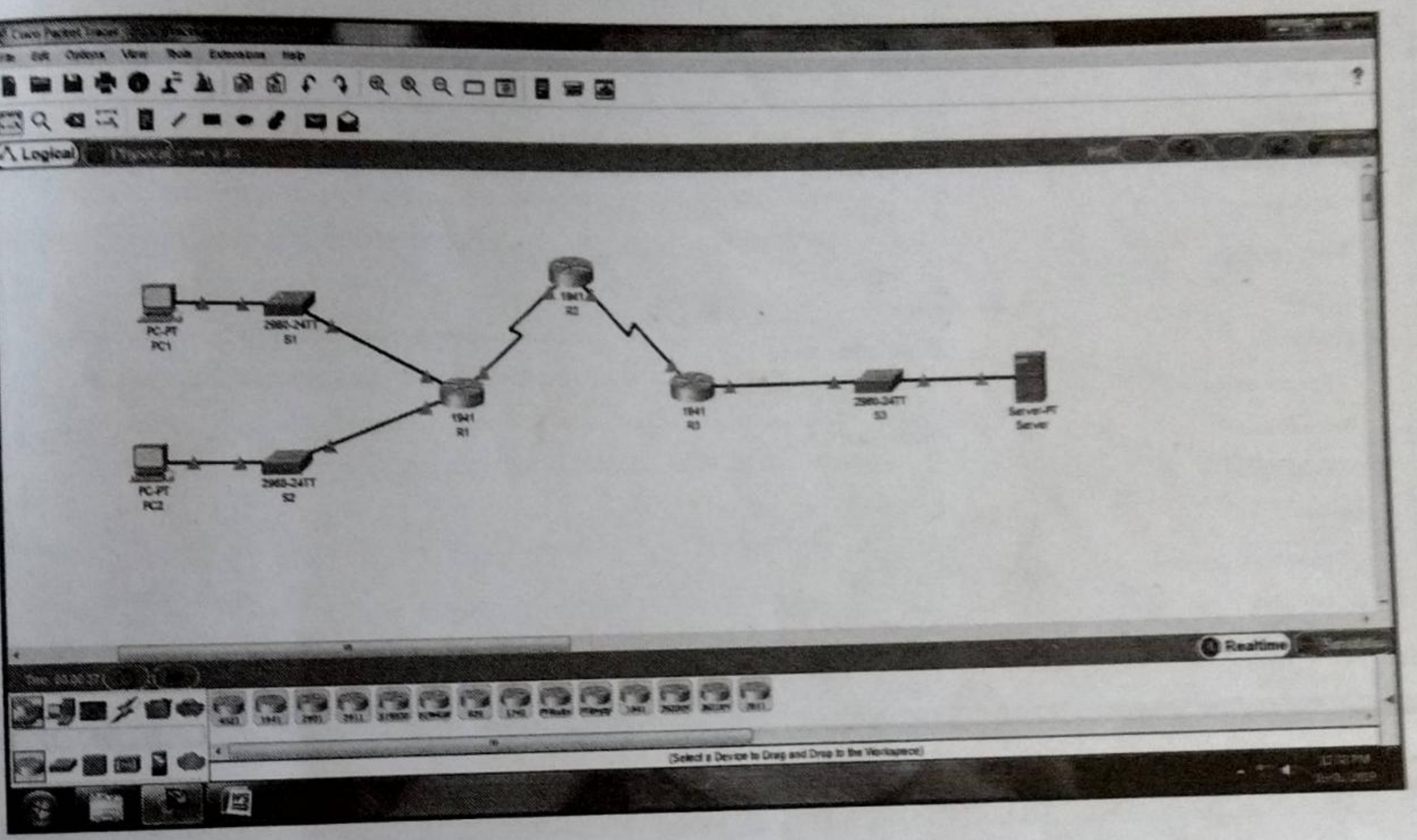
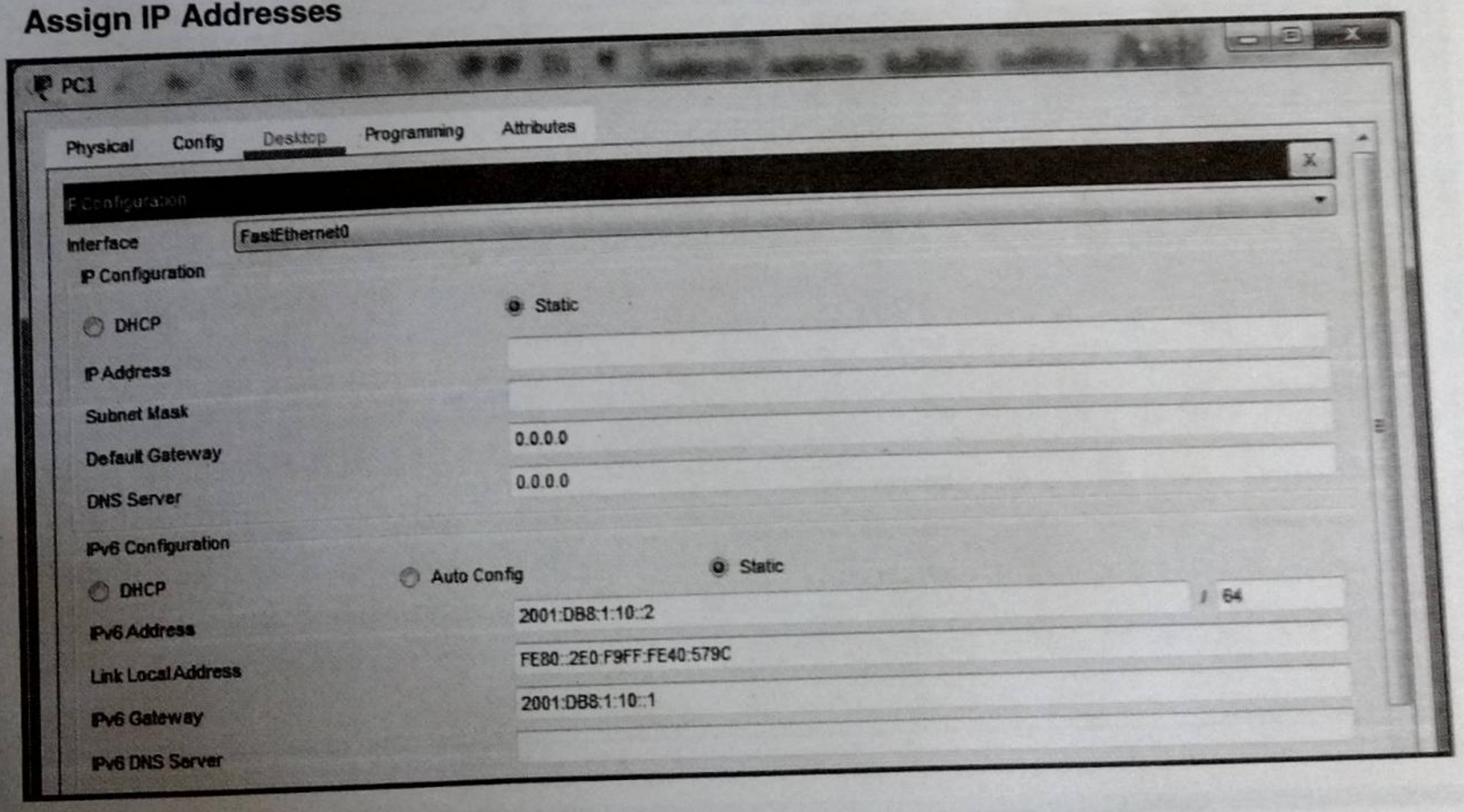
Practical 5

- **Aim : Configuring IPv6 ACLs**

☞ **Topology Diagram**



☞ **Assign IP Addresses**



Server

Physical Config Services Desktop Programming Attributes

IP Configuration

IP Configuration

DHCP Static

IP Address

Subnet Mask

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address 2001:DB8:1:30::30 / 64

Link Local Address FE80::2E0:F9FF:FEB0:678D

IPv6 Gateway 2001:DB8:1:30::1

IPv6 DNS Server

802.1X

Use 802.1X Security

Authentication MD5

Top

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP Static

IP Address

Subnet Mask

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

DHCP Auto Config Static

IPv6 Address 2001:DB8:1:11::2 / 64

Link Local Address FE80::260:5CFF:FE9A:35B2

IPv6 Gateway 2001:DB8:1:11::1

IPv6 DNS Server

802.1X

Use 802.1X Security

Top

```
Router>en
Router#conf t
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)#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)#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#exit
```

```
Router>en
Router#conf t
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)#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#exit
```

```
Router>en
Router#conf t
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)#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#exit
```

☞ Displaying IP Address Details of Routers

```
R1>show ipv6 interface brief
GigabitEthernet0/0 [up/up]
FE80::2D0:FFFF:FE0D:1E01
2001:DB8:1:10::1
GigabitEthernet0/1 [up/up]
FE80::2D0:FFFF:FE0D:1E02
2001:DB8:1:11::1
Serial0/0/0 [up/up]
FE80::2D0:FFFF:FE0D:1E01
2001:DB8:1:28::1
Serial0/0/1 [administratively down/down]
unassigned
Vlan1 [administratively down/down]
Unassigned
```

```
R2>show ipv6 interface brief
GigabitEthernet0/0 [administratively down/down]
unassigned
GigabitEthernet0/1 [administratively down/down]
Unassigned
```

```
Serial0/0/0 [up/up]
FE80::2E0:B0FF:FEAB:1001
2001:DB8:1:28::2
Serial0/0/1 [up/up]
FE80::2E0:B0FF:FEAB:1001
2001:DB8:1:29::2
Vlan1 [administratively down/down]
Unassigned
```

```
R3>show ipv6 interface brief
GigabitEthernet0/0 [up/up]
FE80::200:CFF:FEE7:4B01
2001:DB8:1:30::1
GigabitEthernet0/1 [administratively down/down]
unassigned
Serial0/0/0 [up/up]
FE80::200:CFF:FEE7:4B01
2001:DB8:1:29::1
Serial0/0/1 [administratively down/down]
unassigned
Vlan1 [administratively down/down]
unassigned
```

☞ Configure RIPng on routers

```
R1>en
R1#conf t
R1(config)#ipv6 router rip RIPng
R1(config)#interface GigabitEthernet0/0
R1(config-if)#ipv6 rip RIPng enable
R1(config)#interface GigabitEthernet0/1
R1(config-if)#ipv6 rip RIPng enable
R1(config)#interface Serial0/0/0
R1(config-if)#ipv6 rip RIPng enable
R1(config-if)#^Z
R1#exit
```

```
R2>en
R2#conf t
R2(config)#ipv6 router rip RIPng
R2(config)#interface Serial0/0/0
R2(config-if)#ipv6 rip RIPng enable
R2(config)#interface Serial0/0/1
R2(config-if)#ipv6 rip RIPng enable
R2(config-if)#^Z
R2#exit
R3>en
R3#conf t
R3(config)#ipv6 router rip RIPng
R3(config)#interface GigabitEthernet0/0
R3(config-if)#ipv6 rip RIPng enable
R3(config)#interface Serial0/0/0
R3(config-if)#ipv6 rip RIPng enable
R3(config-if)#^Z
R3#exit
```

☞ Displaying routing table of routers

```
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::2E0:B0FF:FEAB:1001, Serial0/0/0
R 2001:DB8:1:30::/64 [120/3]
via FE80::2E0:B0FF:FEAB:1001, Serial0/0/0
L FF00::/8 [0/0]
via Null0, receive
```

```
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::2D0:FFFF:FE0D:1E01, Serial0/0/0
R 2001:DB8:1:11::/64 [120/2]
via FE80::2D0:FFFF:FE0D:1E01, 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::200:CFF:FEE7:4B01, Serial0/0/1
L FF00::/8 [0/0]
via Null0, receive
```

```
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::2E0:B0FF:FEAB:1001, Serial0/0/0
R 2001:DB8:1:30::/64 [120/3]
via FE80::2E0:B0FF:FEAB:1001, Serial0/0/0
L FF00::/8 [0/0]
via Null0, receive
```

```
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::2D0:FFFF:FE0D:1E01, Serial0/0/0
R 2001:DB8:1:11::/64 [120/2]
via FE80::2D0:FFFF:FE0D:1E01, 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::200:CFF:FEE7:4B01, Serial0/0/1
L FF00::/8 [0/0]
via Null0, receive
```

Checking network connectivity

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
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=2ms 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 = 2ms, 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=12ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=3ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=11ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=11ms TTL=126

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 = 12ms, Average = 9ms
```

Top

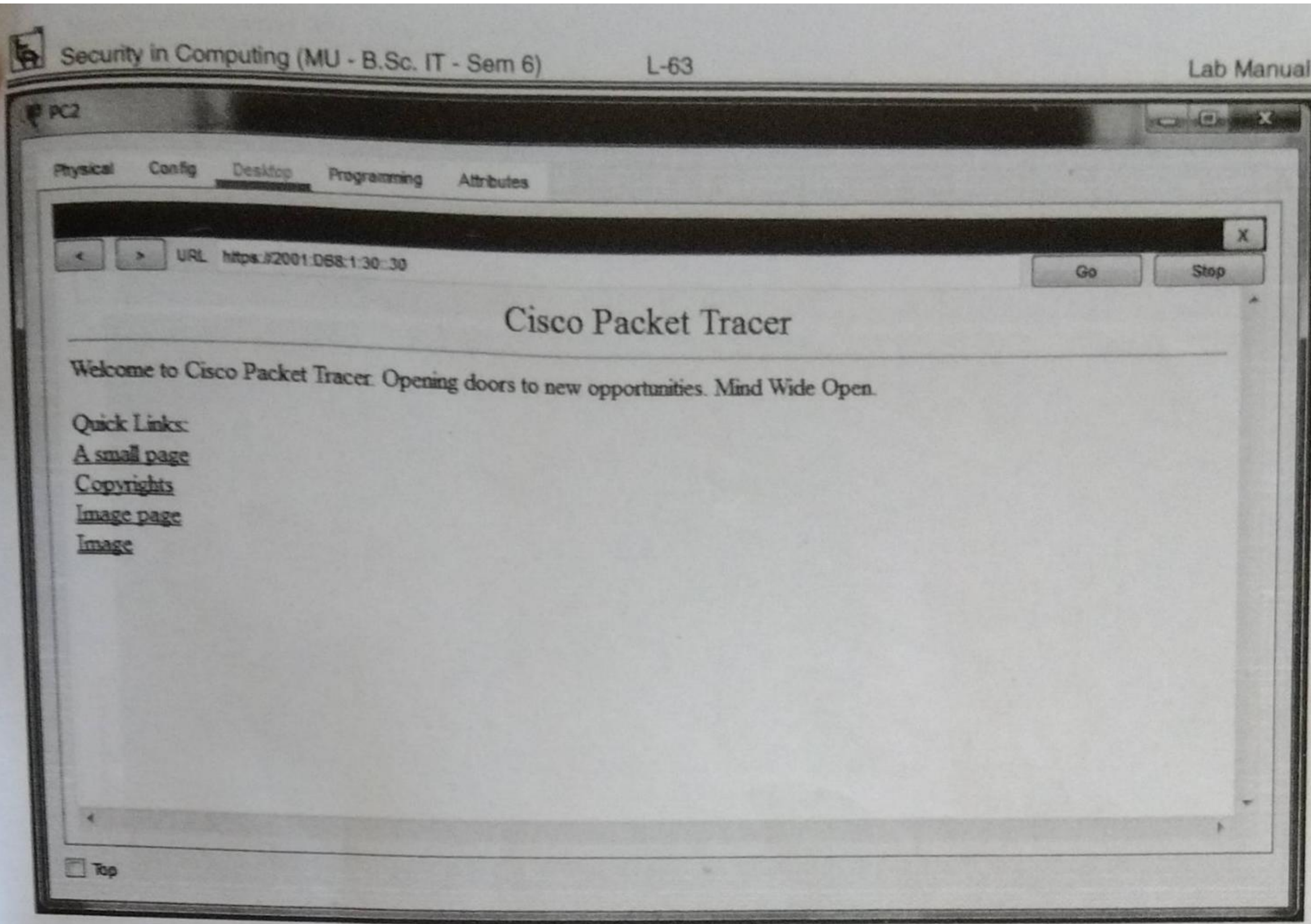
PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
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 = 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=16ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=10ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=14ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=3ms TTL=126

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 = 16ms, Average = 10ms
```

Top



☞ Configuring ACL

(Block HTTP and HTTPS access and Allow all other IPv6 traffic to pass)

```
R1>en
R1#conf t
R1(config)#ipv6 access-list BLOCK_HTTPS_ACL
R1(config-ipv6-acl)#deny tcp any host 2001:DB8:1:30::30 eq www
R1(config-ipv6-acl)#deny tcp any host 2001:DB8:1:30::30 eq 443
R1(config-ipv6-acl)#permit ipv6 any any
R1(config-ipv6-acl)#interface GigabitEthernet0/0
R1(config-if)#ipv6 traffic-filter BLOCK_HTTPS_ACL in
R1(config-if)#^Z
R1#exit
```

Verifying the working of ACL

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
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=2ms 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 = 2ms, 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=12ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=3ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=11ms TTL=125
Reply from 2001:DB8:1:30::30: bytes=32 time=11ms 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 = 12ms, Average = 9ms
```

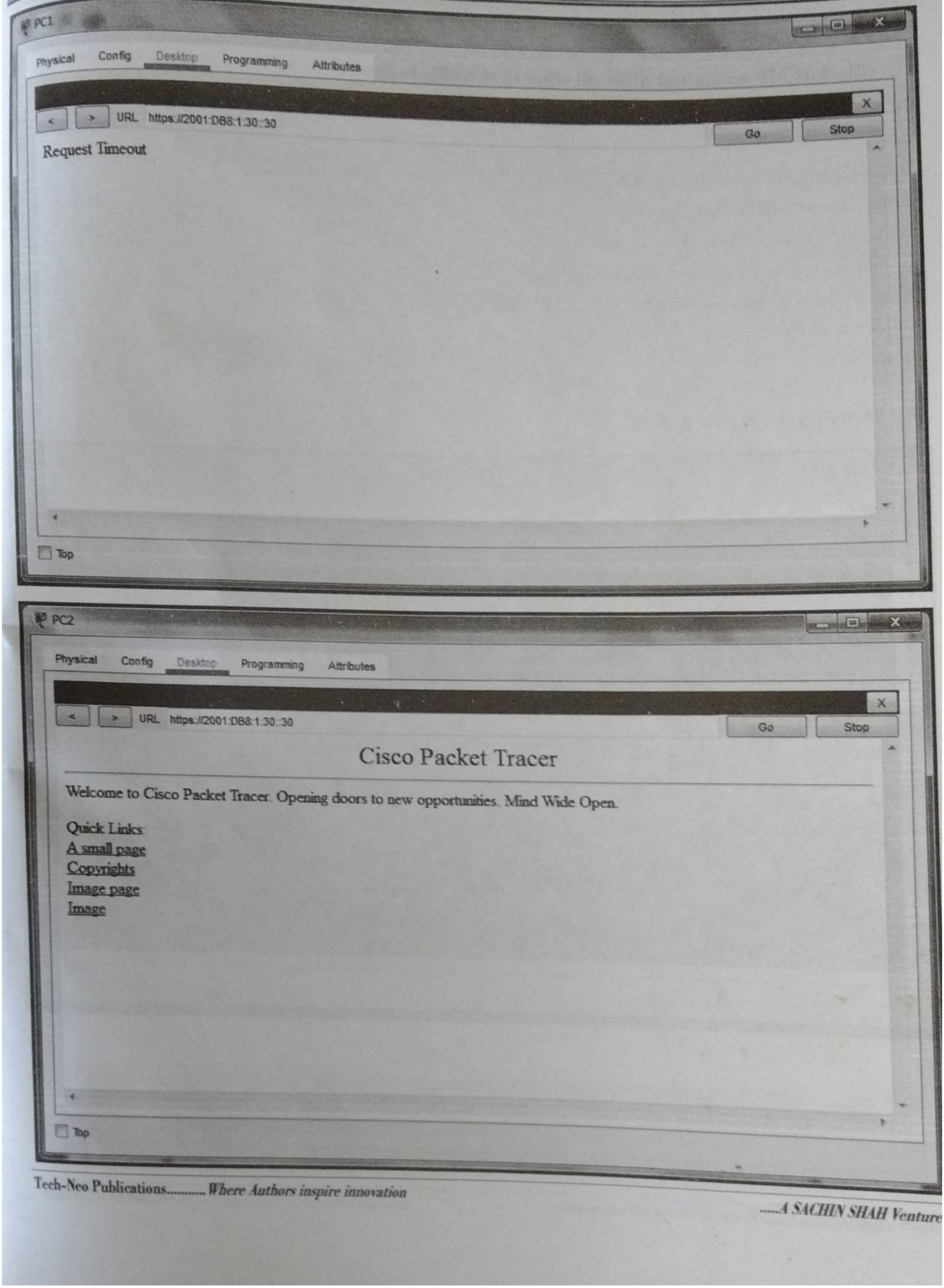
Top

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
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 = 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=16ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=10ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=14ms TTL=126
Reply from 2001:DB8:1:30::30: bytes=32 time=3ms TTL=126

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 = 16ms, Average = 10ms
```

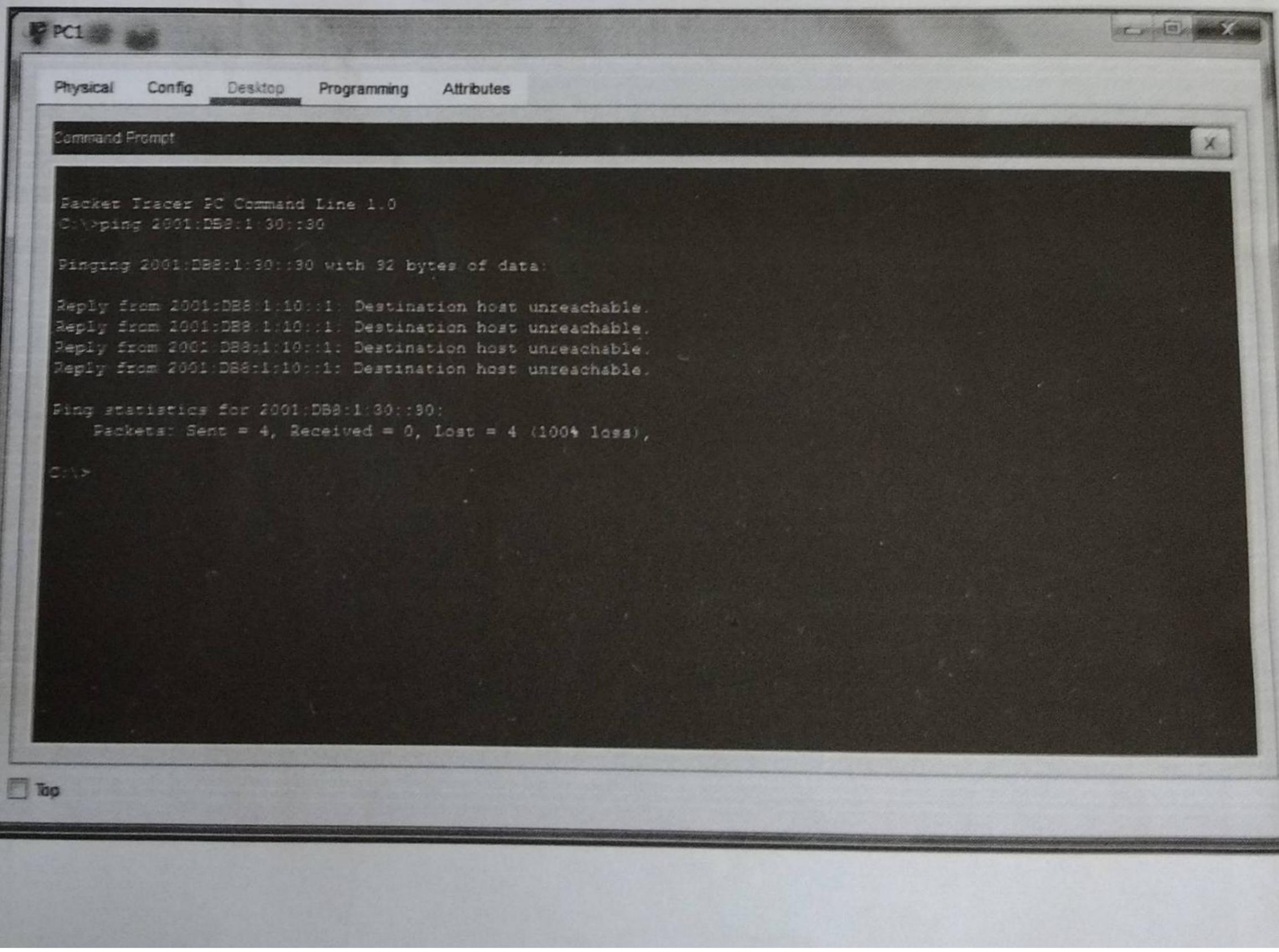


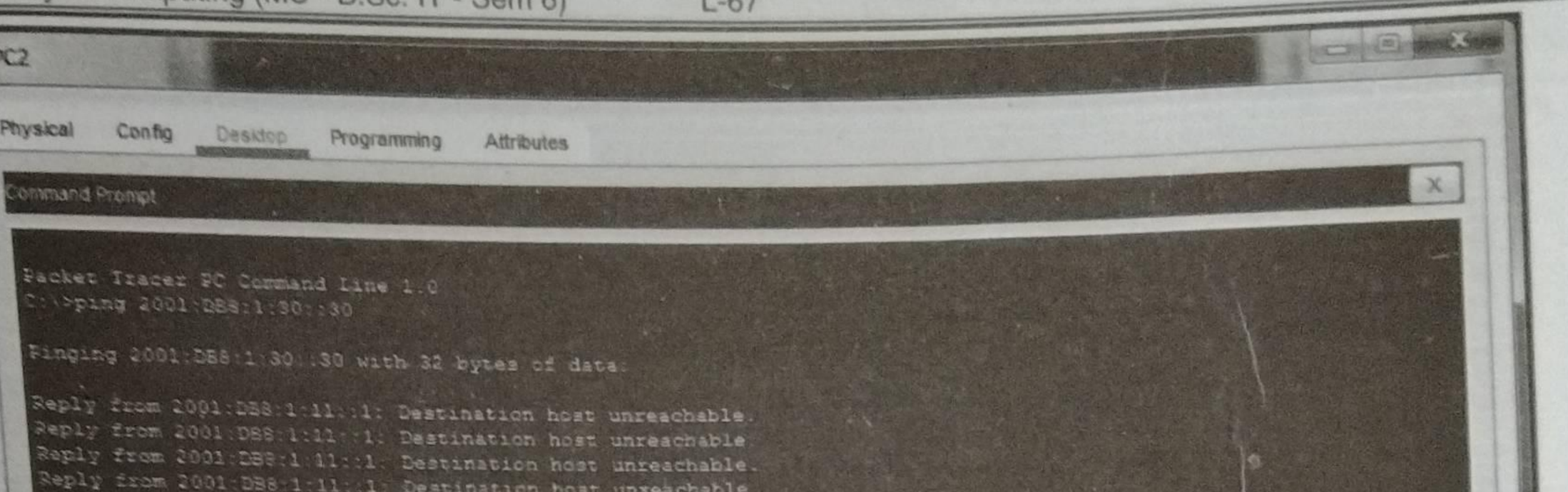
Configuring ACL

(Block ICMP access and Allow all other IPv6 traffic to pass)

```
R3>en
R3#conf t
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#exit
```

Verifying the working of ACL





Practical 6

- **Aim : Configuring a Zone-Based Policy Firewall**