

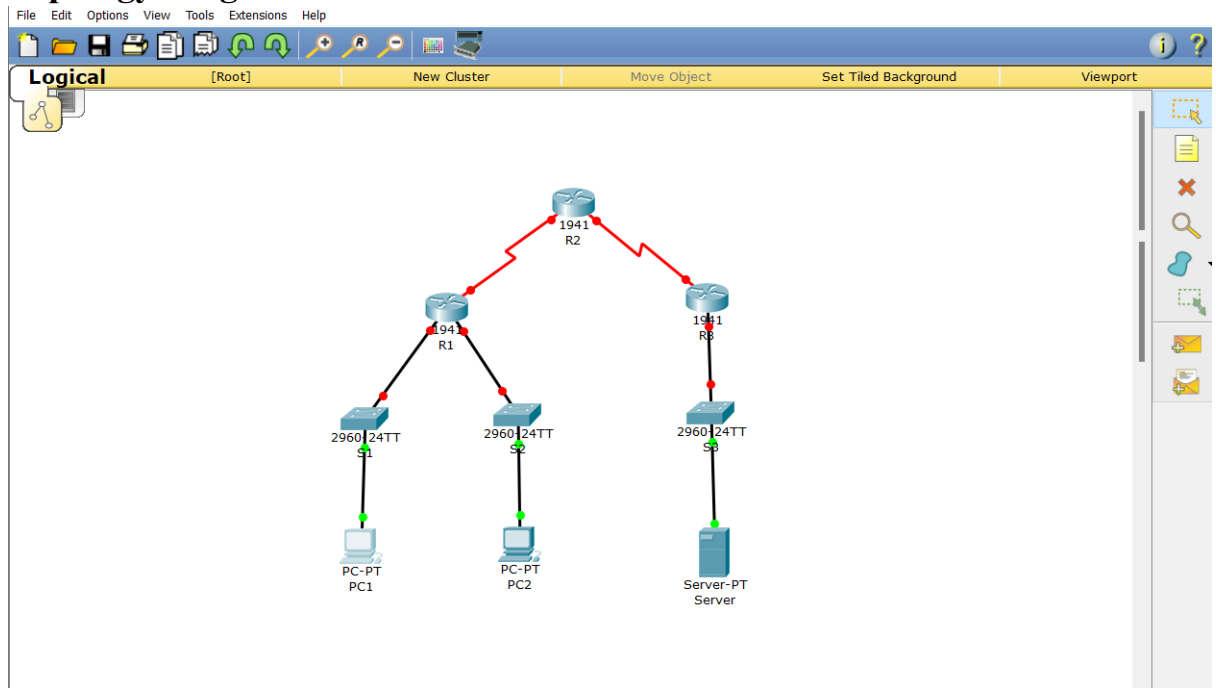
Date: 07/02/2024

Security in Computing

Practical 5:

Aim: Configuring IPv6 ACLs

➤ **Topology Diagram:**



➤ **Assign IP Address**

PC1

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address

Subnet Mask

Default Gateway

DNS Server

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address / 64

Link Local Address

IPv6 Gateway

IPv6 DNS Server

PC2

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address

Subnet Mask

Default Gateway

DNS Server

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address / 64

Link Local Address

IPv6 Gateway

IPv6 DNS Server

Server

Physical Config Services Desktop Custom Interface

IP Configuration

Interface

IP Configuration

☐ DHCP ☒ Static

IP Address

Subnet Mask

Default Gateway

DNS Server

IPv6 Configuration


☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address / 64

Link Local Address

IPv6 Gateway

IPv6 DNS Server

 R1

Physical
 Config
 CLI


IOS Command Line Interface

```

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(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)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to up
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

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console
exit
  
```

 R2

Physical
 Config
 CLI

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)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
interface Serial0/0/1
R2(config-if)#interface Serial0/0/1
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,ipv6 enable
R2(config-if)#ipv6 address 2001:DB8:1:29::2/64
R2(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R2(config-if)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#exit
  
```

 R3 — □

Physical Config CLI

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

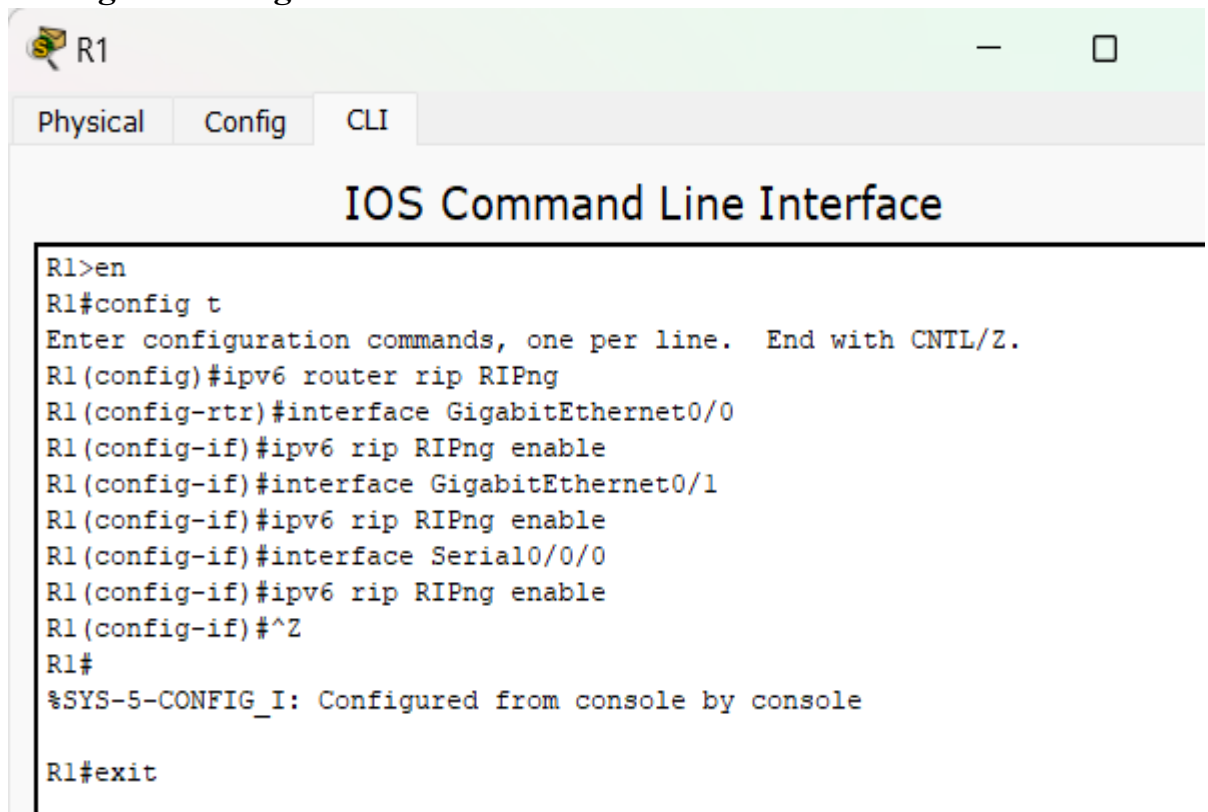
R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
interface Serial0/0/1
R3(config-if)#ipv6 enable
R3(config-if)#ipv6 address 2001:DB8:1:29::1/64
R3(config-if)#no shut

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console

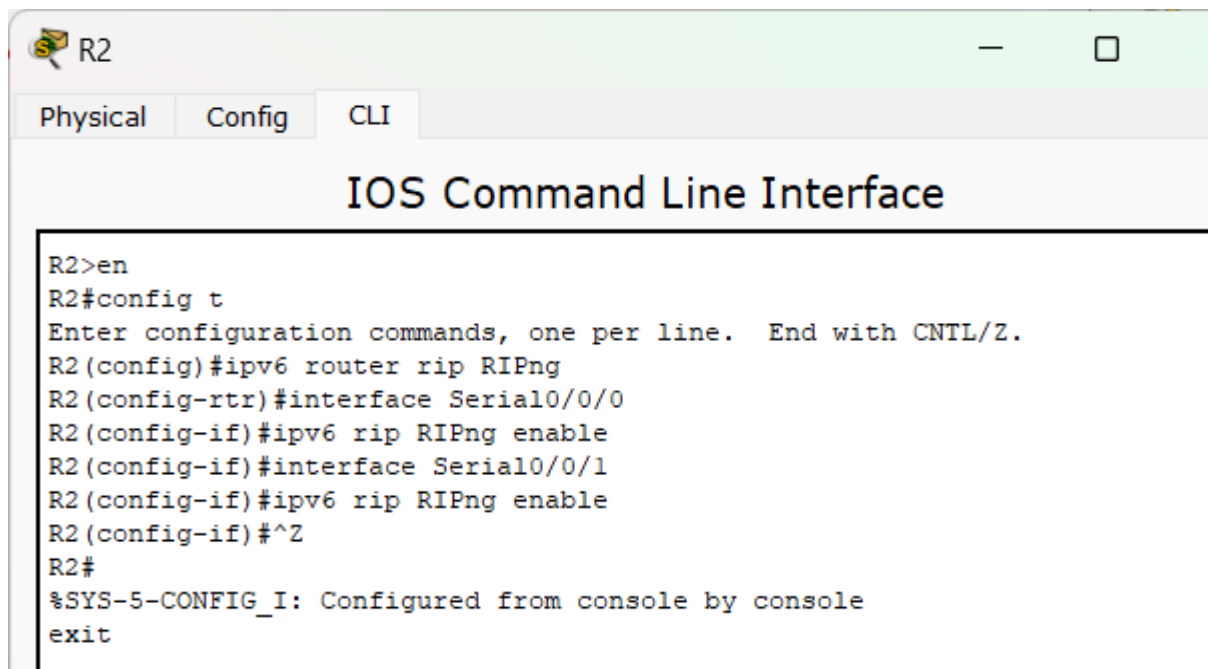
R3#exit
```


➤ **Configure RIPng on routers**



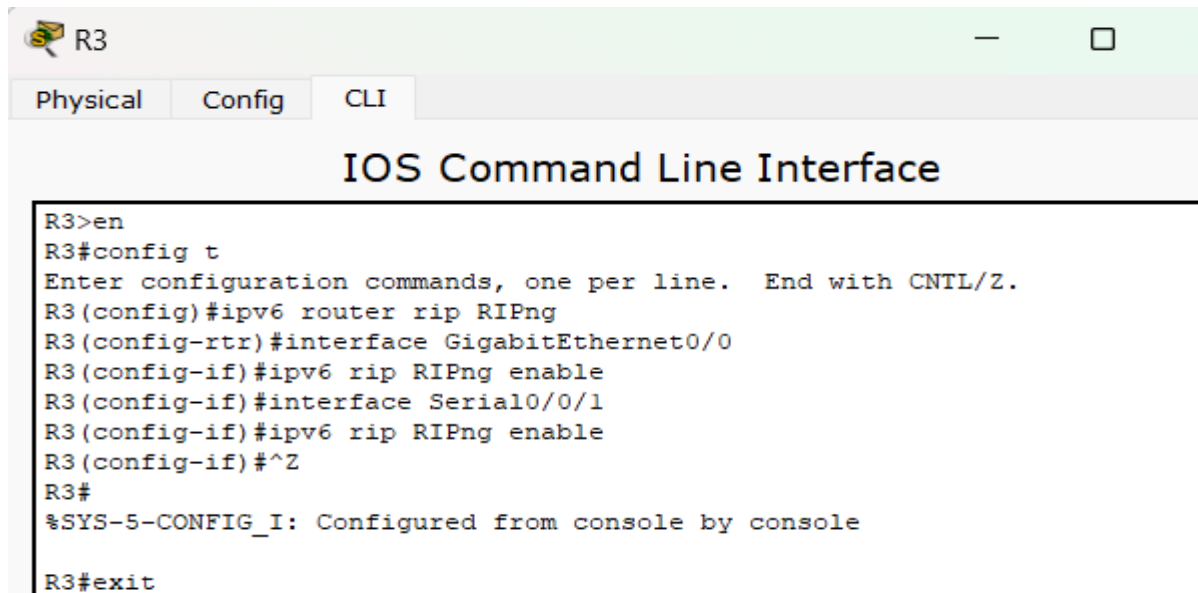
The screenshot shows the CLI interface of router R1. The title bar includes a router icon and the label 'R1'. Below the title bar are three tabs: 'Physical', 'Config', and 'CLI', with 'CLI' being the active tab. The main title is 'IOS Command Line Interface'. The command history is as follows:

```
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
R1#exit
```



The screenshot shows the CLI interface of router R2. The title bar includes a router icon and the label 'R2'. Below the title bar are three tabs: 'Physical', 'Config', and 'CLI', with 'CLI' being the active tab. The main title is 'IOS Command Line Interface'. The command history is 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
```



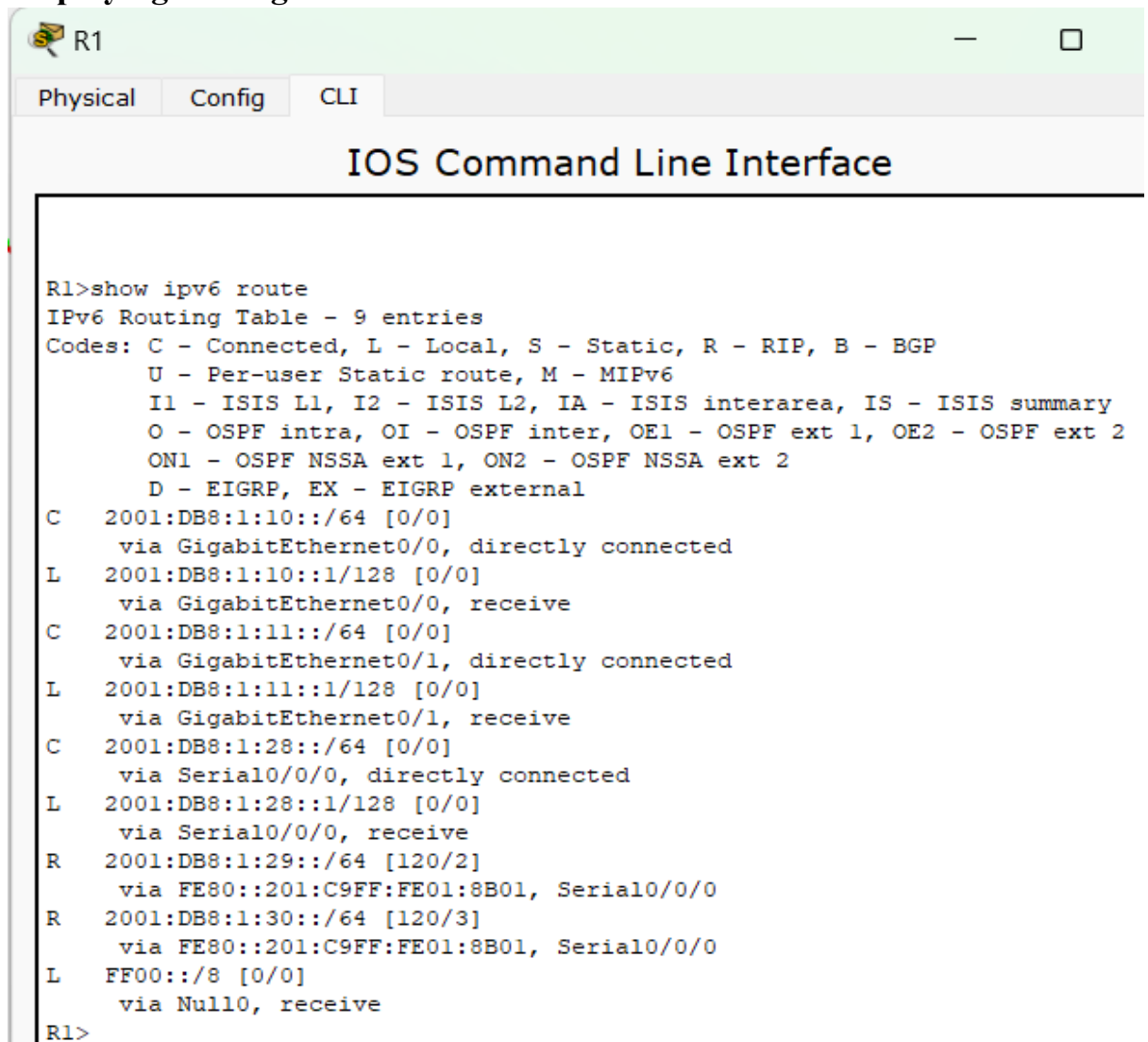
The screenshot shows the CLI of router R3. The tabs 'Physical', 'Config', and 'CLI' are visible at the top. The main title is 'IOS Command Line Interface'. The command history shows the following sequence: `R3>en`, `R3#config t`, `R3(config)#ipv6 router rip RIPng`, `R3(config-rtr)#interface GigabitEthernet0/0`, `R3(config-if)#ipv6 rip RIPng enable`, `R3(config-if)#interface Serial0/0/1`, `R3(config-if)#ipv6 rip RIPng enable`, `R3(config-if)#^Z`, `R3#`, a system message `%SYS-5-CONFIG_I: Configured from console by console`, and `R3#exit`.

```

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 Serial0/0/1
R3(config-if)#ipv6 rip RIPng enable
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#exit

```

➤ **Displaying routing table of routers**



The screenshot shows the CLI of router R1. The tabs 'Physical', 'Config', and 'CLI' are visible at the top. The main title is 'IOS Command Line Interface'. The command history shows the following sequence: `R1>show ipv6 route`, followed by a detailed display of the IPv6 routing table with 9 entries. The entries include connected routes for GigabitEthernet0/0 and Serial0/0/0, and received routes for GigabitEthernet0/0, GigabitEthernet0/1, and Serial0/0/0. The table also shows routes learned via EIGRP and Null0.

```

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
       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::201:C9FF:FE01:8B01, Serial0/0/0
R    2001:DB8:1:30::/64 [120/3]
     via FE80::201:C9FF:FE01:8B01, Serial0/0/0
L    FF00::/8 [0/0]
     via Null0, receive
R1>

```

R2

Physical Config CLI

IOS Command Line Interface

```

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
        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::20B:BEFF:FED5:701, Serial0/0/0
R   2001:DB8:1:11::/64 [120/2]
    via FE80::20B:BEFF:FED5:701, 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:FE43:5701, Serial0/0/1
L   FF00::/8 [0/0]
    via Null0, receive
R2>

```

R3

Physical Config CLI

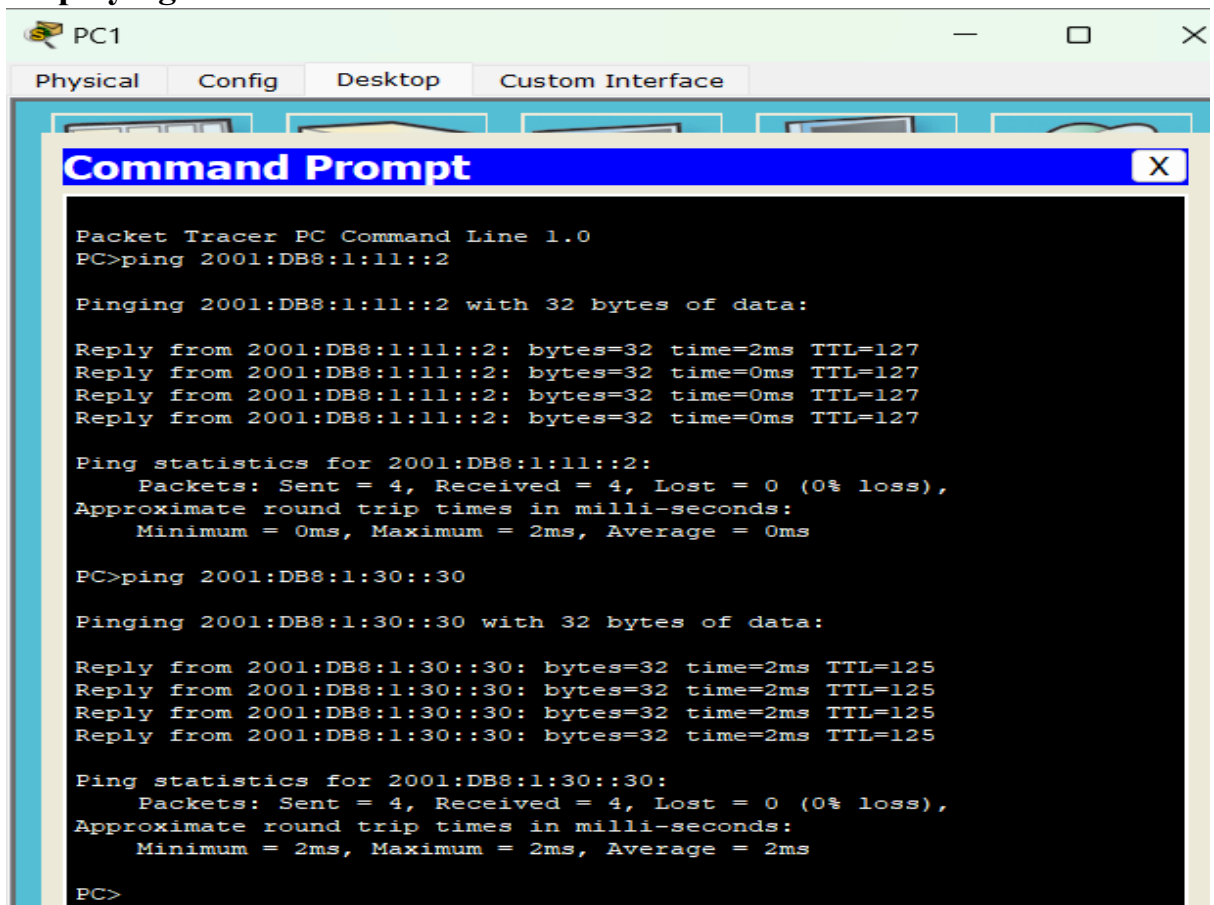
IOS Command Line Interface

```

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
        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::201:C9FF:FE01:8B01, Serial0/0/1
R   2001:DB8:1:11::/64 [120/3]
    via FE80::201:C9FF:FE01:8B01, Serial0/0/1
R   2001:DB8:1:28::/64 [120/2]
    via FE80::201:C9FF:FE01:8B01, Serial0/0/1
C   2001:DB8:1:29::/64 [0/0]
    via Serial0/0/1, directly connected
L   2001:DB8:1:29::1/128 [0/0]
    via Serial0/0/1, 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



PC1

Physical Config Desktop Custom Interface

Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>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=2ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time=0ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time=0ms TTL=127
Reply from 2001:DB8:1:11::2: bytes=32 time=0ms 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 = 2ms, Average = 0ms

PC>ping 2001:DB8:1:30::30

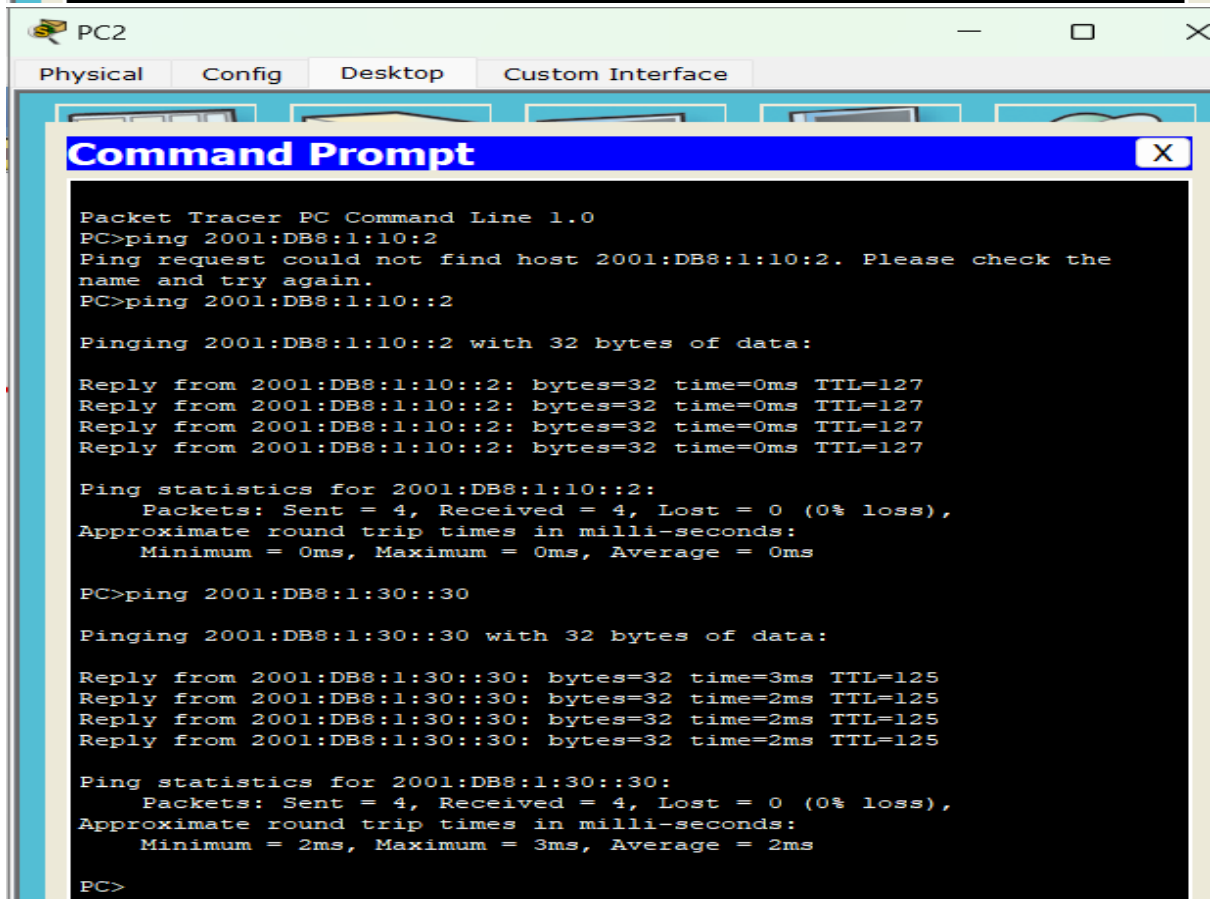
Pinging 2001:DB8:1:30::30 with 32 bytes of data:

Reply from 2001:DB8:1:30::30: bytes=32 time=2ms 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=2ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=2ms 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 = 2ms, Average = 2ms

PC>

```



PC2

Physical Config Desktop Custom Interface

Command Prompt

```

Packet Tracer PC Command Line 1.0
PC>ping 2001:DB8:1:10:2
Ping request could not find host 2001:DB8:1:10:2. Please check the
name and try again.
PC>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=0ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time=0ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time=0ms TTL=127
Reply from 2001:DB8:1:10::2: bytes=32 time=0ms 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 = 0ms, Average = 0ms

PC>ping 2001:DB8:1:30::30

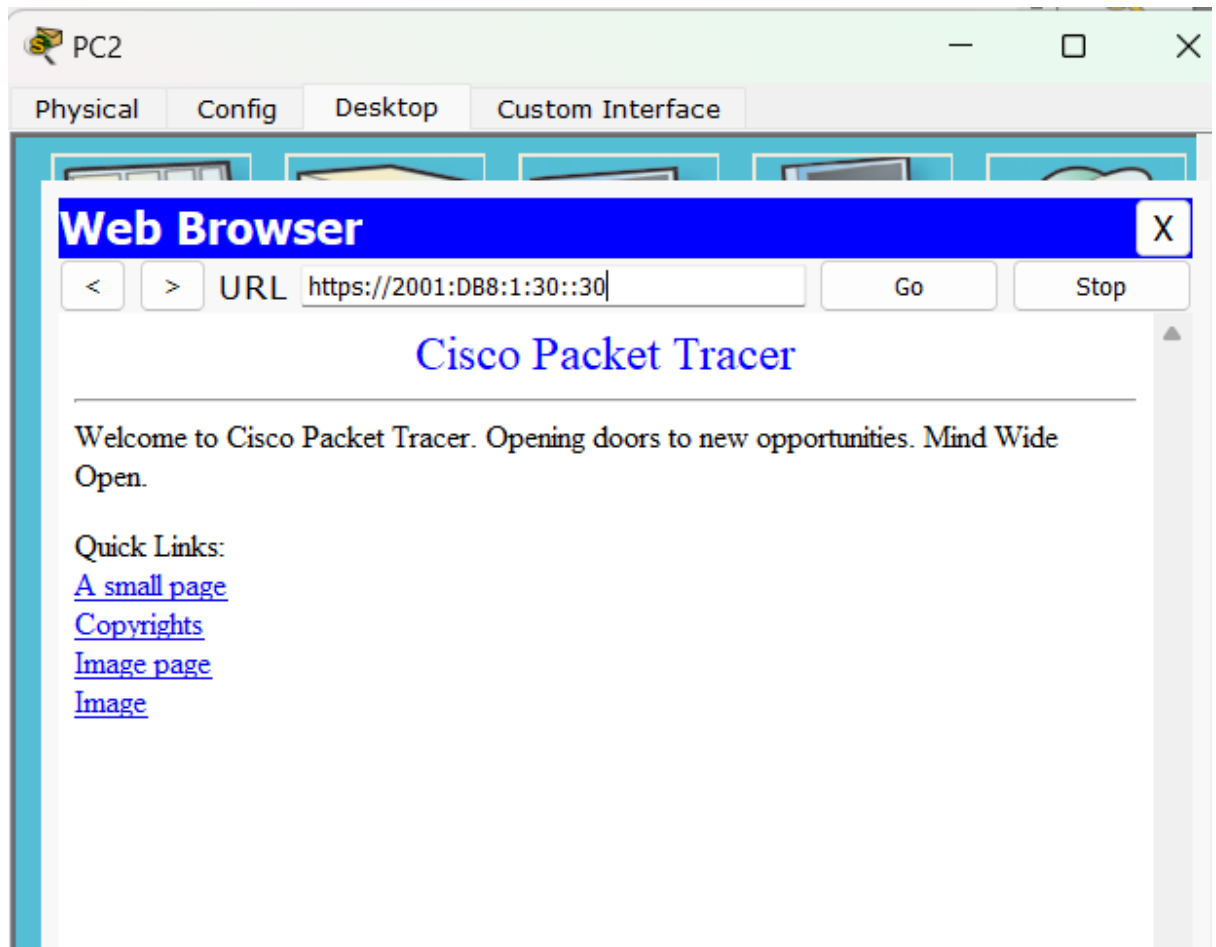
Pinging 2001:DB8:1:30::30 with 32 bytes of data:

Reply from 2001:DB8:1:30::30: bytes=32 time=3ms 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=2ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=2ms TTL=125

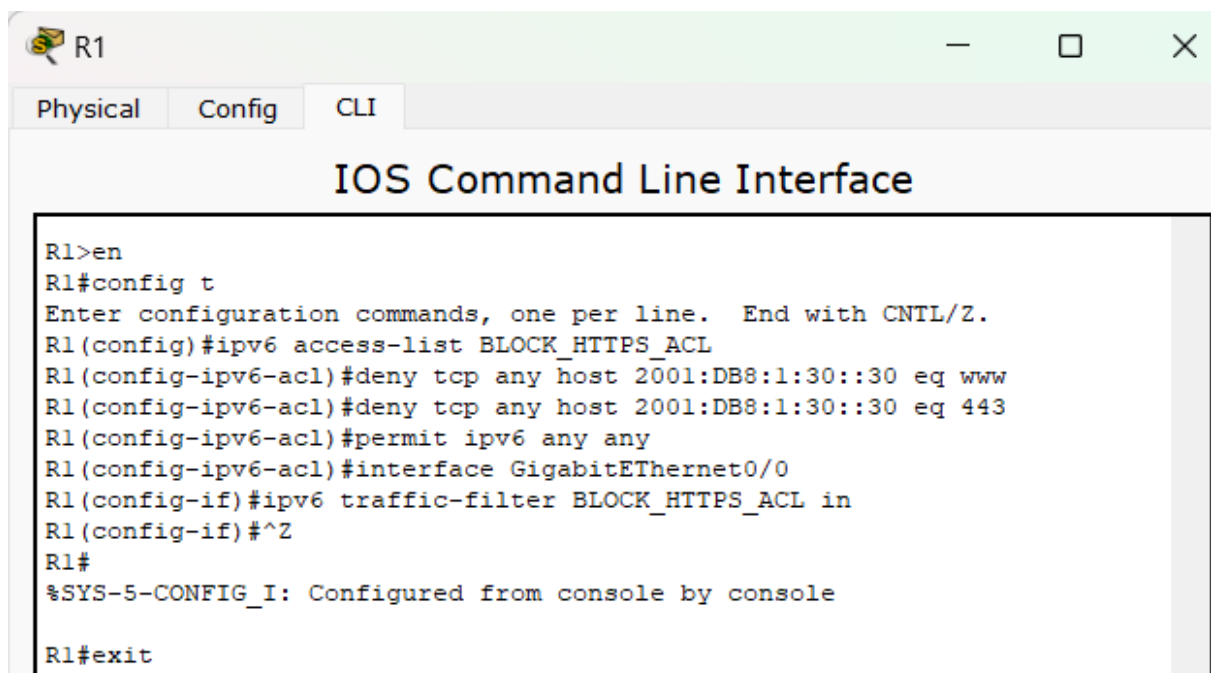
Ping statistics for 2001:DB8:1:30::30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

PC>

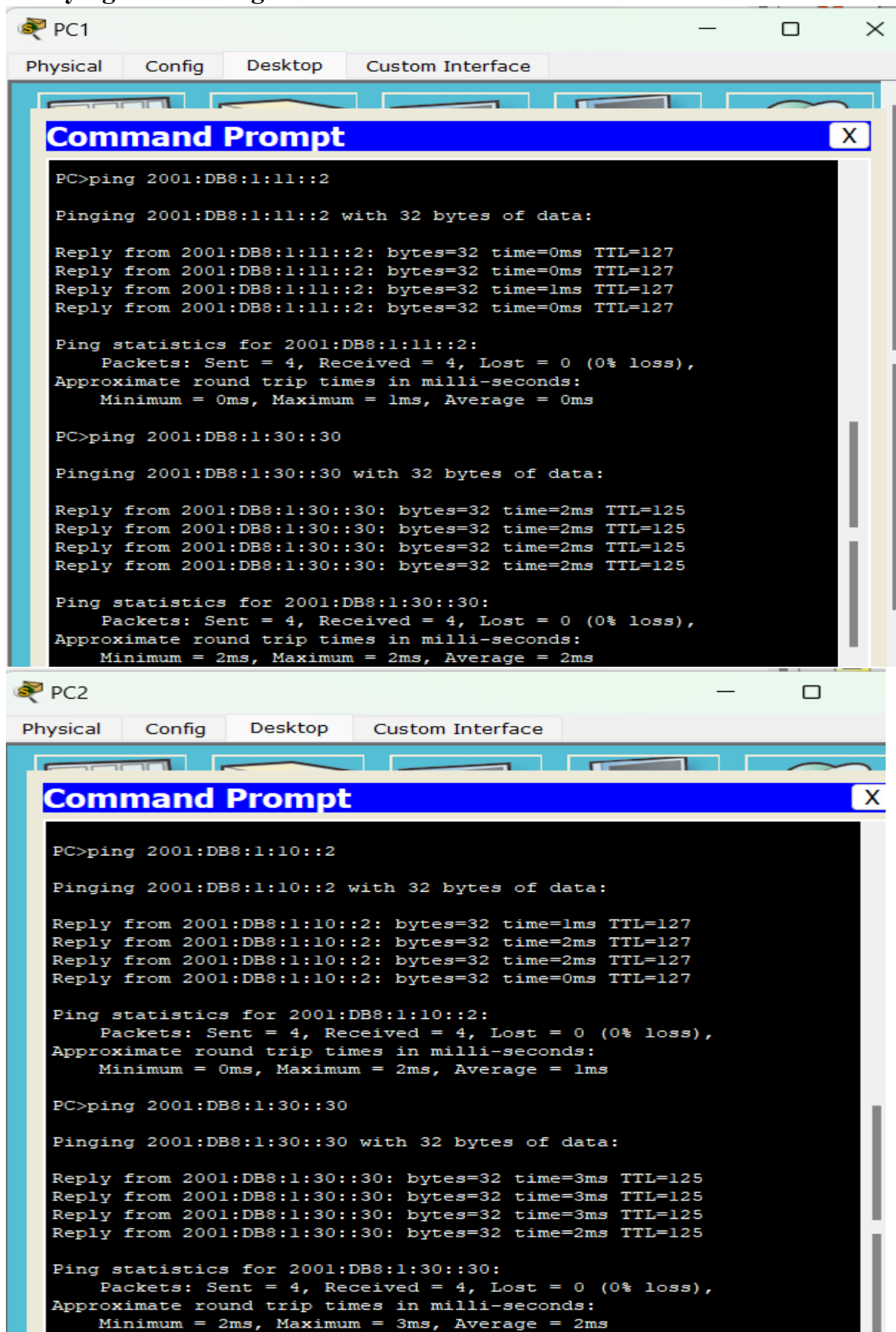
```

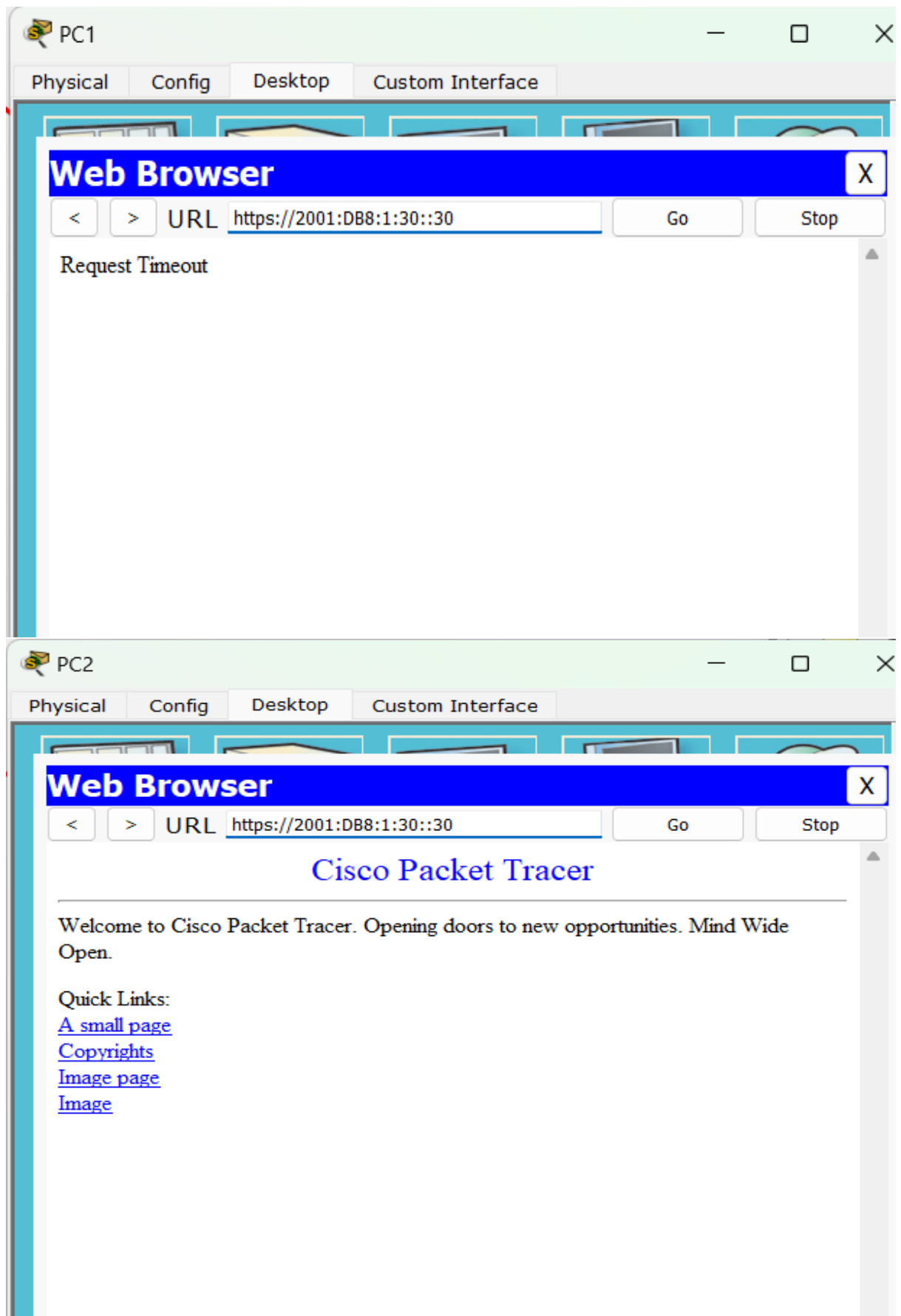


- **Configuring ACL**
(Block HTTP and HTTPS access and Allow all other IPv6 traffic to pass)

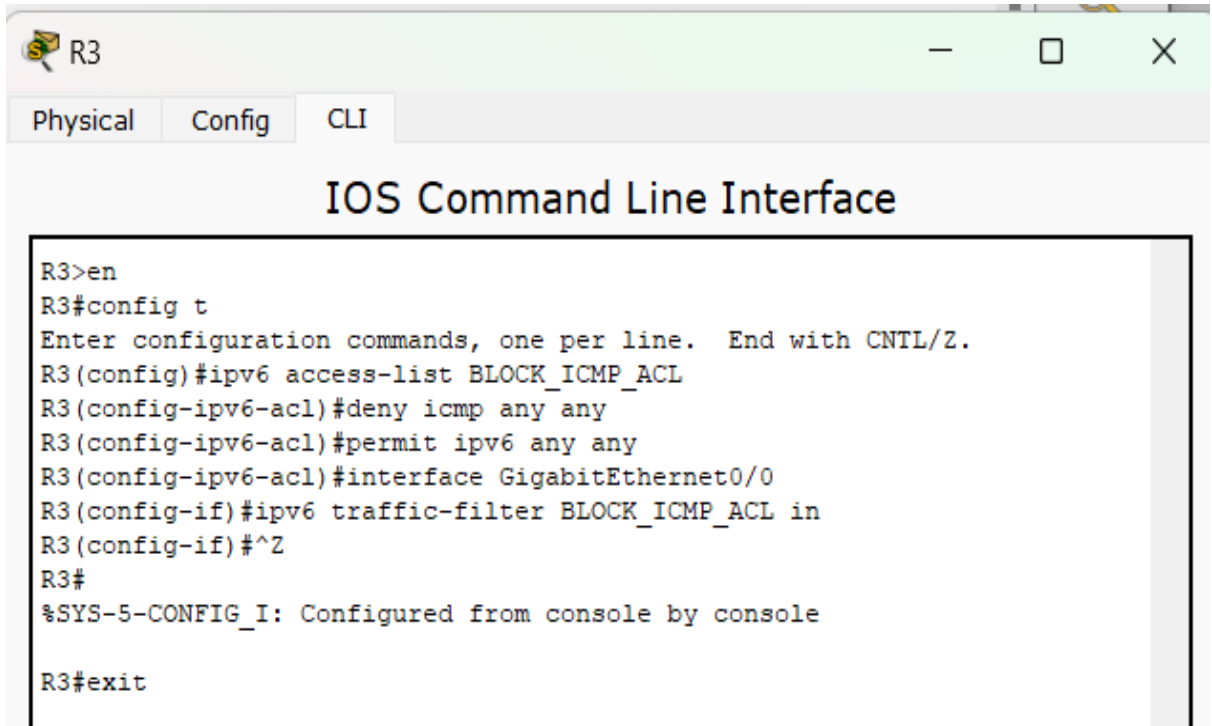


➤ Verifying the working of ACL





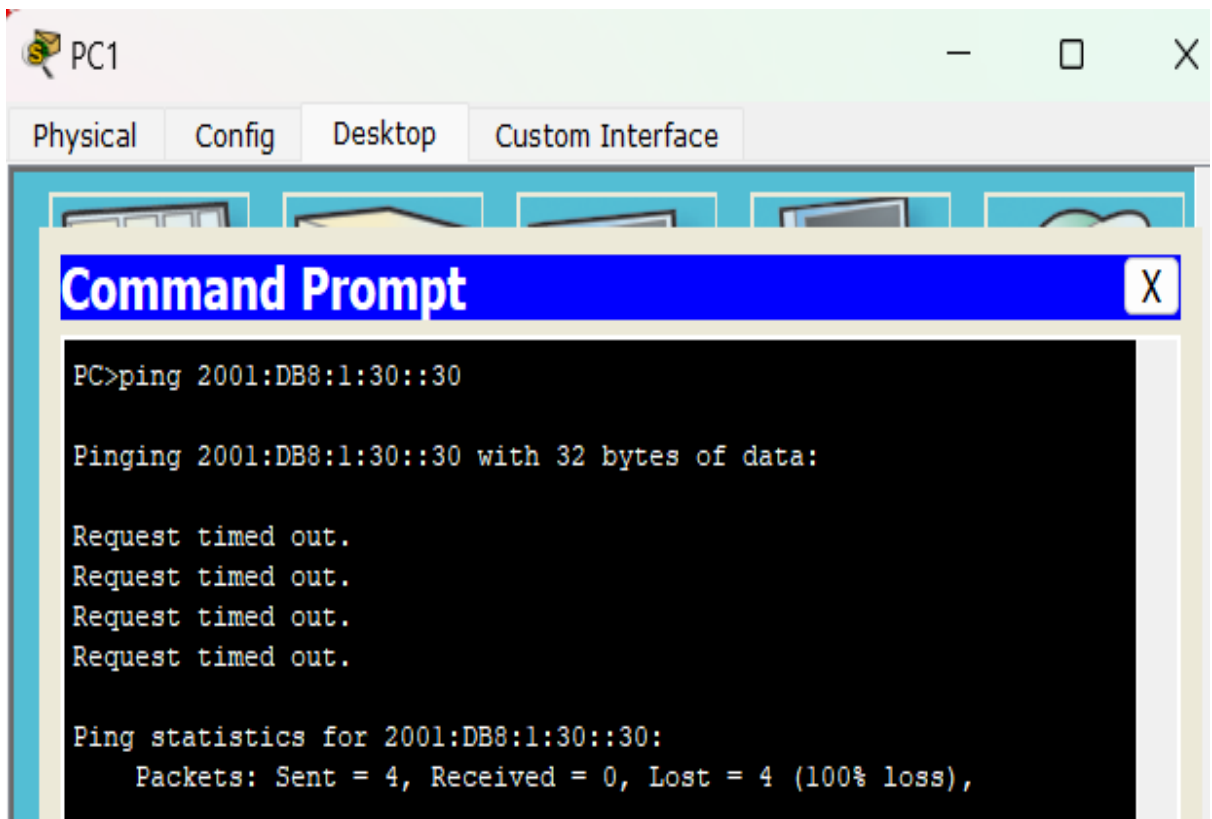
- **Configuring ACL**
(Block ICMP access and Allow all other IPv6 traffic to pass)



The screenshot shows the CLI window for router R3. The window has tabs for Physical, Config, and CLI. The title bar says 'R3'. The main area is titled 'IOS Command Line Interface'. The command history is as follows:

```
R3>en
R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ipv6 access-list BLOCK_ICMP_ACL
R3(config-ipv6-acl)#deny icmp any any
R3(config-ipv6-acl)#permit ipv6 any any
R3(config-ipv6-acl)#interface GigabitEthernet0/0
R3(config-if)#ipv6 traffic-filter BLOCK_ICMP_ACL in
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#exit
```

- **Verifying the working of ACL**



The screenshot shows the Command Prompt window for PC1. The window has tabs for Physical, Config, Desktop, and Custom Interface. The title bar says 'PC1'. The command history is as follows:

```
PC>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),
```

