Continuous Assessment-I

Dissertation submitted in fulfilment of the requirements for the Degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

– DATA SCIENCE WITH MACHINE LEARNING

By

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1. Introduction

Media Network Solutions, a mid-sized enterprise, requires a structured and scalable network for its 7-floor office building. Each floor has 7 computers, and the company aims for efficient inter-department communication. This report details the network design, topology selection, IP addressing, routing strategies, and device placements.

2. Topology Selection

The network follows different topologies based on the floors to ensure fault tolerance and optimal performance:

Floors 1-2: Mesh Topology (High redundancy, improved fault tolerance)

Floors 3-4: Ring Topology (Cost-effective and simple routing)

Floors 5-7: Star Topology (Centralized management, better performance)

3. IP Addressing Scheme

The company follows a classful IP addressing scheme for different floor groups:

Floors 1-2: Class C Private (`192.168.x.0/24`)

Floors 3-4: Class B Private (`172.16.x.0/24`)

-Floors 5-7: Class C Public (`203.0.113.x/24`)

Subnet Allocation

Floor	Network	Subnet Mask	Default Gateway
1	192.168.1.0	255.255.255.0	192.168.1.254
2	192.168.2.0	255.255.255.0	192.168.2.254
3	172.16.1.0	255.255.255.0	172.16.1.254
4	172.16.2.0	255.255.255.0	172.16.2.254
5	203.0.113.0	255.255.255.0	203.0.113.254
6	203.0.114.0	255.255.255.0	203.0.114.254
7	203.0.115.0	255.255.255.0	203.0.115.254

4. Router Configurations

Each router connects different floors and ensures smooth communication. The following configurations show the IP assignments and static routes.

Router A

Interface	IP Address
Gig0/0	192.168.1.254/24
Gig0/1	192.168.2.254/24
Gig0/2	10.0.1.1/30

Router B

Interface	IP Address
Gig0/0	172.16.1.254/24
Gig0/1	172.16.2.254/24
Gig0/2	10.0.2.1/30

Router C

Interface	IP Address
Gig0/0	203.0.113.254/24
Gig0/1	203.0.114.254/24
Gig0/2	203.0.115.254/24
Gig0/3	10.0.3.1/30

Router D

Interface	IP Address
Gig0/0	10.0.1.2/30
Gig0/1	10.0.2.2/30
Gig0/2	10.0.3.2/30

5. Routing Strategy

Static routing is implemented for inter-floor communication. Router D acts as the core router connecting all floor routers. The following static routes are configured:

Router A:

ip route 172.16.0.0 255.255.255.0 10.0.1.2
ip route 203.0.113.0 255.255.255.0 10.0.1.2

Router B:

- ip route 192.168.0.0 255.255.255.0 10.0.2.2
- ip route 203.0.113.0 255.255.255.0 10.0.2.2

Router C:

- ip route 192.168.0.0 255.255.255.0 10.0.3.2
- ip route 172.16.0.0 255.255.255.0 10.0.3.2

Router D:

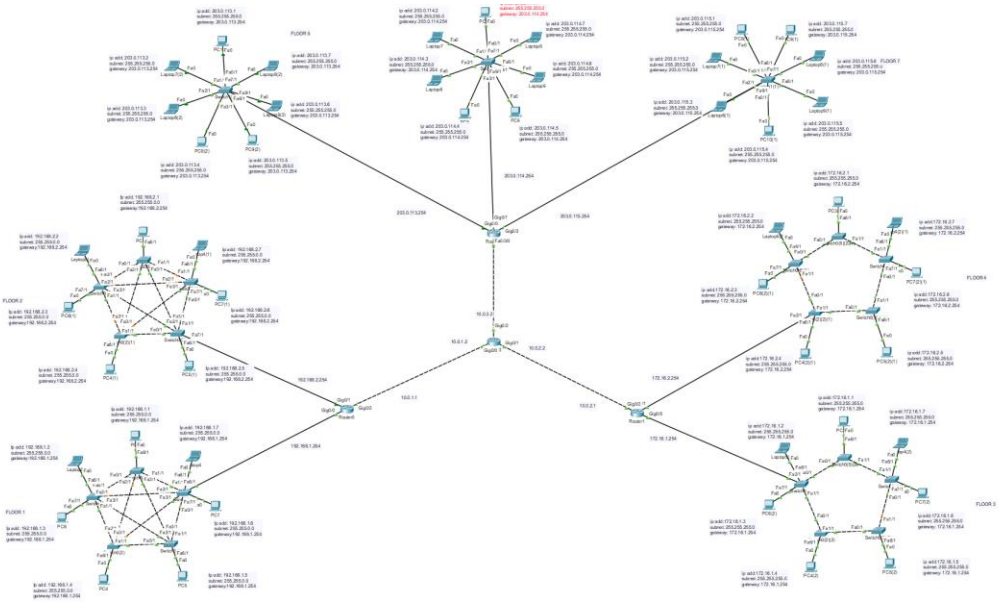
- ip route 192.168.1.0 255.255.255.0 10.0.1.1
- ip route 192.168.2.0 255.255.255.0 10.0.1.1
- ip route 172.16.1.0 255.255.255.0 10.0.2.1
- ip route 172.16.2.0 255.255.255.0 10.0.2.1
- ip route 203.0.113.0 255.255.255.0 10.0.3.1

6. Innovations & Scalability

The following innovations enhance the network:

- **Redundant links in Mesh topology for fault tolerance**
- **Efficient static routing reducing CPU load**
- **Scalable star topology for future expansion**

7. Deployment & Monitoring



Total Number of Networks:

- LAN Networks (One per floor): 7
- Point-to-Point Networks (Between routers): 3
- Total Networks: 10

Total Number of LANs:

- Each floor has 1 LAN.
- There are 7 floors.
- Total LANs: 7

Total Number of Default Gateways:

Each LAN has a unique default gateway (router interface IP) to handle outbound traffic.

- 1 per floor = 7 default gateways

Network Addresses & Subnetting:

Floor	Network Address	Subnet Mask	Default Gateway
1	192.168.1.0	**255.255.255.0** (/24)	192.168.1.254
2	192.168.2.0	**255.255.255.0** (/24)	192.168.2.254
3	172.16.1.0	**255.255.255.0** (/24)	172.16.1.254
4	172.16.2.0	**255.255.255.0** (/24)	172.16.2.254
5	203.0.113.0	**255.255.255.0** (/24)	203.0.113.254
6	203.0.114.0	**255.255.255.0** (/24)	203.0.114.254
7	203.0.115.0	**255.255.255.0** (/24)	203.0.115.254

Routing tables

Router A

```
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

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.1.0/30 is directly connected, GigabitEthernet0/2
L       10.0.1.1/32 is directly connected, GigabitEthernet0/2
     172.16.0.0/16 is variably subnetted, 4 subnets, 2 masks
S       172.16.0.0/16 [1/0] via 10.0.1.2
S       172.16.0.0/24 [1/0] via 10.0.1.2
S       172.16.1.0/24 [1/0] via 10.0.1.2
S       172.16.2.0/24 [1/0] via 10.0.1.2
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.254/32 is directly connected, GigabitEthernet0/0
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
 --More--
```

Router B

```
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

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.2.0/30 is directly connected, GigabitEthernet0/2
L       10.0.2.1/32 is directly connected, GigabitEthernet0/2
     172.16.0.0/16 is variably subnetted, 4 subnets, 2 masks
C       172.16.1.0/24 is directly connected, GigabitEthernet0/0
L       172.16.1.254/32 is directly connected, GigabitEthernet0/0
C       172.16.2.0/24 is directly connected, GigabitEthernet0/1
L       172.16.2.254/32 is directly connected, GigabitEthernet0/1
S    192.168.0.0/24 [1/0] via 10.0.2.2
S    192.168.1.0/24 [1/0] via 10.0.2.2
S    192.168.2.0/24 [1/0] via 10.0.2.2
S    203.0.113.0/24 [1/0] via 10.0.2.2
 --More--
```

Router C

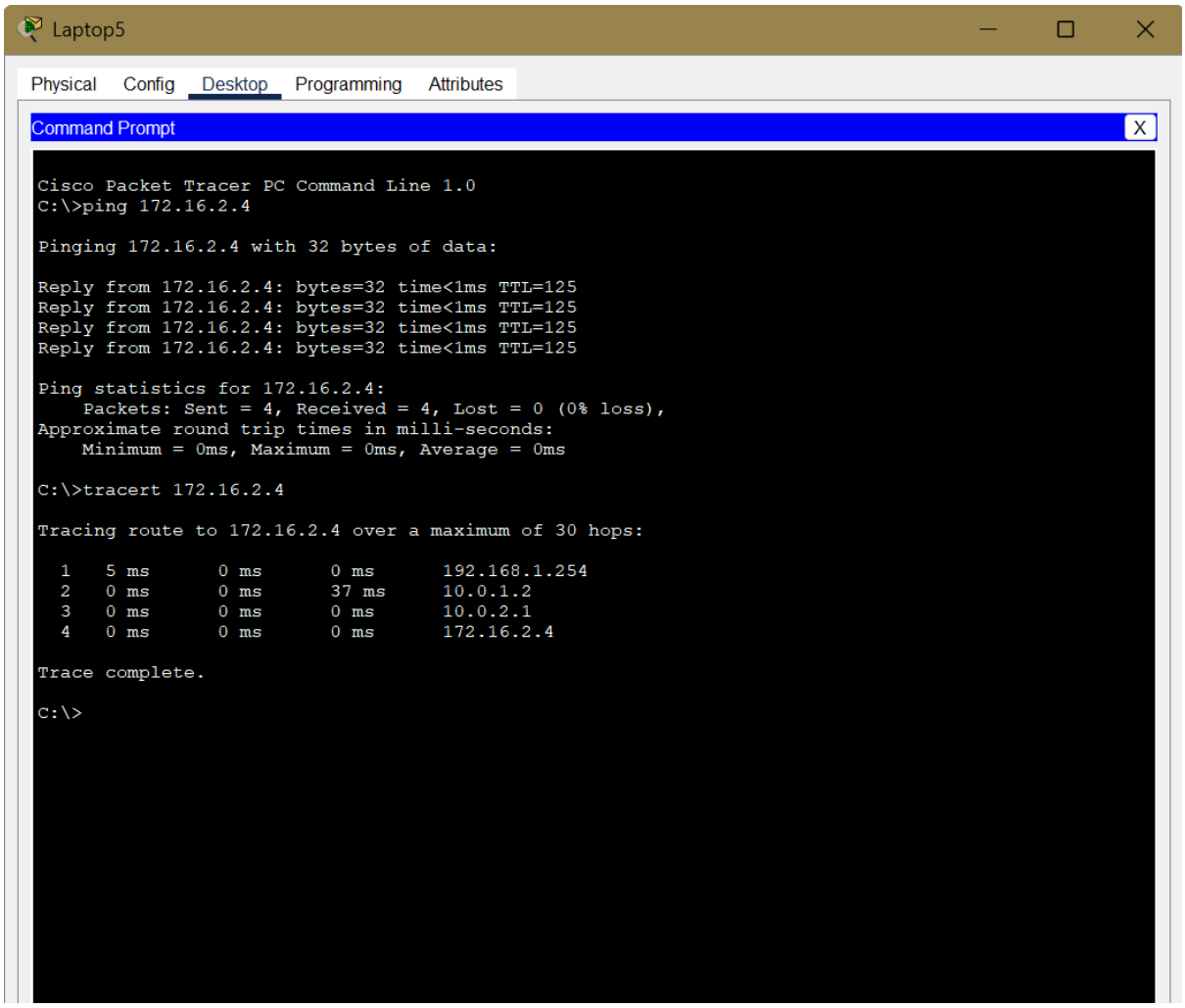
```
Router>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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

     203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C       203.0.113.0/24 is directly connected, GigabitEthernet0/0
L       203.0.113.254/32 is directly connected, GigabitEthernet0/0
     203.0.114.0/24 is variably subnetted, 2 subnets, 2 masks
C       203.0.114.0/24 is directly connected, GigabitEthernet0/1
L       203.0.114.254/32 is directly connected, GigabitEthernet0/1
     203.0.115.0/24 is variably subnetted, 2 subnets, 2 masks
C       203.0.115.0/24 is directly connected, GigabitEthernet0/2
L       203.0.115.254/32 is directly connected, GigabitEthernet0/2

Router>
```

Router D

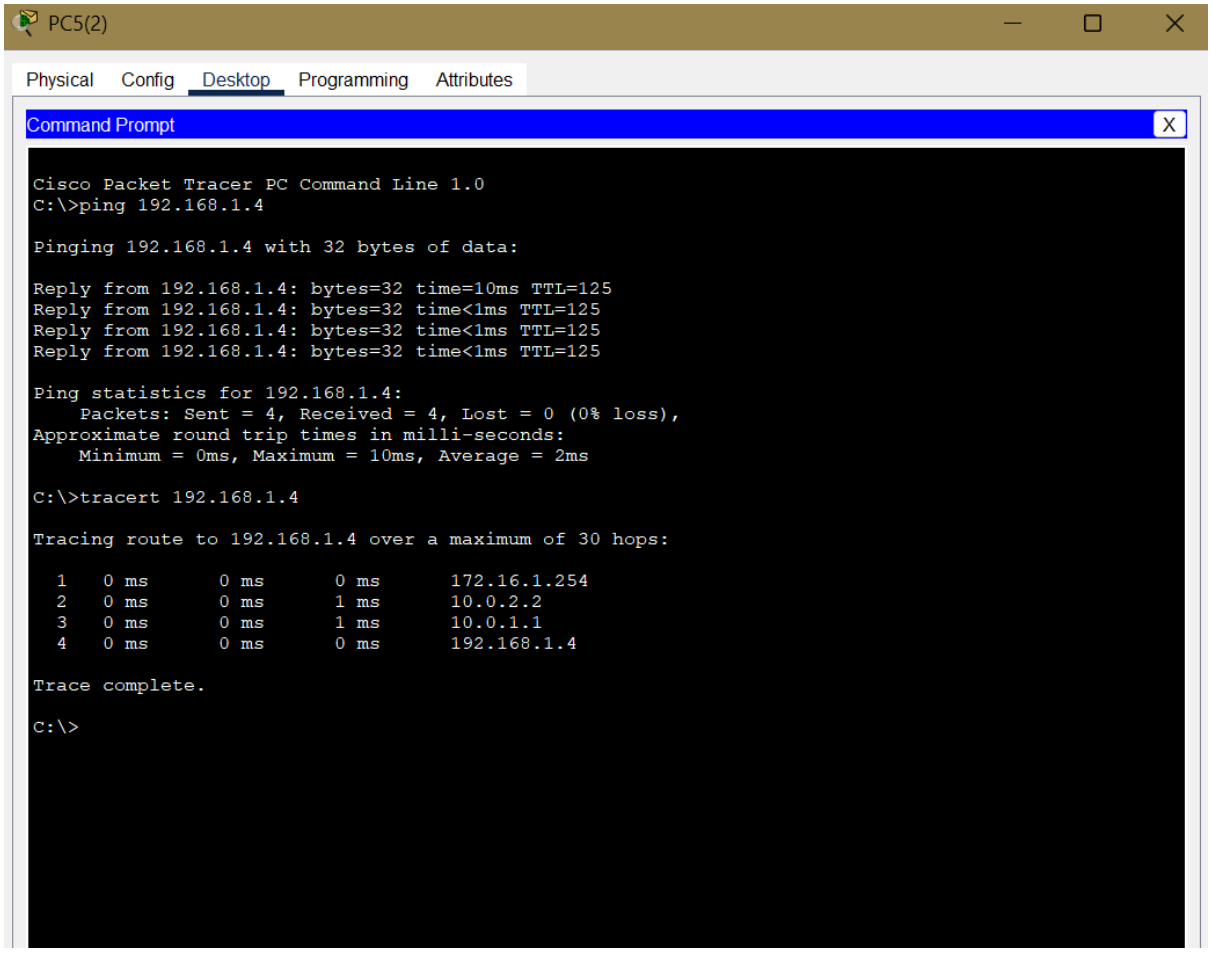
```
Router>show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - 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

     10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C       10.0.1.0/30 is directly connected, GigabitEthernet0/0
L       10.0.1.2/32 is directly connected, GigabitEthernet0/0
C       10.0.2.0/30 is directly connected, GigabitEthernet0/1
L       10.0.2.2/32 is directly connected, GigabitEthernet0/1
C       10.0.3.0/30 is directly connected, GigabitEthernet0/2
L       10.0.3.2/32 is directly connected, GigabitEthernet0/2
     172.16.0.0/24 is subnetted, 2 subnets
S       172.16.1.0/24 [1/0] via 10.0.2.1
S       172.16.2.0/24 [1/0] via 10.0.2.1
S    192.168.1.0/24 [1/0] via 10.0.1.1
S    192.168.2.0/24 [1/0] via 10.0.1.1
  More
```

Ping and Tracert

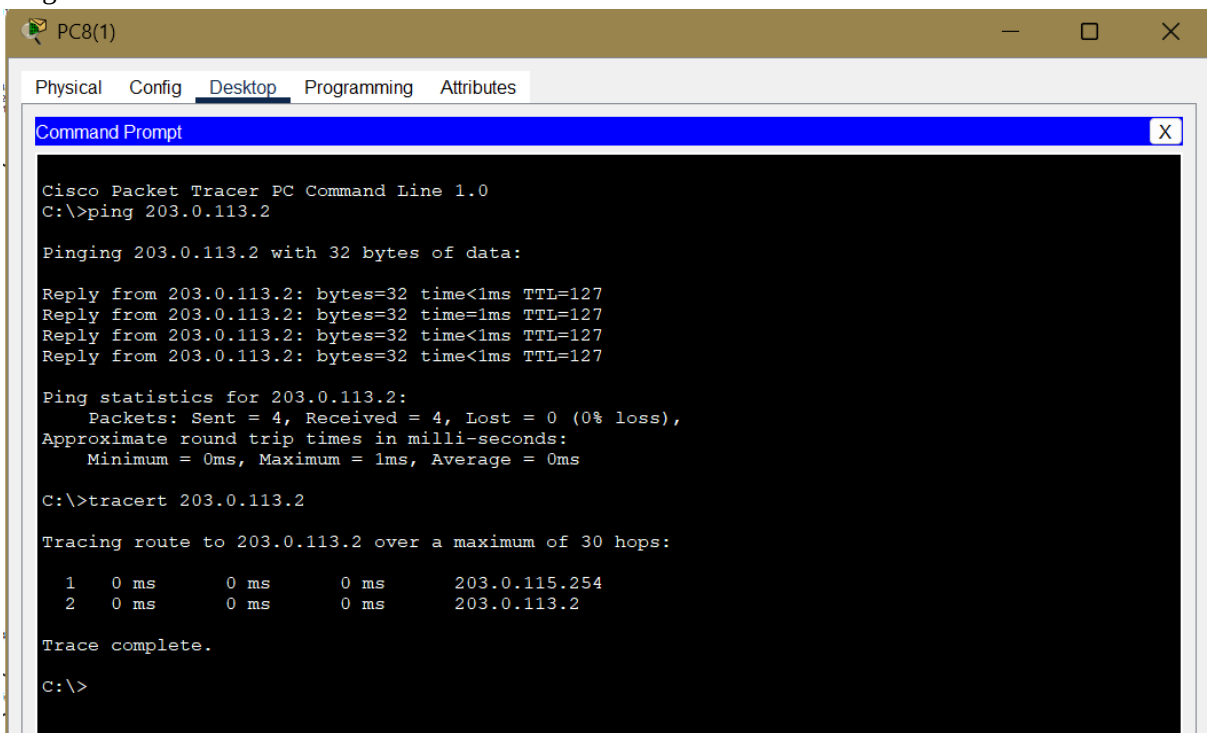
Ping and tracert from floor 1 to floor 4



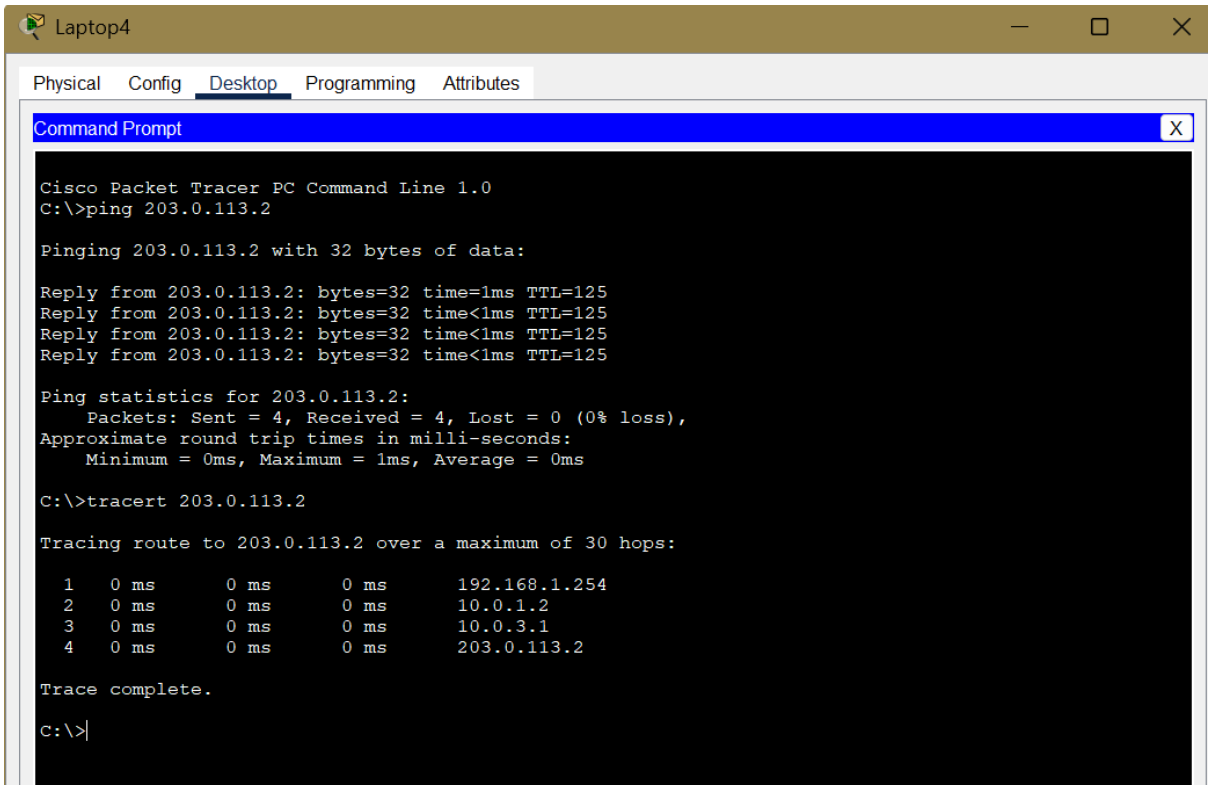
Ping and tracert from floor 3 to floor 1



Ping and tracert from floor 7 to floor 5



Ping and tracert from floor1 to floor 5



8. GitHub Repository

The full project (including configs, diagrams, and documentation) is uploaded to GitHub for tracking and collaboration.

https://github.com/Aare007/CSE-307.git

9. Conclusion

This structured network design ensures efficient, scalable, and fault-tolerant communication within Media Network Solutions. The mix of topologies, optimized IP addressing, and static routing provides a cost-effective yet reliable solution for the enterprise.