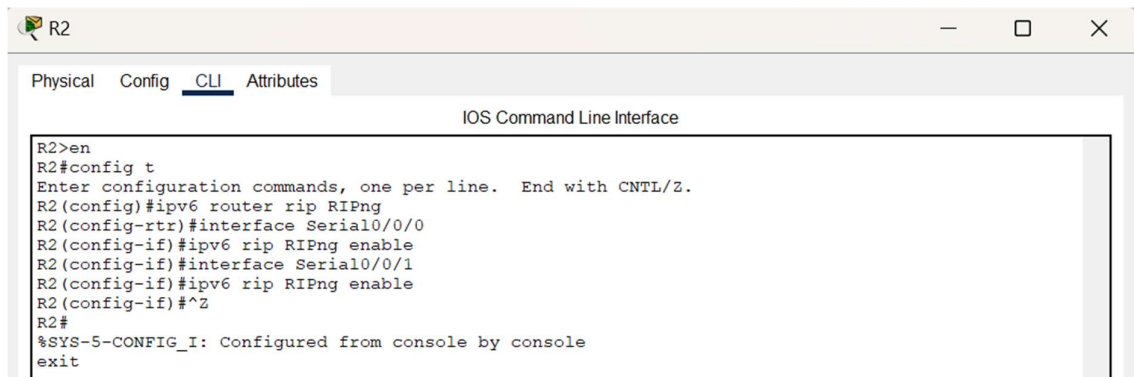
```
R3>show ipv6 interface brief
GigabitEthernet0/0      [up/up]
    FE80::202:4AFF:FE2A:A501
    2001:DB8:1:30::1
GigabitEthernet0/1      [administratively down/down]
    unassigned
Serial0/0/0             [up/up]
    FE80::202:4AFF:FE2A:A501
    2001:DB8:1:29::1
Serial0/0/1             [administratively down/down]
    unassigned
Serial0/1/0             [administratively down/down]
    unassigned
Serial0/1/1             [administratively down/down]
    unassigned
Vlan1                   [administratively down/down]
    unassigned
R3>
```

## ➤ Configure RIPng on routers



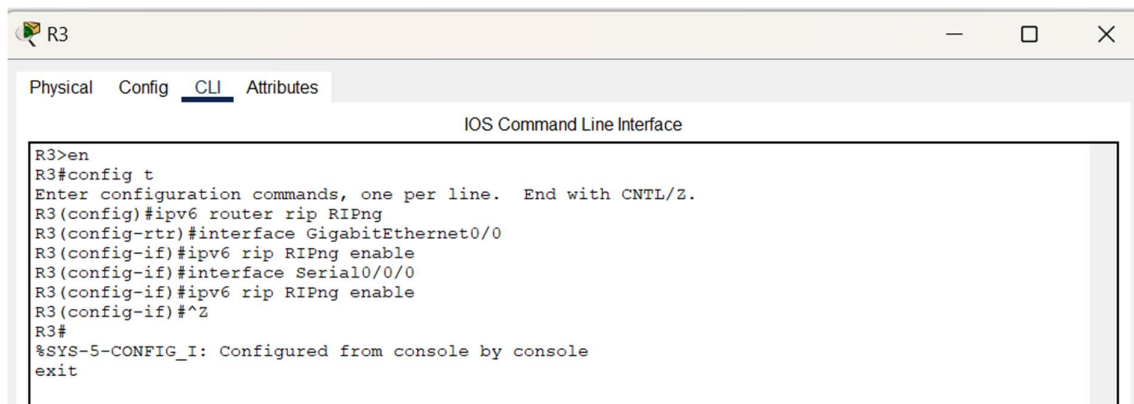
The screenshot shows the configuration window for router R1. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is visible. The configuration commands entered are as follows:

```
R1>en
R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ipv6 router rip RIPng
R1(config-rtr)#interface GigabitEthernet0/0
R1(config-if)#ipv6 rip RIPng enable
R1(config-if)#interface GigabitEthernet0/1
R1(config-if)#ipv6 rip RIPng enable
R1(config-if)#interface Serial0/0/0
R1(config-if)#ipv6 rip RIPng enable
R1(config-if)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
exit
```



The screenshot shows the configuration window for router R2. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is visible. The configuration commands entered are as follows:

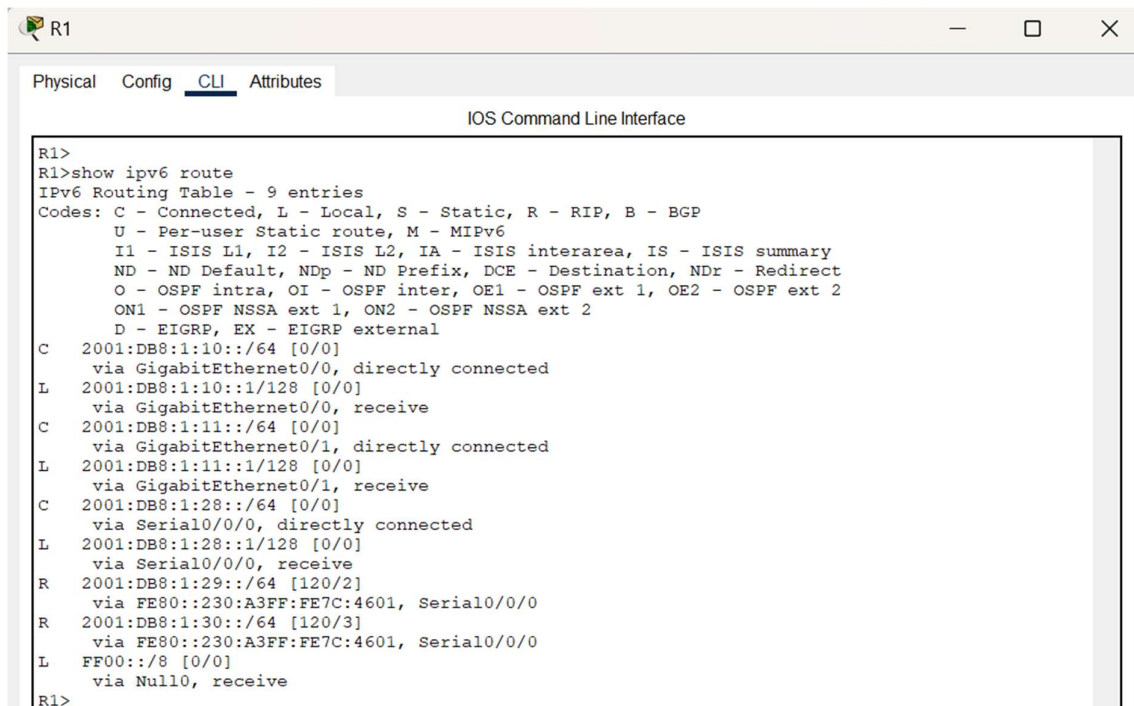
```
R2>en
R2#config t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ipv6 router rip RIPng
R2(config-rtr)#interface Serial0/0/0
R2(config-if)#ipv6 rip RIPng enable
R2(config-if)#interface Serial0/0/1
R2(config-if)#ipv6 rip RIPng enable
R2(config-if)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
exit
```



The screenshot shows the configuration window for router R3. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is visible. The configuration commands entered are as follows:

```
R3>en
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ipv6 router rip RIPng
R3(config-rtr)#interface GigabitEthernet0/0
R3(config-if)#ipv6 rip RIPng enable
R3(config-if)#interface Serial0/0/0
R3(config-if)#ipv6 rip RIPng enable
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

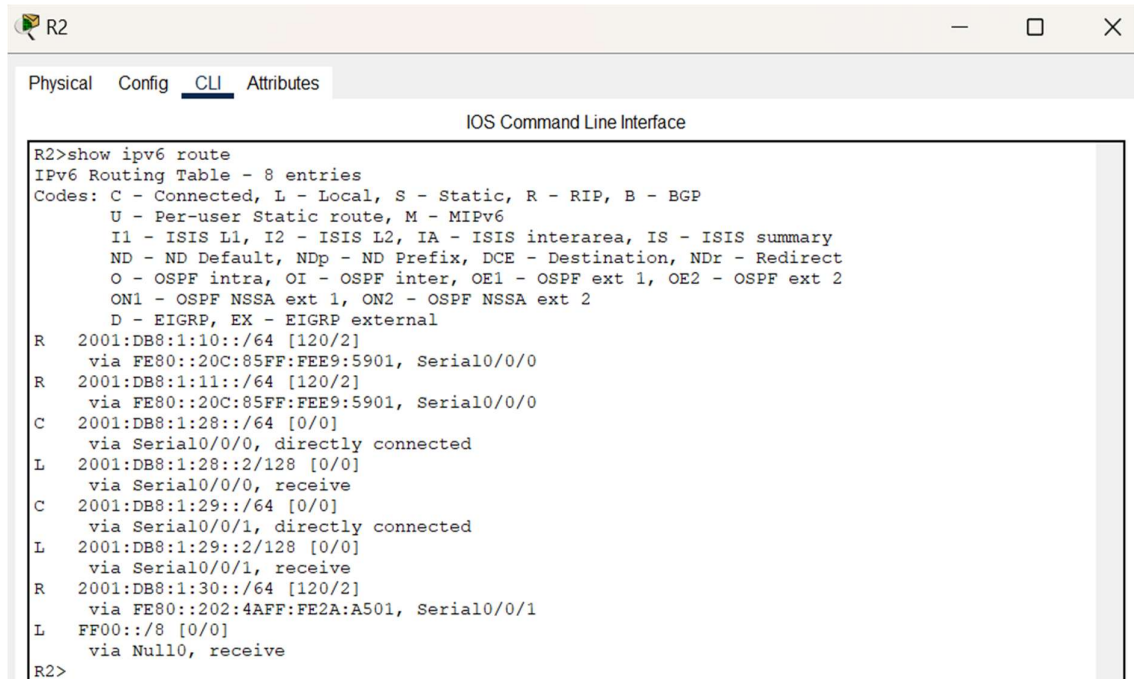
## ➤ Displaying routing table of routers



```

R1>
R1>show ipv6 route
IPv6 Routing Table - 9 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:DB8:1:10::/64 [0/0]
   via GigabitEthernet0/0, directly connected
L 2001:DB8:1:10::1/128 [0/0]
   via GigabitEthernet0/0, receive
C 2001:DB8:1:11::/64 [0/0]
   via GigabitEthernet0/1, directly connected
L 2001:DB8:1:11::1/128 [0/0]
   via GigabitEthernet0/1, receive
C 2001:DB8:1:28::/64 [0/0]
   via Serial0/0/0, directly connected
L 2001:DB8:1:28::1/128 [0/0]
   via Serial0/0/0, receive
R 2001:DB8:1:29::/64 [120/2]
   via FE80::230:A3FF:FE7C:4601, Serial0/0/0
R 2001:DB8:1:30::/64 [120/3]
   via FE80::230:A3FF:FE7C:4601, Serial0/0/0
L FF00::/8 [0/0]
   via Null0, receive
R1>

```

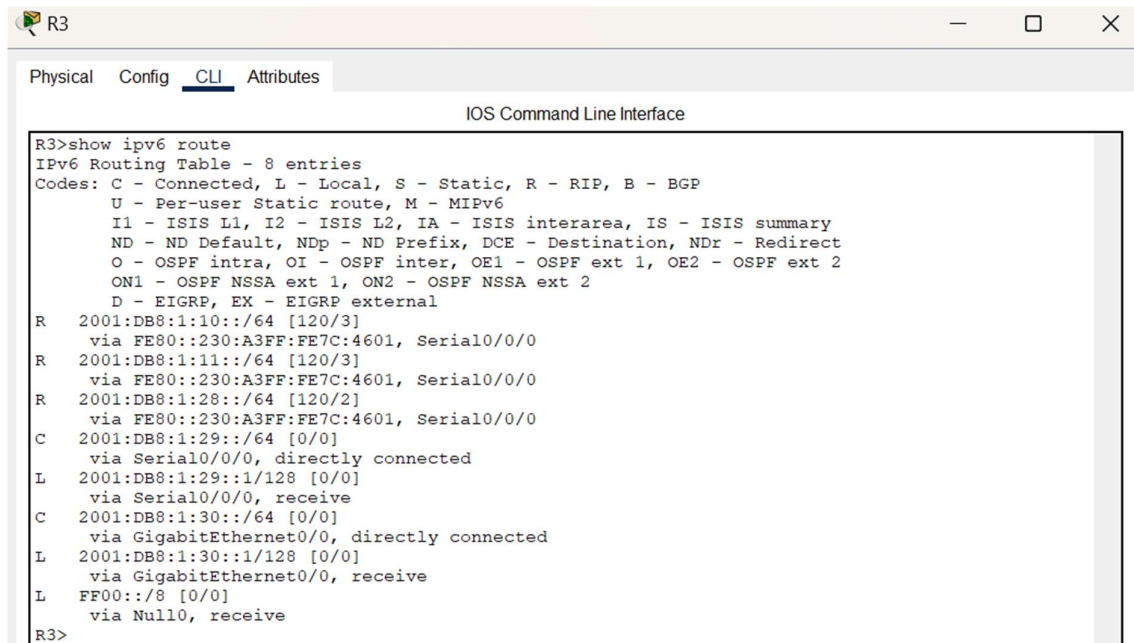


```

R2>show ipv6 route
IPv6 Routing Table - 8 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
R 2001:DB8:1:10::/64 [120/2]
   via FE80::20C:85FF:FEE9:5901, Serial0/0/0
R 2001:DB8:1:11::/64 [120/2]
   via FE80::20C:85FF:FEE9:5901, Serial0/0/0
C 2001:DB8:1:28::/64 [0/0]
   via Serial0/0/0, directly connected
L 2001:DB8:1:28::2/128 [0/0]
   via Serial0/0/0, receive
C 2001:DB8:1:29::/64 [0/0]
   via Serial0/0/1, directly connected
L 2001:DB8:1:29::2/128 [0/0]
   via Serial0/0/1, receive
R 2001:DB8:1:30::/64 [120/2]
   via FE80::202:4AFF:FE2A:A501, Serial0/0/1
L FF00::/8 [0/0]
   via Null0, receive
R2>

```





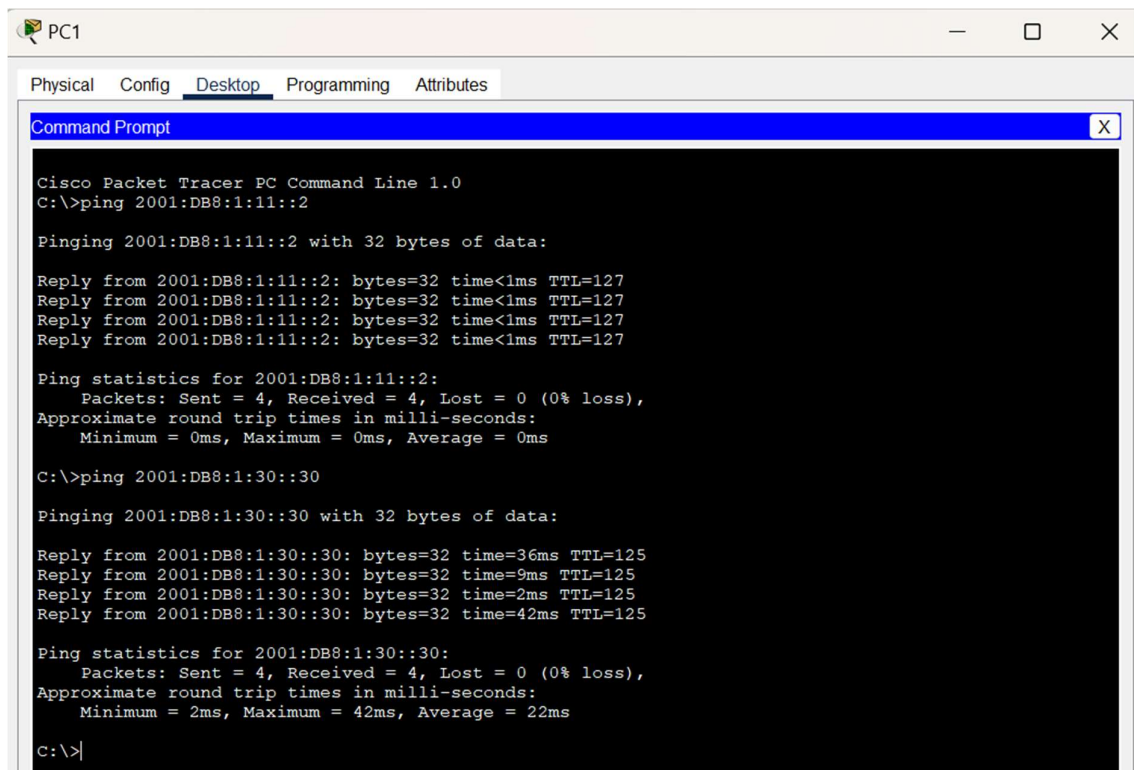
The screenshot shows the CLI of a router named R3. The 'CLI' tab is selected. The command 'show ipv6 route' has been entered, displaying the IPv6 Routing Table with 8 entries. The output lists various routes including static, connected, and received routes for different IPv6 addresses and interfaces.

```

R3>show ipv6 route
IPv6 Routing Table - 8 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
R   2001:DB8:1:10::/64 [120/3]
    via FE80::230:A3FF:FE7C:4601, Serial0/0/0
R   2001:DB8:1:11::/64 [120/3]
    via FE80::230:A3FF:FE7C:4601, Serial0/0/0
R   2001:DB8:1:28::/64 [120/2]
    via FE80::230:A3FF:FE7C:4601, Serial0/0/0
C   2001:DB8:1:29::/64 [0/0]
    via Serial0/0/0, directly connected
L   2001:DB8:1:29::1/128 [0/0]
    via Serial0/0/0, receive
C   2001:DB8:1:30::/64 [0/0]
    via GigabitEthernet0/0, directly connected
L   2001:DB8:1:30::1/128 [0/0]
    via GigabitEthernet0/0, receive
L   FF00::/8 [0/0]
    via Null0, receive
R3>

```

## ➤ Displaying IP Address Details of Routers



The screenshot shows the Command Prompt of a PC named PC1. The 'Desktop' tab is selected. The user has entered two ping commands: 'ping 2001:DB8:1:11::2' and 'ping 2001:DB8:1:30::30'. The output shows successful ping results with 32 bytes of data, 4 packets sent, and 0% loss. Ping statistics are also displayed for both destinations.

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:DB8:1:11::2

Pinging 2001:DB8:1:11::2 with 32 bytes of data:

Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127

Ping statistics for 2001:DB8:1:11::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 2001:DB8:1:30::30

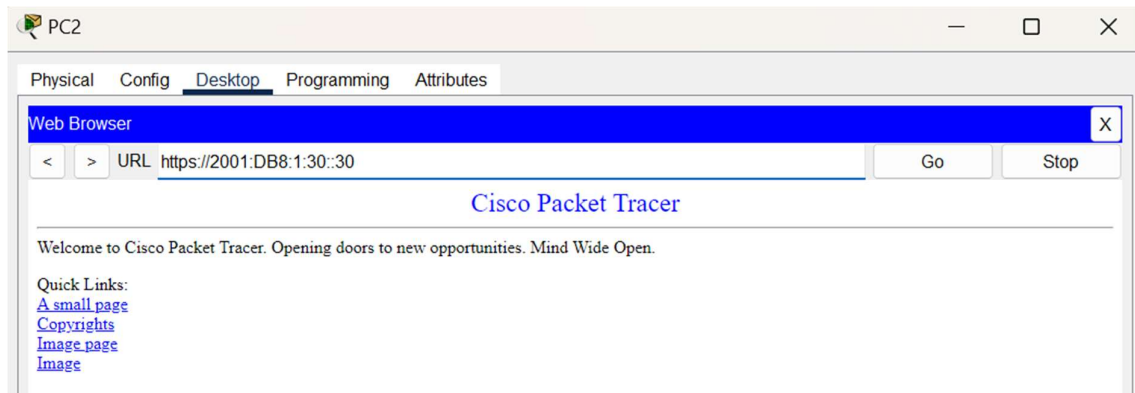
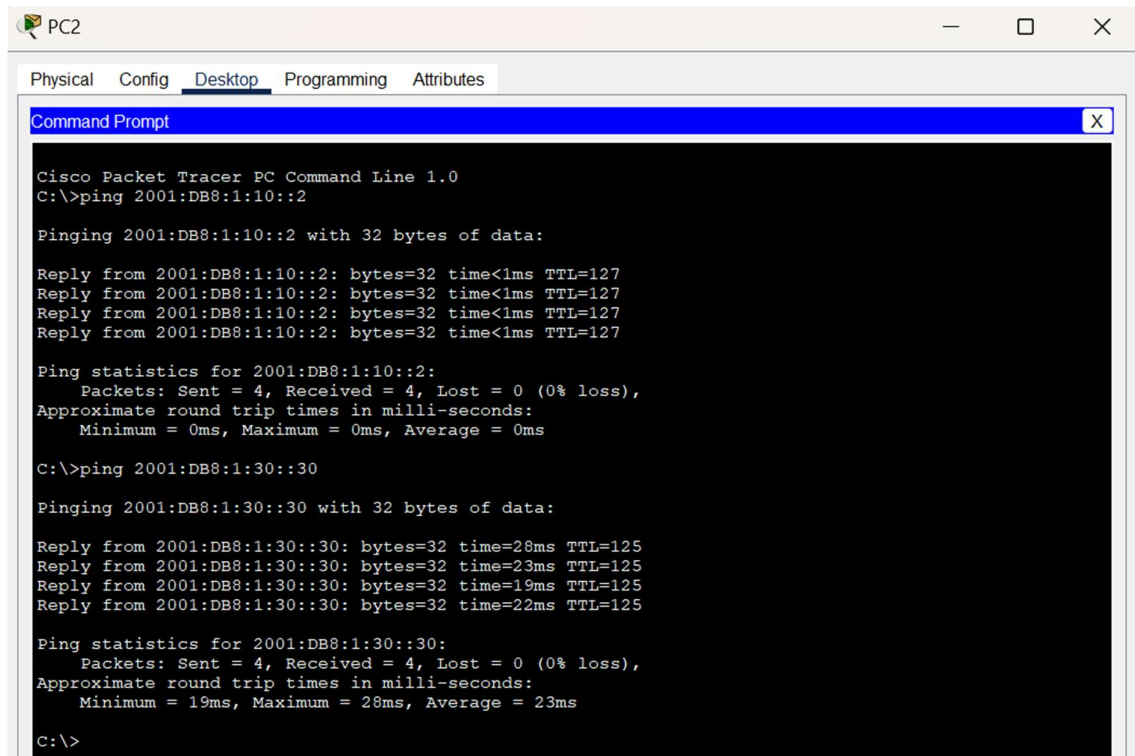
Pinging 2001:DB8:1:30::30 with 32 bytes of data:

Reply from 2001:DB8:1:30::30: bytes=32 time=36ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=9ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=2ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=42ms TTL=125

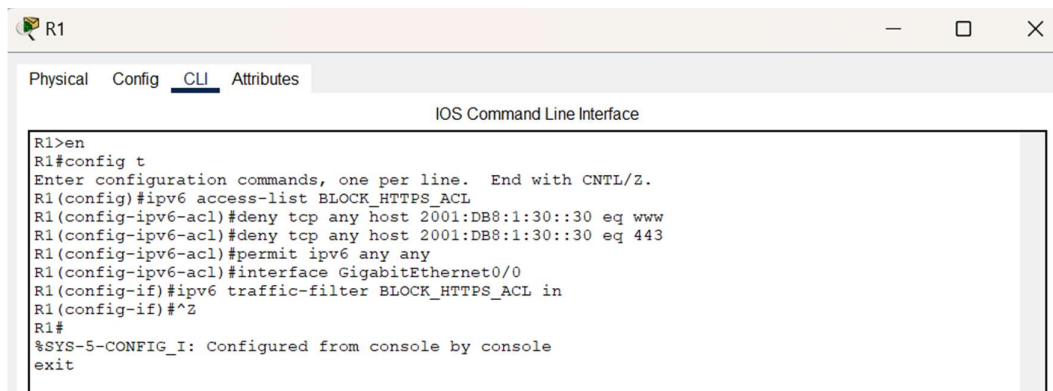
Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 42ms, Average = 22ms

C:\>

```



## ➤ Configuring ACL (Block HTTP and HTTPS access and Allow all other IPv6 traffic to pass)





## ➤ Verifying the working of ACL

### PC1

```
C:\>ping 2001:DB8:1:11::2

Pinging 2001:DB8:1:11::2 with 32 bytes of data:

Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time=11ms TTL=127

Ping statistics for 2001:DB8:1:11::2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 2ms

C:\>ping 2001:DB8:1:30::30

Pinging 2001:DB8:1:30::30 with 32 bytes of data:

Reply from 2001:DB8:1:30::30: bytes=32 time=67ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=12ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=45ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=3ms TTL=125

Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 67ms, Average = 31ms

C:\>|
```

### PC2

```
C:\>ping 2001:DB8:1:10::2

Pinging 2001:DB8:1:10::2 with 32 bytes of data:

Reply from 2001:DB8:1:10::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time=1ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time<1ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time<1ms TTL=127

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

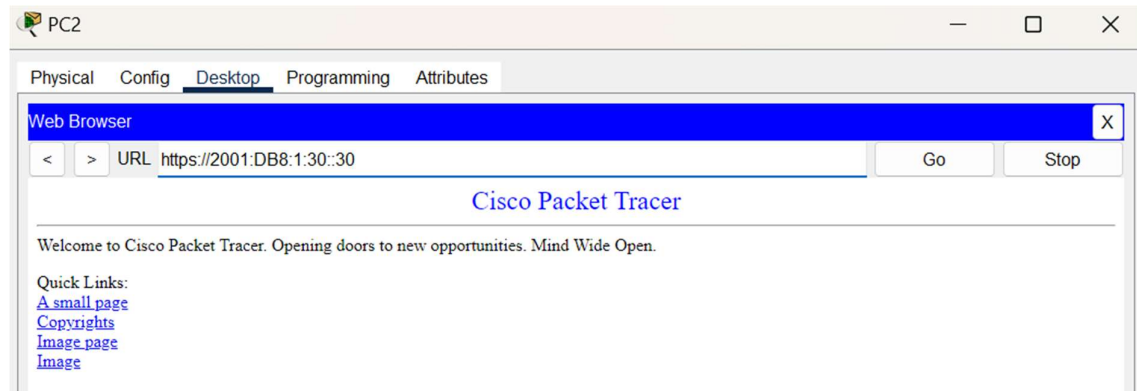
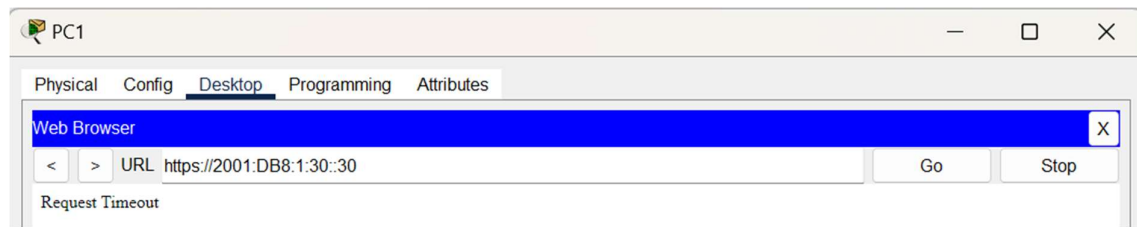
C:\>ping 2001:DB8:1:30::30

Pinging 2001:DB8:1:30::30 with 32 bytes of data:

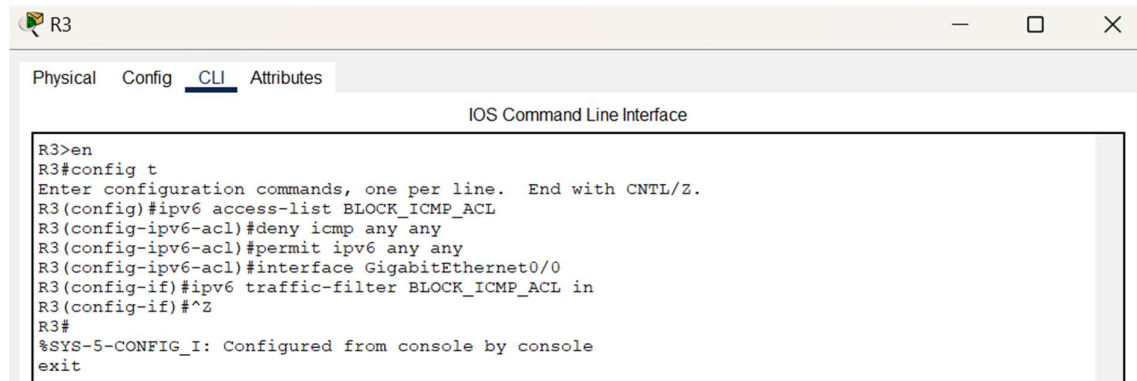
Reply from 2001:DB8:1:30::30: bytes=32 time=23ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=12ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=21ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=10ms TTL=125

Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 23ms, Average = 16ms

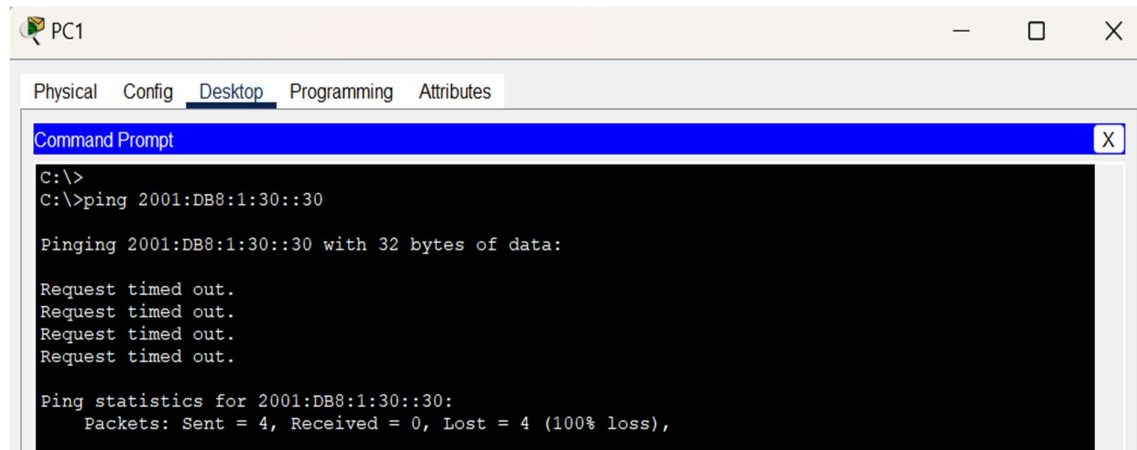
C:\>|
```



➤ **Configuring ACL**  
**(Block ICMP access and Allow all other IPv6 traffic to pass)**



➤ **Verifying the working of ACL**



PC1

Physical Config Desktop Programming Attributes

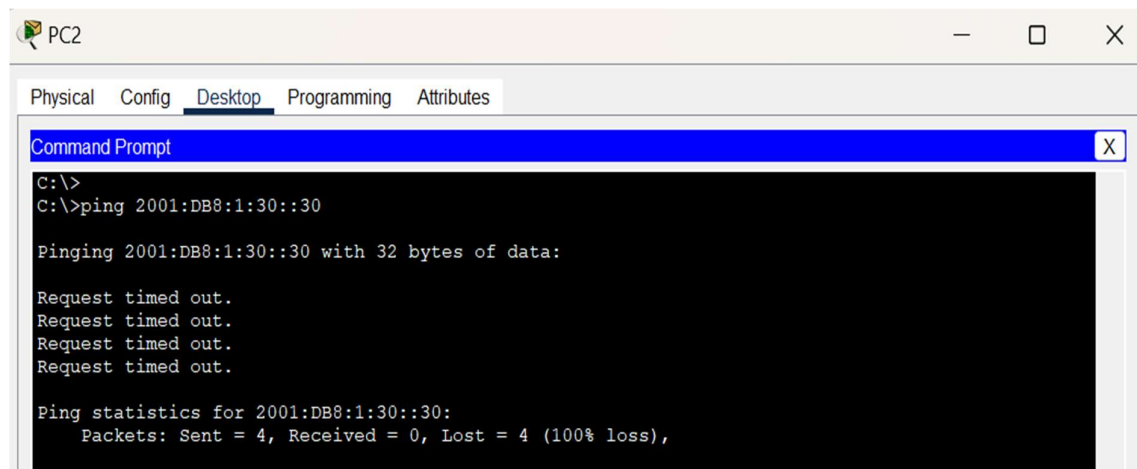
Command Prompt

```
C:\>
C:\>ping 2001:DB8:1:30::30

Pinging 2001:DB8:1:30::30 with 32 bytes of data:

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

Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```



PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>
C:\>ping 2001:DB8:1:30::30

Pinging 2001:DB8:1:30::30 with 32 bytes of data:

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

Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```