CSE307 NETWORKING LAB REPORT

On

Multi-floor Office Network Setup and Configuration

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GitHub Repository Link: https://github.com/Aryan-Dangi/Multi-Floor-Office-Network-Design

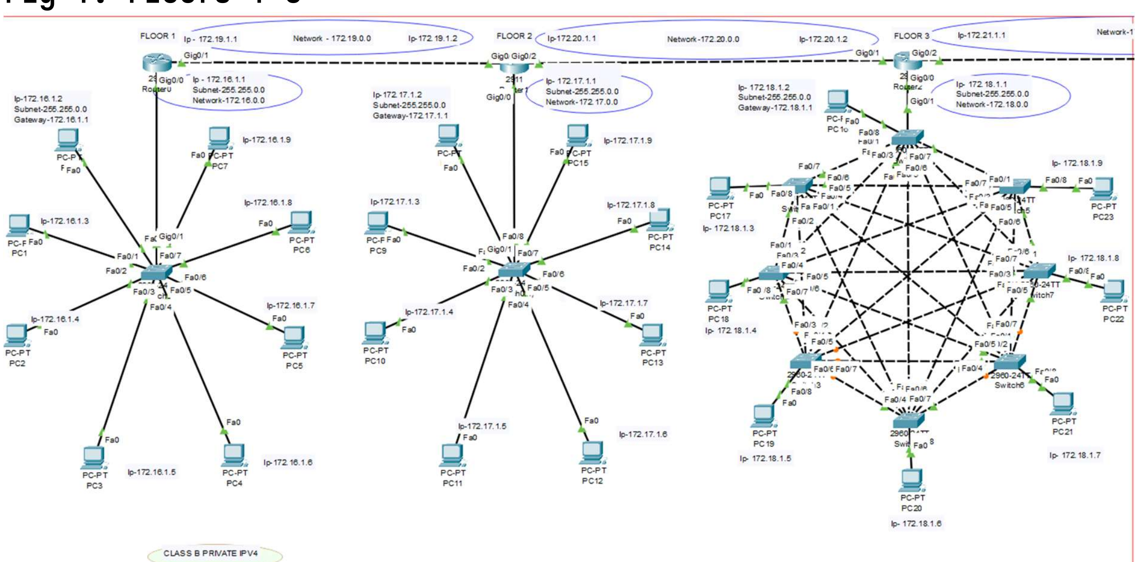
Physical Scenario Creation:

This network represents a seven floor building of a mid-sized enterprise named XL Network Solutions, where each floor has its own set of 8 PC’s each. The first two floors follow a star topology followed by mesh topology on the successive two floors and the remaining floors are accompanied by ring topology. Each floor has its own dedicated 2960 switch which is connected to all devices on floor using fast ethernet ports. Each floor has its own 2911 router and the routers of each floor are connected in a bus topology for a seamless connection.

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 :

Fig 1. Floors 1-3



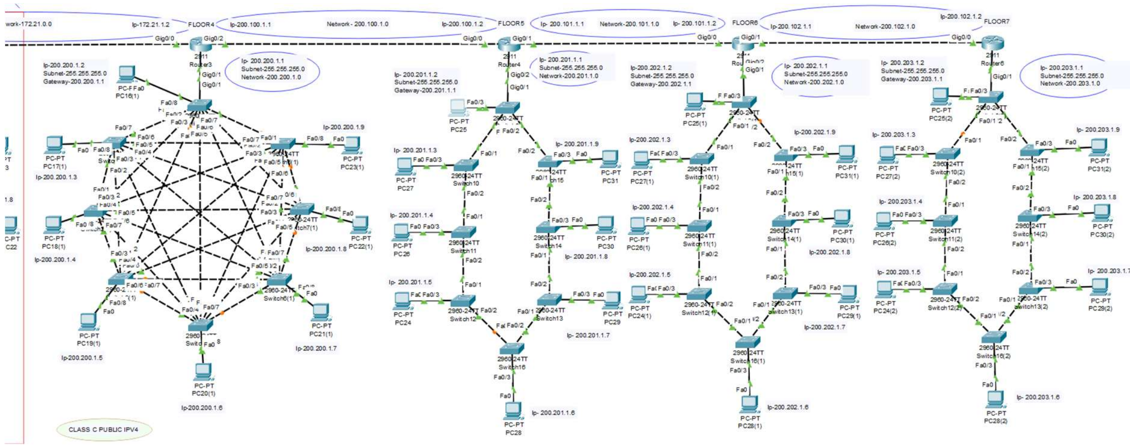
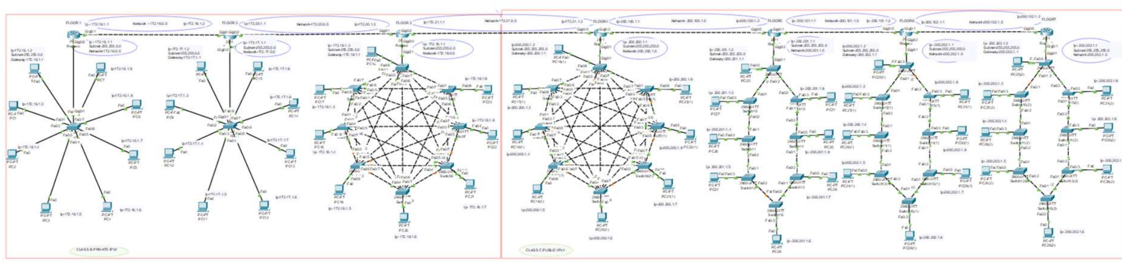


Fig 2. Floors 4-7

Fig 3. Entire network Floors 1-7



Switch used - 2960

Router used - 2911

Floor 1 and Floor 2 - Star Topology

Floor 3 and Floor 4 - Mesh Topology

Floor 5, 6 and 7   - Ring Topology

IP Addressing

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

- Floors 1, 2, and 3 use **Private IPv4 Class B** addresses.
- Floors 4, 5, 6, and 7 use **Public IPv4 Class C** addresses.

Floor No.	Gateway	Ip's for PC's
1	172.16.1.1	172.16.1.2 - 1.9
2	172.17.1.1	172.17.1.2 - 1.9
3	172.18.1.1	172.18.1.2 - 1.9
4	200.200.1.1	200.200.1.2 - 1.9
5	200.201.1.1	200.201.1.2 - 1.9
6	200.202.1.1	200.202.1.2 - 1.9
7	200.203.1.1	200.203.1.2 - 1.9

Table 1. Floor-wise Gateway and IP configuration

Floor 1 IP Address 172.16.1.2 Subnet Mask 255.255.0.0 Default Gateway 172.16.1.1	Floor 2 IP Address 172.17.1.2 Subnet Mask 255.255.0.0 Default Gateway 172.17.1.1
Floor 3 IP Address 172.18.1.2 Subnet Mask 255.255.0.0 Default Gateway 172.18.1.1	Floor 4 IP Address 200.200.1.2 Subnet Mask 255.255.255.0 Default Gateway 200.200.1.1

Floor 5 IP Address 200.201.1.2 Subnet Mask 255.255.255.0 Default Gateway 200.201.1.1	Floor 6 IP Address 200.202.1.2 Subnet Mask 255.255.255.0 Default Gateway 200.202.1.1
Floor 7 IP Address 200.203.1.2 Subnet Mask 255.255.255.0 Default Gateway 200.203.1.1	

Table 2. Snaps of IP configuration window from a pc of each floor

Router IP Configuration:

```
Router(config)#interface gig0/0
Router(config-if)#ip address 200.100.1.2 255.255.255.0
Router(config-if)#no shutdown
```

```
Router(config)#interface gig0/2
Router(config-if)#ip address 200.201.1.1 255.255.255.0
Router(config-if)#no shutdown
```

```
Router(config)#interface gig0/1
Router(config-if)#ip address 200.101.1.1 255.255.255.0
Router(config-if)#no shutdown
```

Fig 4. Ex.IP addressing of Floor 4’s router in CLI

Routing

In our project, we used RIP (Routing Information Protocol) for dynamic routing between the floor routers. RIP was configured on each floor’s router, allowing the routers to automatically exchange routes and learn about networks on other floors.
This makes sure that devices from one floor can communicate with devices on any other floor without needing manual static routes for each connection.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 172.16.0.0
Router(config-router)#network 172.19.0.0
Router(config-router)#exit
```

Floor 1

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 172.19.0.0
Router(config-router)#network 172.17.0.0
Router(config-router)#network 172.20.0.0
Router(config-router)#exit
```

Floor 2

```
Router(config)#router rip
Router(config-router)#network 172.20.0.0
Router(config-router)#network 172.18.0.0
Router(config-router)#network 172.21.0.0
Router(config-router)#exit
Router(config)#
```

Floor 3

```
Router(config)#router rip
Router(config-router)#network 172.21.0.0
Router(config-router)#network 200.200.1.0
Router(config-router)#network 200.100.1.0
Router(config-router)#exit
Router(config)#
```

Floor 4

```
Router(config)#router rip
Router(config-router)#network 200.100.1.0
Router(config-router)#network 200.201.1.0
Router(config-router)#network 200.101.1.0
Router(config-router)#exit
Router(config)#exit
```

Floor 5

```
Router#enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 200.101.1.0
Router(config-router)#network 200.202.1.0
Router(config-router)#network 200.102.1.0
Router(config-router)#exit
```

Floor 6

```
Router(config)#router rip
Router(config-router)#network 200.203.1.0
Router(config-router)#network 200.102.1.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Floor 7

Table 3. Snaps of dynamic routing between routers using rip command on CLI

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

```
C:\>ping 172.16.1.4

Pinging 172.16.1.4 with 32 bytes of data:

Reply from 172.16.1.4: bytes=32 time<1ms TTL=128
Reply from 172.16.1.4: bytes=32 time<1ms TTL=128
Reply from 172.16.1.4: bytes=32 time<1ms TTL=128
Reply from 172.16.1.4: bytes=32 time<1ms TTL=128
```

Floor 1 to 2

```
C:\>ping 172.17.1.4

Pinging 172.17.1.4 with 32 bytes of data:

Reply from 172.17.1.4: bytes=32 time<1ms TTL=126
Reply from 172.17.1.4: bytes=32 time=24ms TTL=126
Reply from 172.17.1.4: bytes=32 time<1ms TTL=126
Reply from 172.17.1.4: bytes=32 time<1ms TTL=126
```

Floor 1 to 3

```
C:\>ping 172.18.1.9

Pinging 172.18.1.9 with 32 bytes of data:

Reply from 172.18.1.9: bytes=32 time=1ms TTL=125
Reply from 172.18.1.9: bytes=32 time<1ms TTL=125
Reply from 172.18.1.9: bytes=32 time<1ms TTL=125
Reply from 172.18.1.9: bytes=32 time<1ms TTL=125
```

Floor 1 to 4

```
C:\>ping 200.200.1.6

Pinging 200.200.1.6 with 32 bytes of data:

Reply from 200.200.1.6: bytes=32 time=1ms TTL=124
Reply from 200.200.1.6: bytes=32 time<1ms TTL=124
Reply from 200.200.1.6: bytes=32 time<1ms TTL=124
Reply from 200.200.1.6: bytes=32 time<1ms TTL=124
```

Floor 1 to 5

```
C:\>ping 200.201.1.2

Pinging 200.201.1.2 with 32 bytes of data:

Reply from 200.201.1.2: bytes=32 time<1ms TTL=123
Reply from 200.201.1.2: bytes=32 time=7ms TTL=123
Reply from 200.201.1.2: bytes=32 time<1ms TTL=123
Reply from 200.201.1.2: bytes=32 time=4ms TTL=123
```

Floor 1 to 6

```
C:\>ping 200.202.1.3

Pinging 200.202.1.3 with 32 bytes of data:

Reply from 200.202.1.3: bytes=32 time=2ms TTL=122
Reply from 200.202.1.3: bytes=32 time<1ms TTL=122
Reply from 200.202.1.3: bytes=32 time<1ms TTL=122
Reply from 200.202.1.3: bytes=32 time=1ms TTL=122
```

Floor 1 to 7

```
C:\>ping 200.203.1.5

Pinging 200.203.1.5 with 32 bytes of data:

Reply from 200.203.1.5: bytes=32 time<1ms TTL=121
Reply from 200.203.1.5: bytes=32 time=1ms TTL=121
Reply from 200.203.1.5: bytes=32 time=2ms TTL=121
Reply from 200.203.1.5: bytes=32 time<1ms TTL=121
```

Table 4. Snaps of inter-communication between pc’s of all floors Using the ping command.

```
C:\>tracert 200.203.1.5

Tracing route to 200.203.1.5 over a maximum of 30 hops:

  1   0 ms      0 ms      1 ms      172.16.1.1
  2   0 ms      0 ms      0 ms      172.19.1.2
  3   0 ms      0 ms      0 ms      172.20.1.2
  4   1 ms      1 ms      0 ms      172.21.1.2
  5   0 ms      0 ms      0 ms      200.100.1.2
  6   0 ms      0 ms      0 ms      200.101.1.2
  7   0 ms      0 ms      0 ms      200.102.1.2
  8   1 ms      11 ms     0 ms      200.203.1.5

Trace complete.

C:\>
```

Fig 5. Use of Tracert command on floor 1’s pc to floor 7’s pc to see flow of data to trace the route.