
CSE307 NETWORKING LAB

REPORT On

Multi-floor Network Setup and Configuration

Submitted to:

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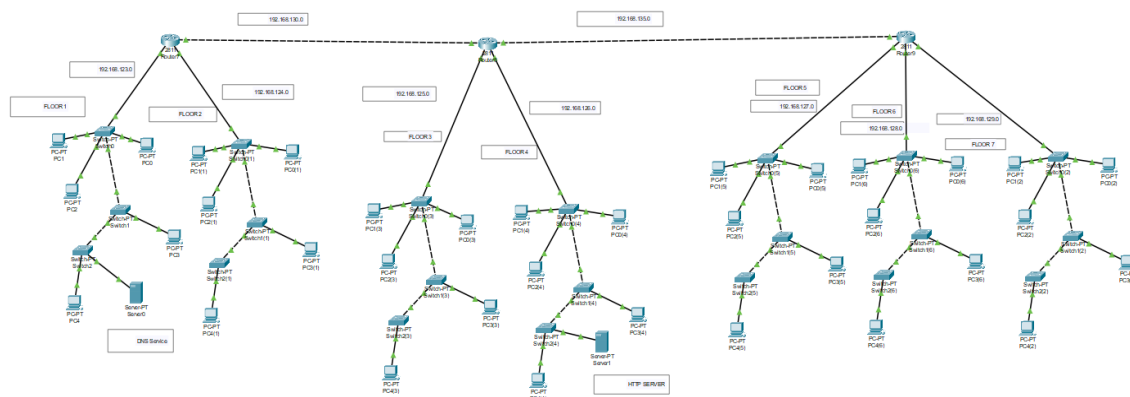
GitHub Repository Link: <https://github.com/Raghav-chauhan1/MultiFloor-Network.git>

Physical Scenario Creation:

This network represents Seven floors building of a mid-sized enterprise named XL Network Solutions, where each floor has its own set of 5 Pc's each. By all floors computers are connected in hybrid topology using star and tree topology. Each floor has its own dedicated PT-Switch which is connected to all devices on floor using fast ethernet ports. First two floors have its own 2811 router and the next two floor also having their own router 2811 and the last three floors having a common router and router are connected in a bus topology for a seamless connection and with the Servers DNS and HTTP to configure DNS Service.

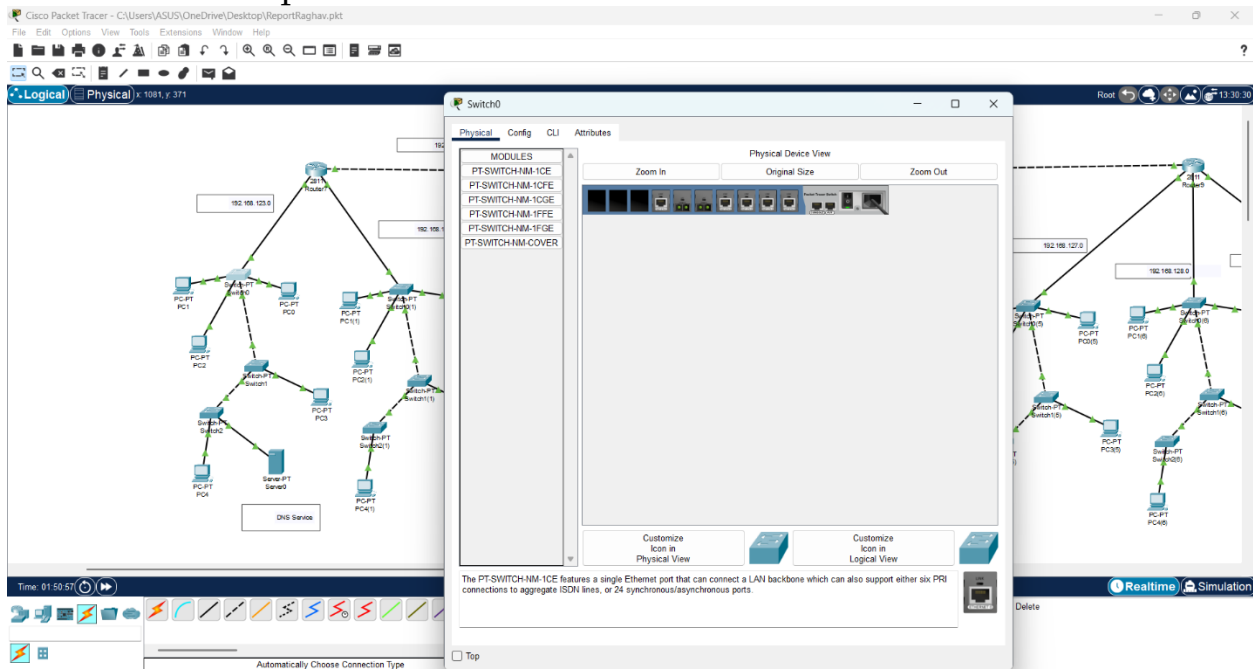
To connect the floors with each other, we used Gigabit Ethernet ports available on the routers and switches. Specifically, each floor's switch connects to its floor router using Gigabit Ethernet, and routers of adjacent floors are also interconnected through Gigabit Ethernet ports to ensure faster communication and better bandwidth for inter-floor data transfer.

Following are the snapshots of the physical layout of the entire network:



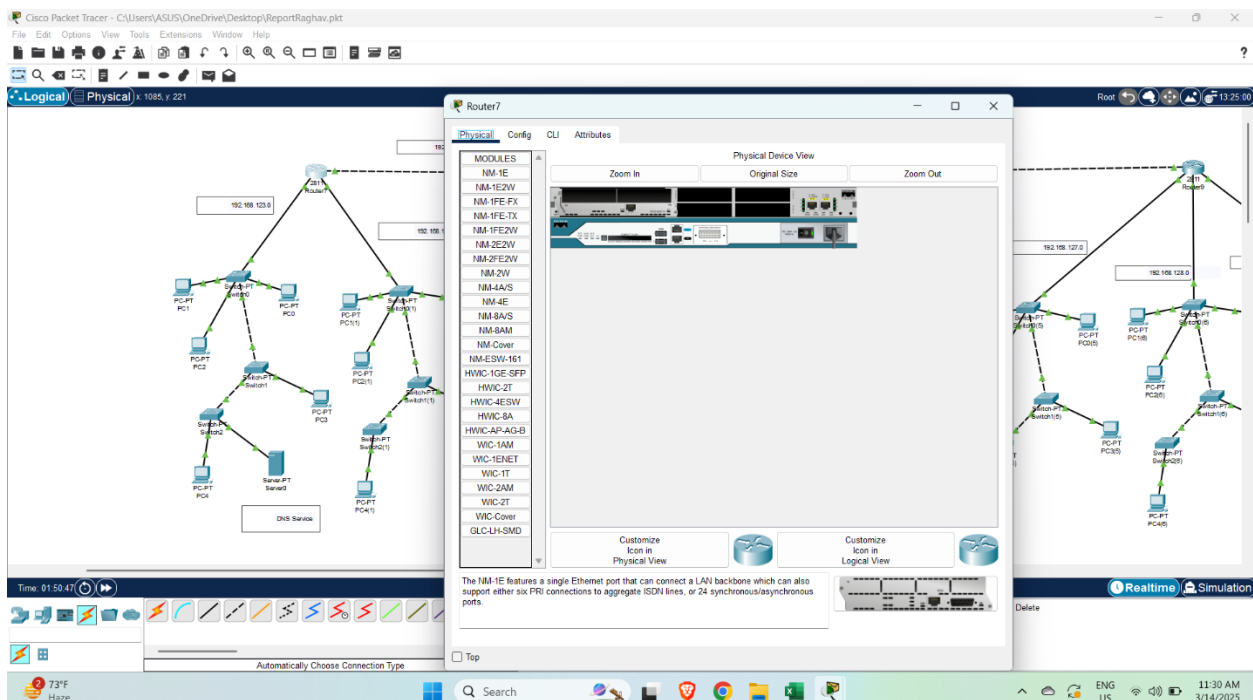
Switch Used: PT-Switch

Extended Switch port:



Router Used: 2811

Extended Router Port:



Hybrid Topology – Star Topology + Tree Topology

Server Used: DNS and HTTP

IP Addressing

To ensure proper segmentation and clear identification of devices, we assigned IP addresses floor-wise.

Floor wise IP addressing for Pc's:

1. Floor 1
IP address 192.168.123.0
Subnet mask 255.255.255.0
Default Gateway 192.168.123.1
DNS Server 192.168.126.7
2. Floor 2
IP address 192.168.124.0
Subnet mask 255.255.255.0
Default Gateway 192.168.124.1
DNS Server 192.168.126.7
3. Floor 3
IP address 192.168.125.0
Subnet mask 255.255.255.0
Default Gateway 192.168.125.1
DNS Server 192.168.126.7
4. Floor 4
IP address 192.168.126.0
Subnet mask 255.255.255.0
Default Gateway 192.168.126.1
DNS Server 192.168.126.7
5. Floor 5
IP address 192.168.127.0
Subnet mask 255.255.255.0
Default Gateway 192.168.127.1
DNS Server 192.168.126.7
6. Floor 6
IP address 192.168.128.0
Subnet mask 255.255.255.0

Default Gateway 192.168.128.1

DNS Server 192.168.126.7

7. Floor 7

IP address 192.168.129.0

Subnet mask 255.255.255.0

Default Gateway 192.168.129.1

DNS Server 192.168.126.7

Router wise IP addressing:

Router 1 to 2 IP address 192.168.130.0

Router 2 to 3 IP address 192.168.135.0

Static Routing Ip Routes:

Router 7:

The screenshot displays the Cisco Packet Tracer interface. On the left, a network diagram shows a multi-tiered topology with various routers, switches, and PCs. A central window titled 'Router7' shows the 'CLI' (Command Line Interface) tab. The CLI output shows the 'show ip route' command results, indicating that the router has a default route (0.0.0.0/0) pointing to 192.168.128.1. The output also lists several static routes for specific subnets, such as 192.168.129.0/24, 192.168.123.0/24, and 192.168.124.0/24, all pointing to 192.168.130.2. The bottom status bar shows the time as 01:53:16 and the simulation mode as 'Realtime'.

```
Router7>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       I - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.129.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.123.0/24 is directly connected, FastEthernet0/0
C    192.168.123.1/32 is directly connected, FastEthernet0/0
C    192.168.124.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.124.1/32 is directly connected, FastEthernet0/1
C    192.168.124.1/32 is directly connected, FastEthernet0/1
S    192.168.125.0/24 [1/0] via 192.168.130.2
S    192.168.126.0/24 [1/0] via 192.168.130.2
S    192.168.127.0/24 [1/0] via 192.168.130.2
S    192.168.128.0/24 [1/0] via 192.168.130.2
S    192.168.129.0/24 [1/0] via 192.168.130.2
S    192.168.130.0/24 is variably subnetted, 2 subnets, 2 masks
--Note--
```

Router 8:

The image displays the Cisco Packet Tracer interface for Router 8. The left pane shows a network diagram with various routers and switches connected. The right pane shows the CLI configuration for Router 8.

Router 8 CLI Configuration:

```
Processor board ID JAD05190MTZ (4292891495)
4 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
256K bytes of non-volatile configuration memory.
249954K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up

Router>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

S 192.168.123.0/24 [1/0] via 192.168.130.1
S 192.168.124.0/24 [1/0] via 192.168.130.1
S 192.168.125.0/24 [1/0] via 192.168.135.1
C 192.168.125.0/24 is directly connected, FastEthernet0/1
L 192.168.125.1/32 is directly connected, FastEthernet0/1
S 192.168.124.0/24 [1/0] via 192.168.135.2
C 192.168.124.0/24 is directly connected, FastEthernet1/0
L 192.168.124.1/32 is directly connected, FastEthernet1/0
S 192.168.127.0/24 [1/0] via 192.168.135.2
S 192.168.128.0/24 [1/0] via 192.168.135.2
S 192.168.129.0/24 [1/0] via 192.168.135.2
S 192.168.130.0/24 [1/0] via 192.168.135.2
```

Router 9:

The image displays the Cisco Packet Tracer interface for Router 9. The left pane shows a network diagram with various routers and switches connected. The right pane shows the CLI configuration for Router 9.

Router 9 CLI Configuration:

```
Processor board ID JAD05190MTZ (4292891495)
4 FastEthernet interface(s)
DRAM configuration is 64 bits wide with parity disabled.
256K bytes of non-volatile configuration memory.
249954K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
!LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up

Router>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

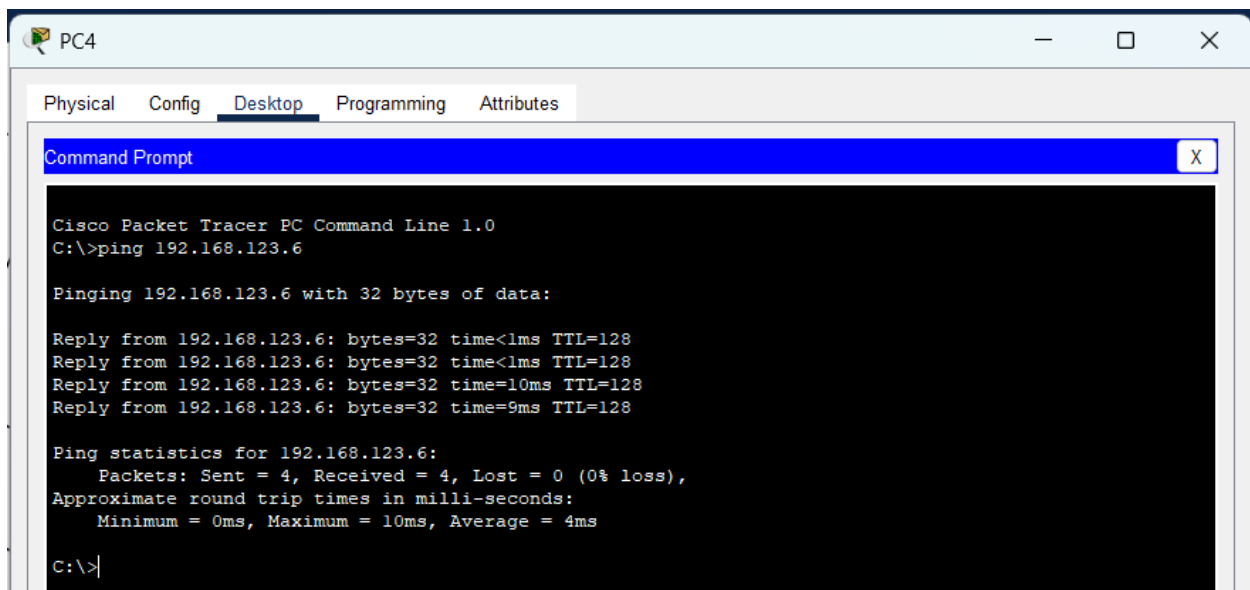
Gateway of last resort is not set

S 192.168.123.0/24 [1/0] via 192.168.135.1
S 192.168.124.0/24 [1/0] via 192.168.135.1
S 192.168.125.0/24 [1/0] via 192.168.135.1
S 192.168.126.0/24 [1/0] via 192.168.135.1
C 192.168.127.0/24 is directly connected, FastEthernet0/1
L 192.168.127.1/32 is directly connected, FastEthernet0/1
S 192.168.128.0/24 [1/0] via 192.168.135.2
C 192.168.128.0/24 is directly connected, FastEthernet1/0
L 192.168.128.1/32 is directly connected, FastEthernet1/0
S 192.168.129.0/24 [1/0] via 192.168.135.2
S 192.168.129.0/24 is directly connected, FastEthernet1/1
```

Communication between PC's

To check communication between pc's we used the ping command in the command prompt and to see the paths we used tracert command also to see flow of packets.

Floor 1 to 1:



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC4. The 'Desktop' tab is selected. The command prompt displays the output of a ping command to 192.168.123.6. The output shows four successful replies with 32 bytes of data, times of 1ms, 1ms, 10ms, and 9ms, and a TTL of 128. The ping statistics show 4 packets sent, 4 received, and 0% loss, with an average round trip time of 4ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.6

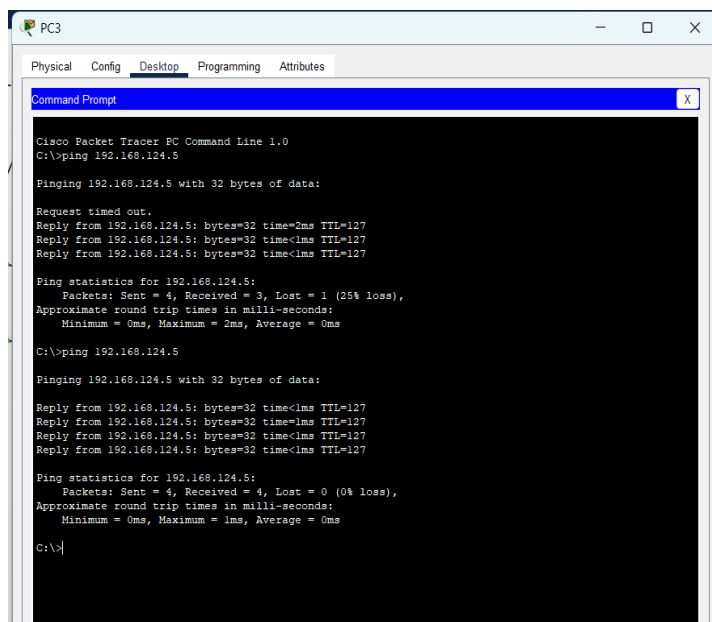
Pinging 192.168.123.6 with 32 bytes of data:

Reply from 192.168.123.6: bytes=32 time<1ms TTL=128
Reply from 192.168.123.6: bytes=32 time<1ms TTL=128
Reply from 192.168.123.6: bytes=32 time=10ms TTL=128
Reply from 192.168.123.6: bytes=32 time=9ms TTL=128

Ping statistics for 192.168.123.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 4ms

C:\>|
```

Floor 1 to 2:



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC3. The 'Desktop' tab is selected. The command prompt displays the output of a ping command to 192.168.124.5. The output shows four successful replies with 32 bytes of data, times of 2ms, 1ms, 1ms, and 1ms, and a TTL of 127. The ping statistics show 4 packets sent, 4 received, and 0% loss, with an average round trip time of 1ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.124.5

Pinging 192.168.124.5 with 32 bytes of data:

Request timed out.
Reply from 192.168.124.5: bytes=32 time=2ms TTL=127
Reply from 192.168.124.5: bytes=32 time<1ms TTL=127
Reply from 192.168.124.5: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.124.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>ping 192.168.124.5

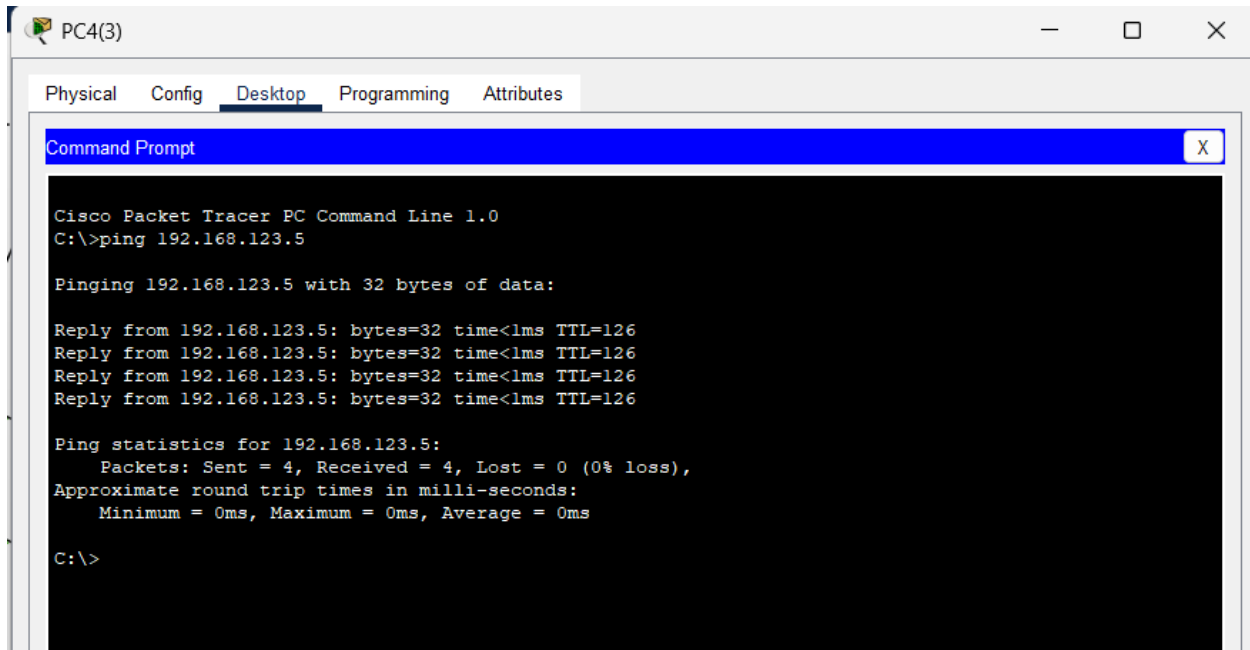
Pinging 192.168.124.5 with 32 bytes of data:

Reply from 192.168.124.5: bytes=32 time<1ms TTL=127
Reply from 192.168.124.5: bytes=32 time<1ms TTL=127
Reply from 192.168.124.5: bytes=32 time<1ms TTL=127
Reply from 192.168.124.5: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.124.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>|
```

Floor 1 to 3:



The screenshot shows a Cisco Packet Tracer PC window for PC4(3). The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the execution of the 'ping 192.168.123.5' command, which successfully pings the destination IP address with 32 bytes of data. The output shows four successful replies with a time of less than 1ms and a TTL of 126. The ping statistics indicate that all four packets were sent and received with 0% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.5

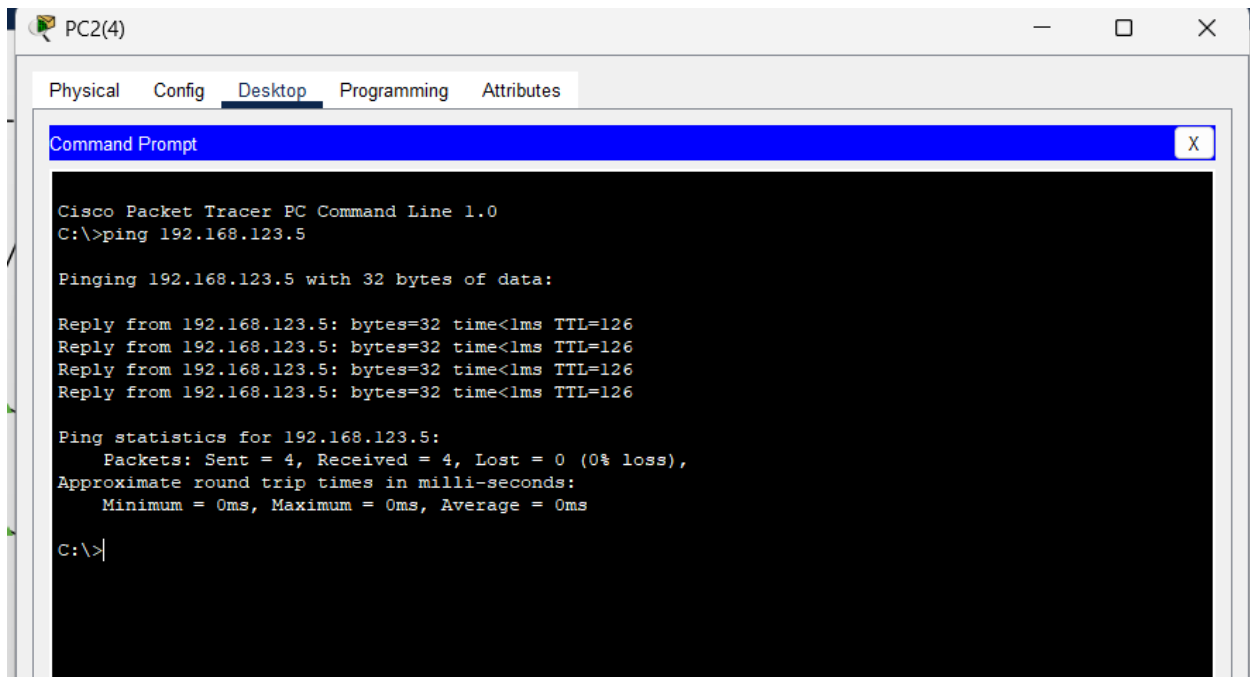
Pinging 192.168.123.5 with 32 bytes of data:

Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.123.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Floor 1 to 4:



The screenshot shows a Cisco Packet Tracer PC window for PC2(4). The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the execution of the 'ping 192.168.123.5' command, which successfully pings the destination IP address with 32 bytes of data. The output shows four successful replies with a time of less than 1ms and a TTL of 126. The ping statistics indicate that all four packets were sent and received with 0% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.5

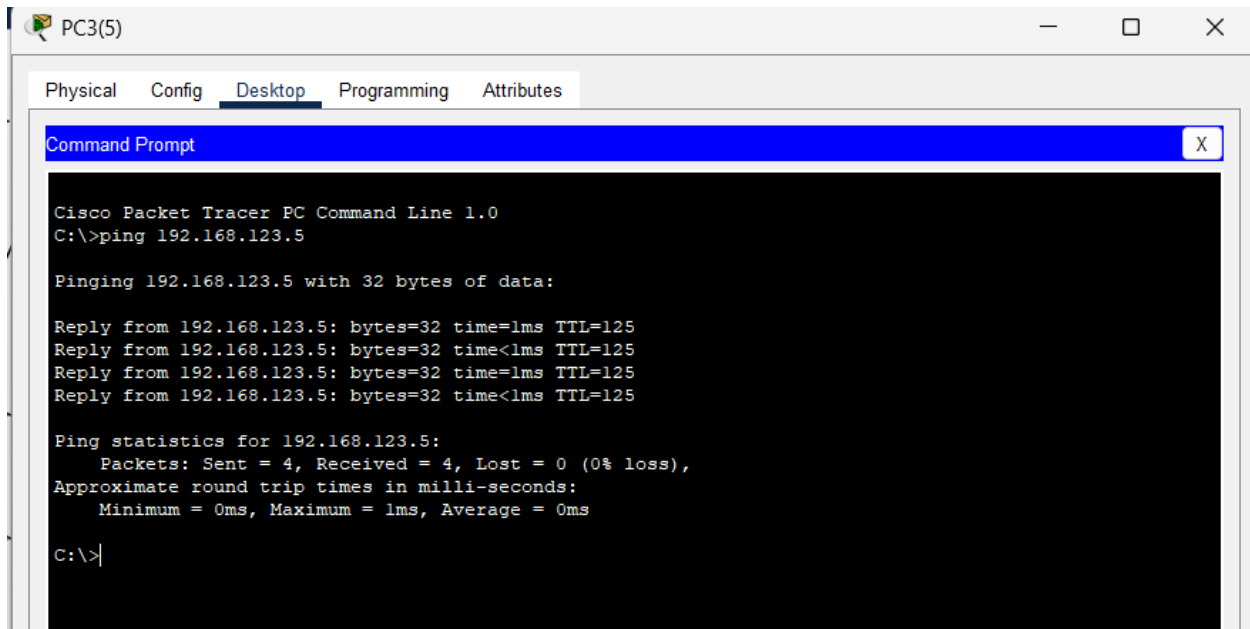
Pinging 192.168.123.5 with 32 bytes of data:

Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126
Reply from 192.168.123.5: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.123.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```


Floor 1 to 5:



The screenshot shows a window titled "PC3(5)" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a "Command Prompt" window. The Command Prompt shows the output of a ping command to 192.168.123.5. The output indicates that 4 packets were sent and received with 0% loss, and the round trip times were all 0ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.5

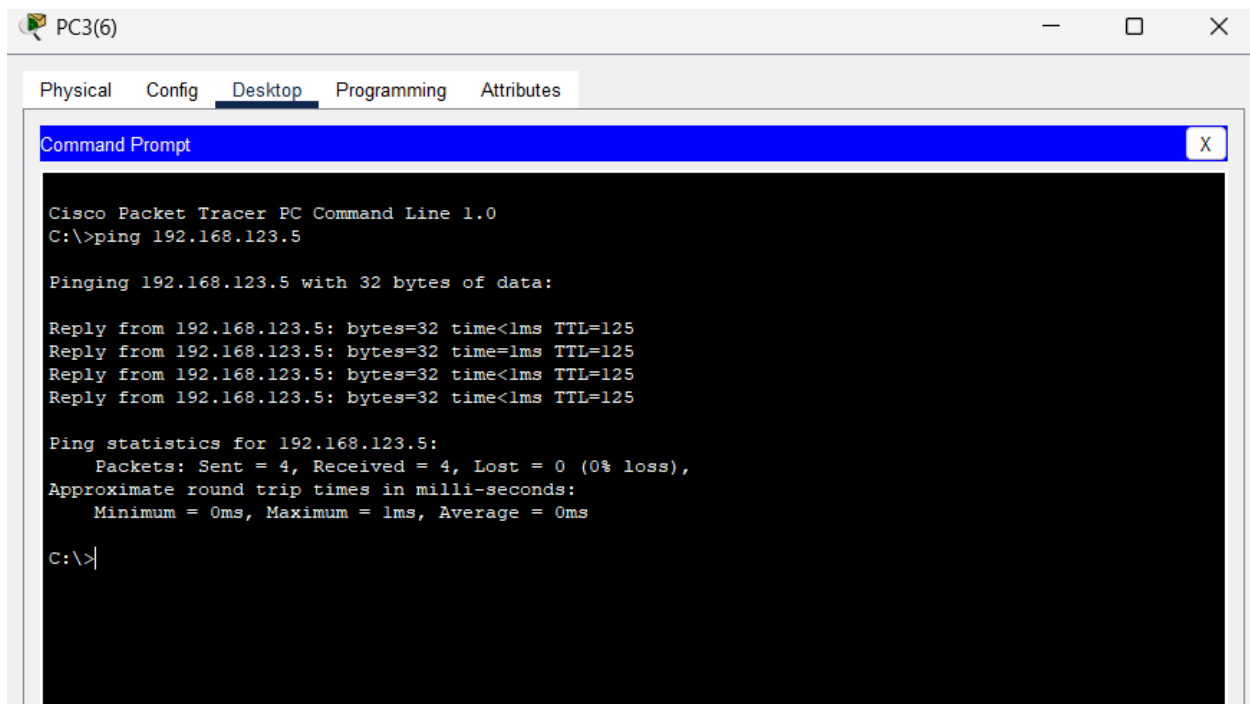
Pinging 192.168.123.5 with 32 bytes of data:

Reply from 192.168.123.5: bytes=32 time=1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time=1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.123.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Floor 1 to 6:



The screenshot shows a window titled "PC3(6)" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a "Command Prompt" window. The Command Prompt shows the output of a ping command to 192.168.123.5. The output indicates that 4 packets were sent and received with 0% loss, and the round trip times were all 0ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.5

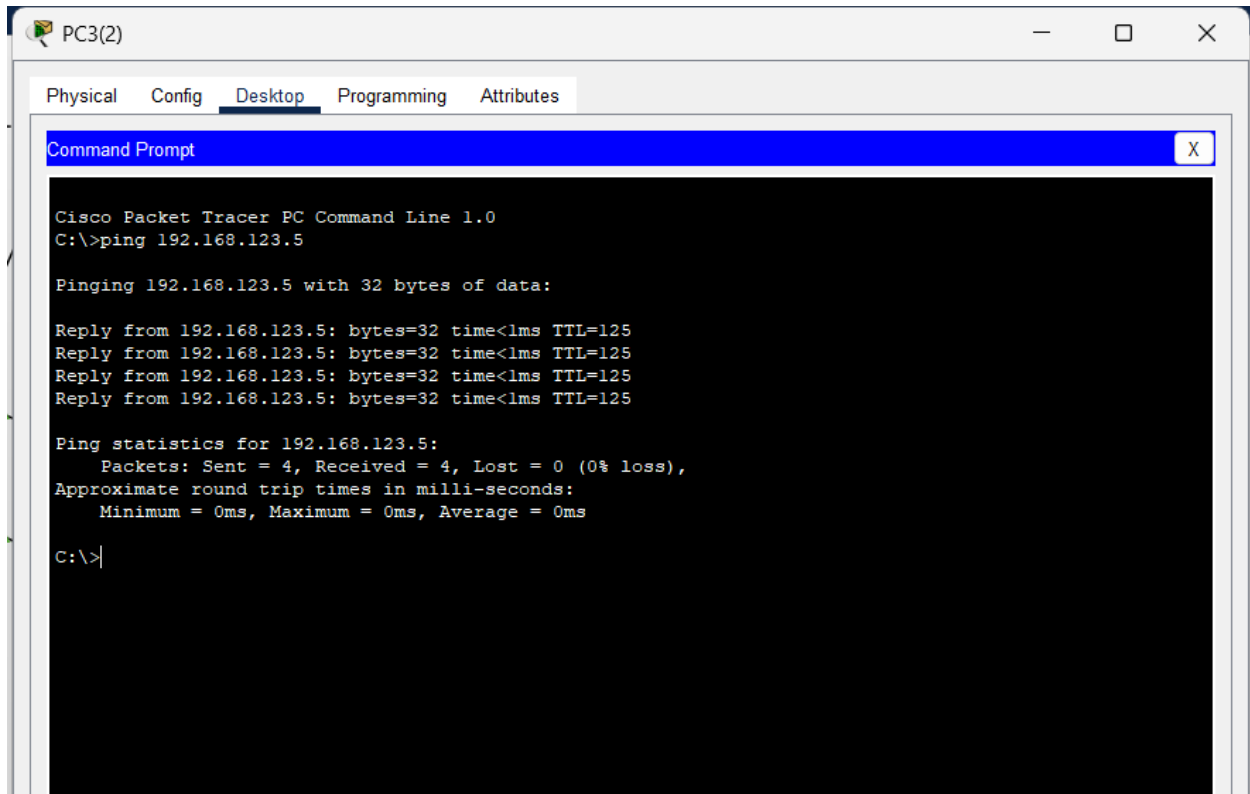
Pinging 192.168.123.5 with 32 bytes of data:

Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time=1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.123.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Floor 1 to 7:



```
PC3(2)
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.123.5

Pinging 192.168.123.5 with 32 bytes of data:

Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125
Reply from 192.168.123.5: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.123.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Use of Tracert command on floor 1's pc to floor 7's pc to see flow of data to trace the route.

```
C:\>tracert 192.168.129.6

Tracing route to 192.168.129.6 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      192.168.123.1
  2  0 ms      0 ms      0 ms      192.168.130.2
  3  0 ms      0 ms      0 ms      192.168.135.2
  4  0 ms      0 ms      0 ms      192.168.129.6

Trace complete.

C:\>tracert 192.168.127.6

Tracing route to 192.168.127.6 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      192.168.123.1
  2  0 ms      0 ms      0 ms      192.168.130.2
  3  0 ms      11 ms     1 ms      192.168.135.2
  4  0 ms      1 ms       0 ms      192.168.127.6

Trace complete.

C:\>tracert 192.168.125.6

Tracing route to 192.168.125.6 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      192.168.123.1
  2  0 ms      0 ms      0 ms      192.168.130.2
  3  *         0 ms      0 ms      192.168.125.6

Trace complete.

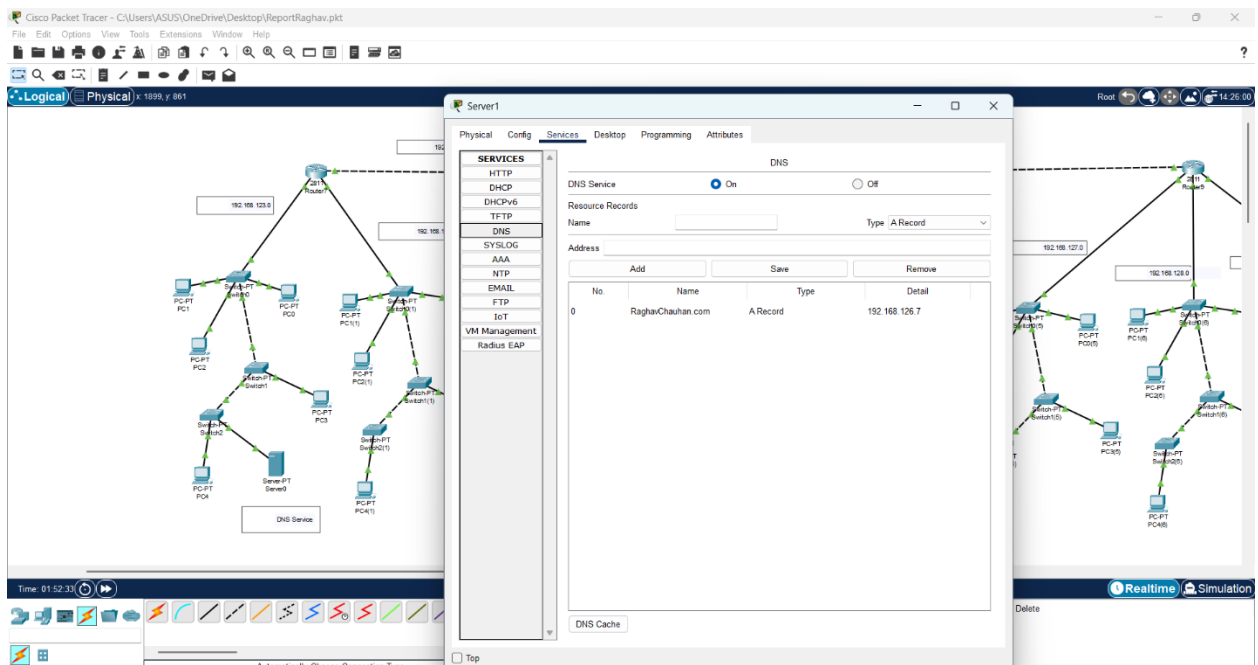
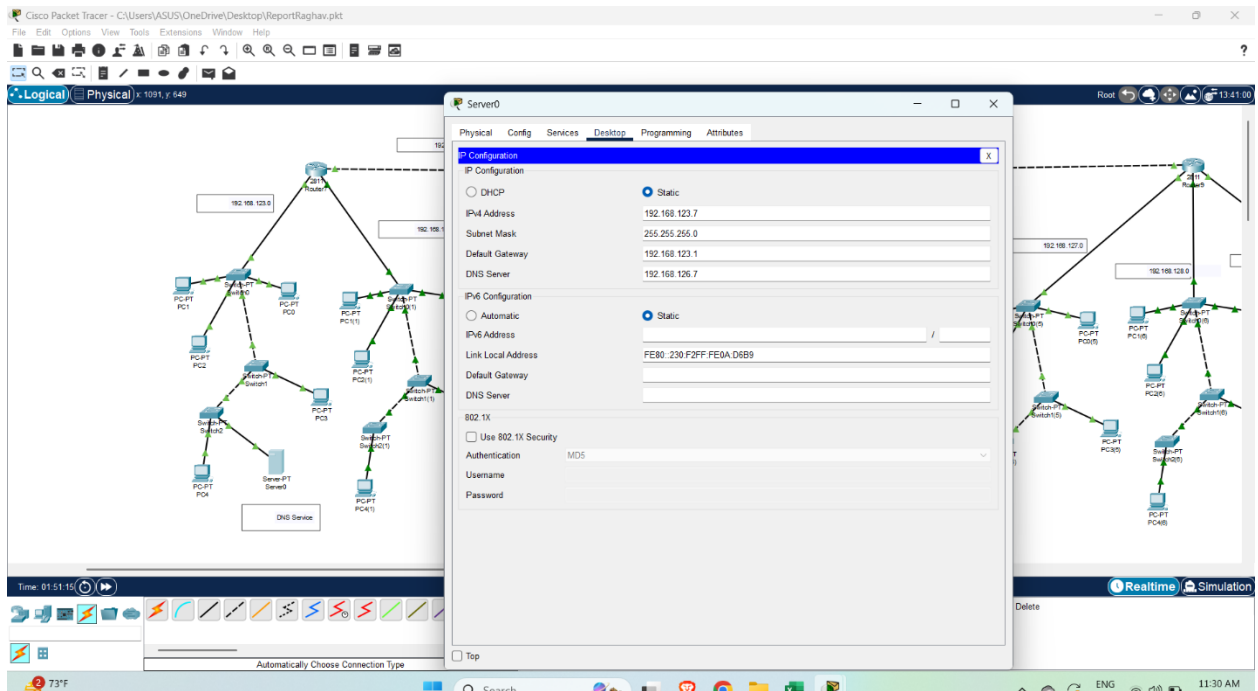
C:\>tracert 192.168.128.6

Tracing route to 192.168.128.6 over a maximum of 30 hops:

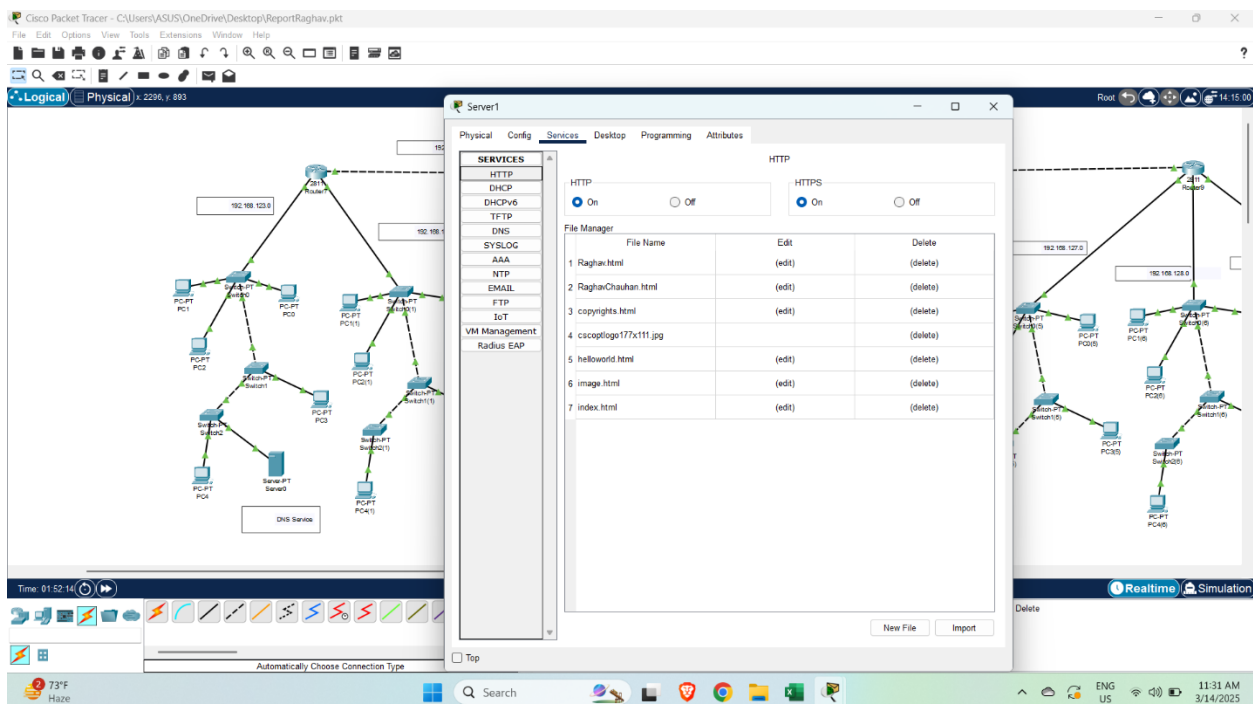
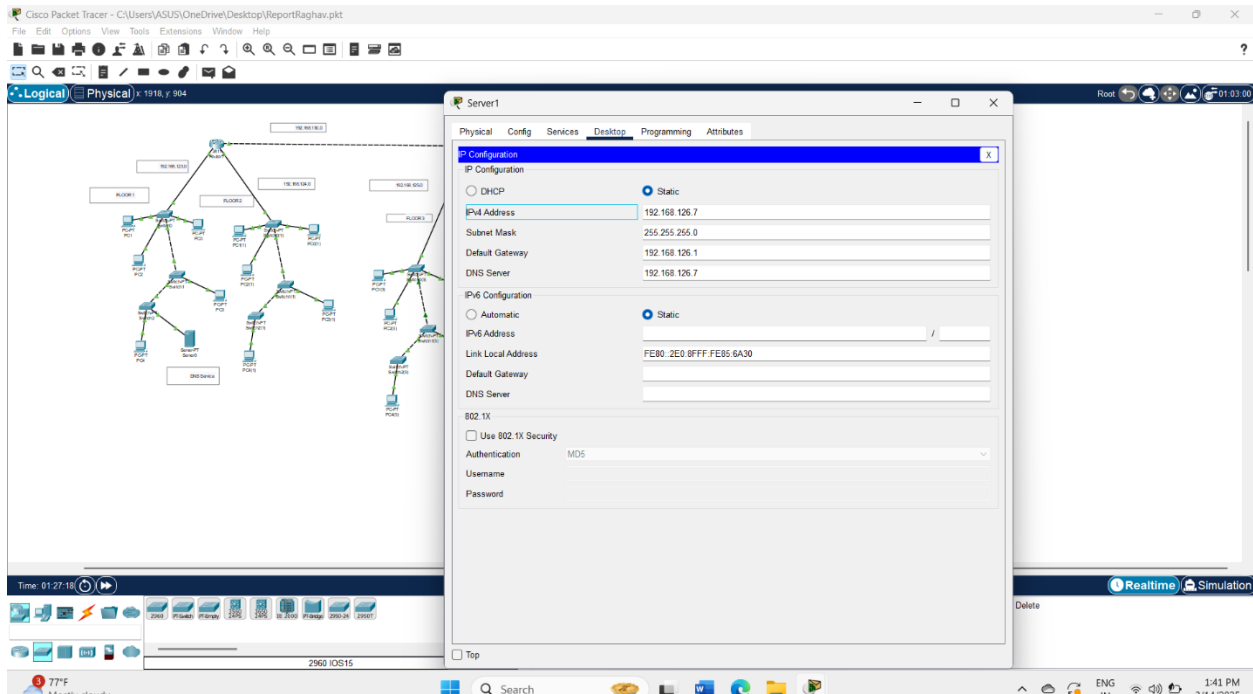
  1  0 ms      0 ms      0 ms      192.168.123.1
  2  5 ms      0 ms      11 ms     192.168.130.2
  3  0 ms      0 ms      0 ms      192.168.135.2
  4  0 ms      10 ms     0 ms      192.168.128.6

Trace complete.
```

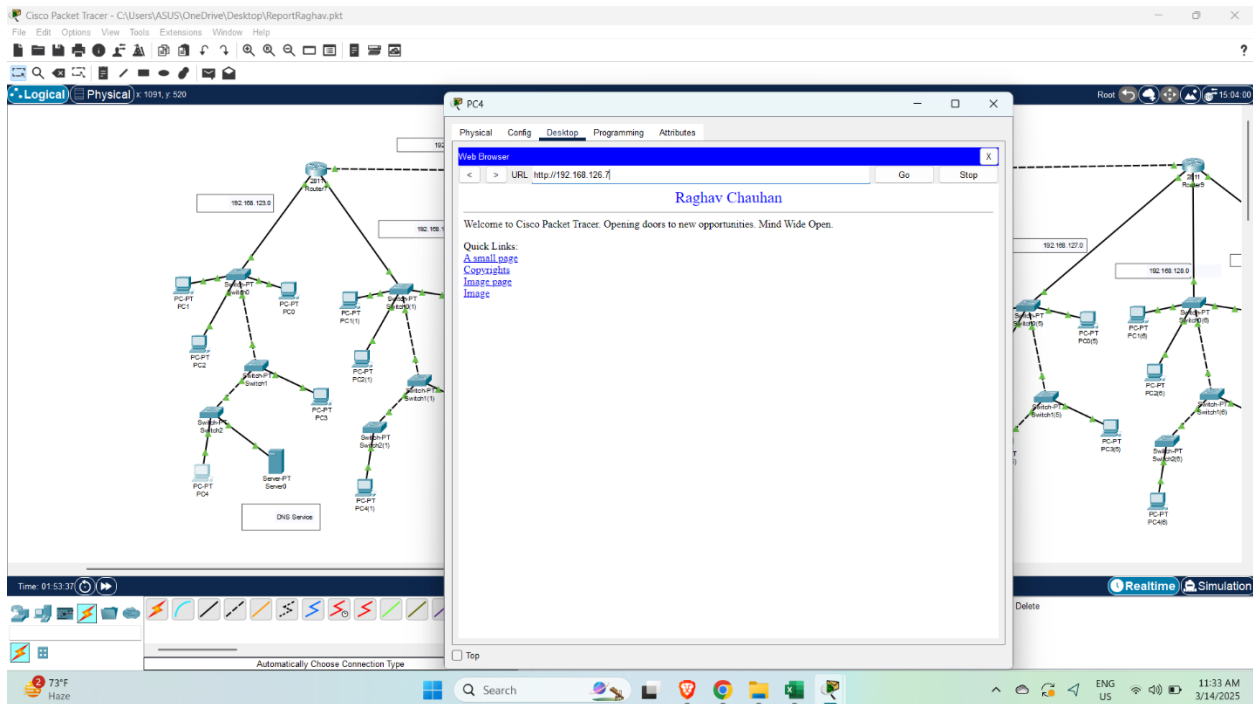
DNS Server With IP:



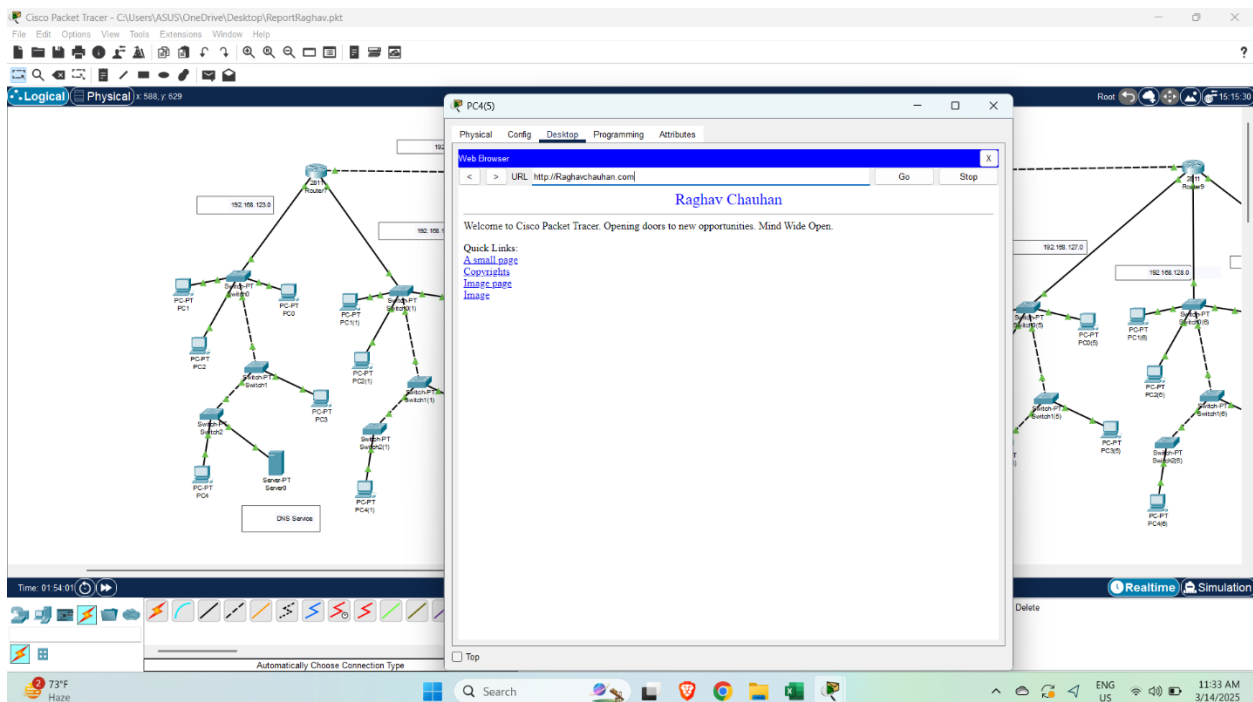
HTTP Server With IP:



Service Verification of DNS Server with IP:



Service Verification of DNS Server with Domain:



Conclusion:

In this networking lab, we successfully designed and configured a multi-floor network setup for a mid-sized enterprise. By using a combination of star and tree topologies, along with efficient IP addressing and routing strategies, we ensured smooth communication between all floors. Testing with ping and tracert commands confirmed seamless connectivity across the network. This project gave me hands-on experience in real-world networking concepts, reinforcing my understanding of routers, switches, and static routing. Overall, it was a valuable learning experience that enhanced my practical skills in network design and troubleshooting.