Project Name

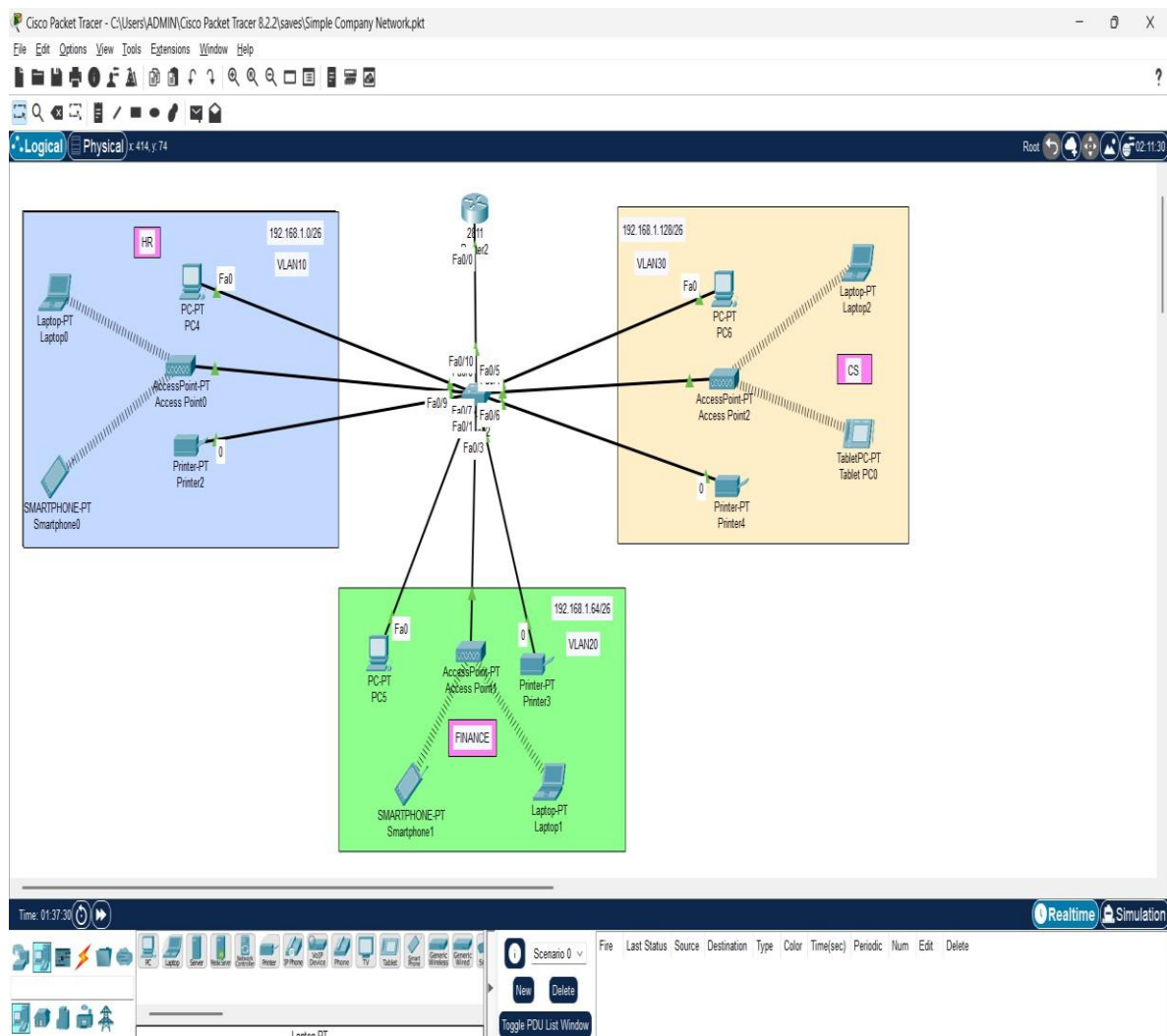# Branch Office Network Design With VLAN Segmentation

- **Name :-**

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- **Objective / Purpose :-**

The purpose of this project is to create a secure and efficient network for smooth communication between departments.

• **Network Topology Diagram**

Branch office Network

- **Lab Setup:-**

Vlan	Interface	Ip address (DHCP)	Subnet-Mask
Vlan10	Fa 0/7	192.168.1.1	192.168.1.0/26
	Fa 0/8	192.168.1.2	192.168.1.0/26
	Fa 0/9	Access point	192.168.1.0/26
Vlan20	Fa 0/1	192.168.1.65	192.168.1.64/26
	Fa 0/2	192.168.1.66	192.168.1.64/26
	Fa 0/3	Access point	192.168.1.64/26
Vlan30	Fa 0/4	Access point	192.168.1.128/26
	Fa 0/5	192.168.1.129	192.168.1.128/26
	Fa 0/6	192.168.1.130	192.168.1.128/26

• Switch:-

Vlan10:-

Switch>enable

Switch# configure terminal

Switch (config)#int range fa 0/7-9

Switch (config-if-range)#switchport mode access

Switch (config-if-range)# switchport access vlan 10

Switch (config-if-range)#do write

Switch (config-if-range)#exit

Vlan20:-

Switch>enable

Switch# configure terminal

Switch (config)#int range fa 0/1-3

Switch (config-if-range)#switchport mode access

Switch (config-if-range)# switchport access vlan 20

Switch (config-if-range)#do write

Switch (config-if-range)#exit

Vlan30:-

Switch>enable

Switch# configure terminal

Switch (config)#int range fa 0/4-6

Switch (config-if-range)#switchport mode access

Switch (config-if-range)# switchport access vlan 10

Switch (config-if-range)#do write

Switch (config-if-range)#exit

```
Switch>enable
Switch# configure terminal
Switch (config)#int fa 0/10
Switch (config-if)#switchport mode Trunk
Switch (config-if)#do write
```

- **Router Configuration**

```
router>enable
router# configure terminal
router (config)#int fa 0/0
router (config-if)#no shutdown
```

- **Vlan10**

```
router>enable
router# configure terminal
router (config)#int fa 0/0.10
router (config-subif)#encapsulation dot1Q 10
router (config-subif)#ip address 192.168.1.1 255.255.255.192
router (config-subif)#exit
```

- **Vlan20**

```
router>enable
router# configure terminal
router (config)#int fa 0/0.20
router (config-subif)#encapsulation dot1Q 20
router (config-subif)#ip address 192.168.1.65 255.255.255.192
router (config-subif)#exit
```

- **Vlan20**
```
 router>enable
router# configure terminal
router (config)#int fa 0/0.30
router (config-subif)#encapsulation dot1Q 30
router (config-subif)#ip address 192.168.1.128 255.255.255.192
router (config-subif)#exit
```

- **DHCP Configuration**

Vlan10

```
 router>enable
router# configure terminal
router(config)#ip dhcp pool Admin-pool
router(dhcp-config)#network 192.168.1.0 255.255.255.192
router(dhcp-config)#default router 192.168.1.1
router(dhcp-config)#dns-server 192.168.1.1
router(dhcp-config)#domain-name Admin@123
router(dhcp-config)#exit
```

Vlan20

```
router>enable
router# configure terminal
router(config)#ip dhcp pool Finance-pool
router(dhcp-config)#network 192.168.1.64 255.255.255.192
router(dhcp-config)#default router 192.168.1.65
router(dhcp-config)#dns-server 192.168.1.65
router(dhcp-config)#domain-name Finance@123
router(dhcp-config)#exit
```
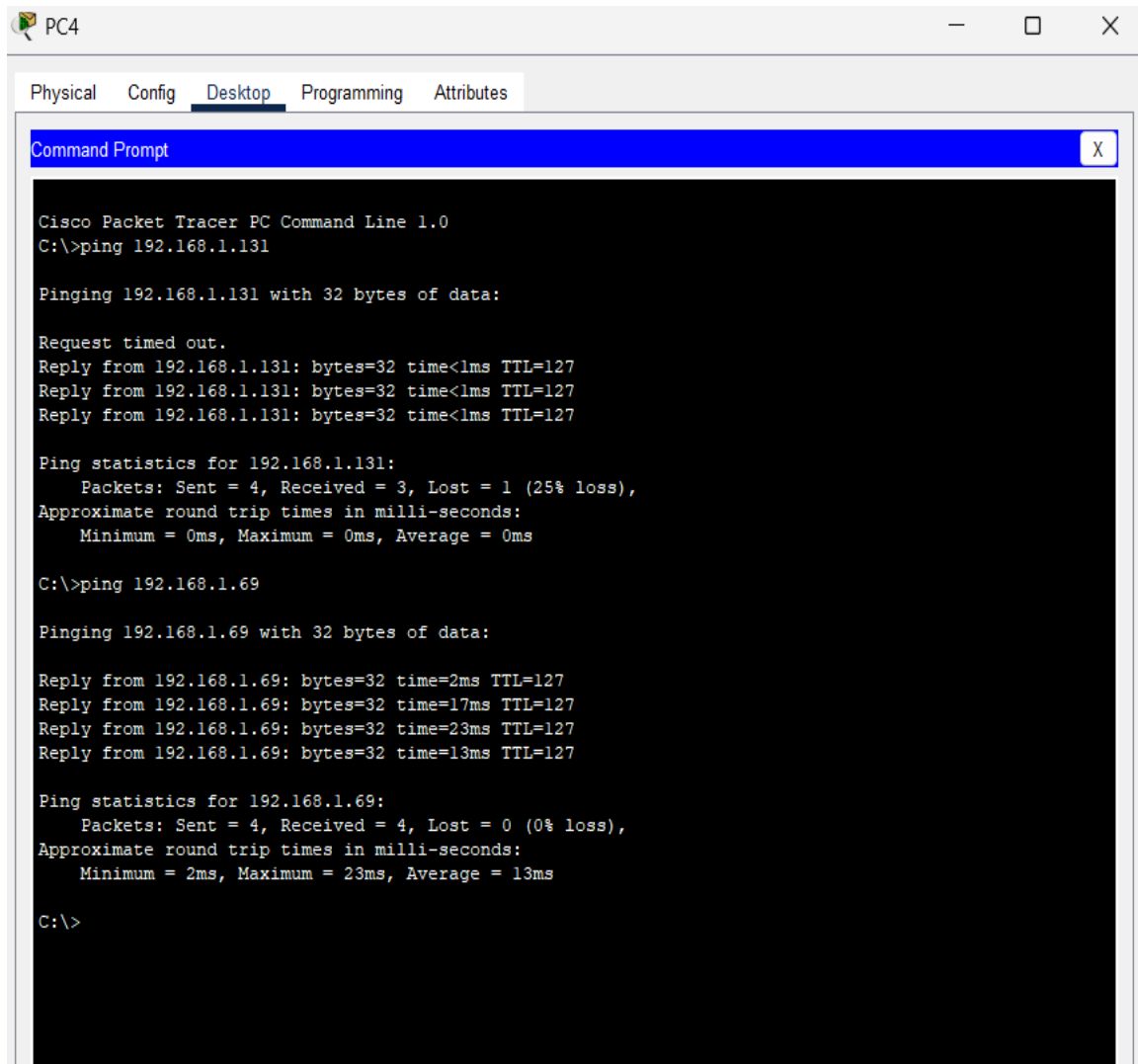
Vlan30

```
router>enable
router# configure terminal
router(config)#ip dhcp pool Finance-pool
router(dhcp-config)#network 192.168.1.128 255.255.255.192
router(dhcp-config)#default router 192.168.1.129
router(dhcp-config)#dns-server 192.168.1.129
router(dhcp-config)#domain-name CS@123
router(dhcp-config)#exit
```

• Ping Test Section


```
PC4                                                          —    □    X

Physical   Config   Desktop   Programming   Attributes

Command Prompt                                                         X

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.131

Pinging 192.168.1.131 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.131: bytes=32 time<1ms TTL=127
Reply from 192.168.1.131: bytes=32 time<1ms TTL=127
Reply from 192.168.1.131: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.131:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.69

Pinging 192.168.1.69 with 32 bytes of data:

Reply from 192.168.1.69: bytes=32 time=2ms TTL=127
Reply from 192.168.1.69: bytes=32 time=17ms TTL=127
Reply from 192.168.1.69: bytes=32 time=23ms TTL=127
Reply from 192.168.1.69: bytes=32 time=13ms TTL=127

Ping statistics for 192.168.1.69:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 23ms, Average = 13ms

C:\>
```

Smartphone1 — Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.134

Pinging 192.168.1.134 with 32 bytes of data:

Reply from 192.168.1.134: bytes=32 time=57ms TTL=127
Reply from 192.168.1.134: bytes=32 time=43ms TTL=127
Reply from 192.168.1.134: bytes=32 time=67ms TTL=127
Reply from 192.168.1.134: bytes=32 time=38ms TTL=127

Ping statistics for 192.168.1.134:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 38ms, Maximum = 67ms, Average = 51ms

C:\>ping 192.168.1.6

Pinging 192.168.1.6 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.6: bytes=32 time=42ms TTL=127
Reply from 192.168.1.6: bytes=32 time=58ms TTL=127
Reply from 192.168.1.6: bytes=32 time=38ms TTL=127

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 38ms, Maximum = 58ms, Average = 46ms

C:\>
```
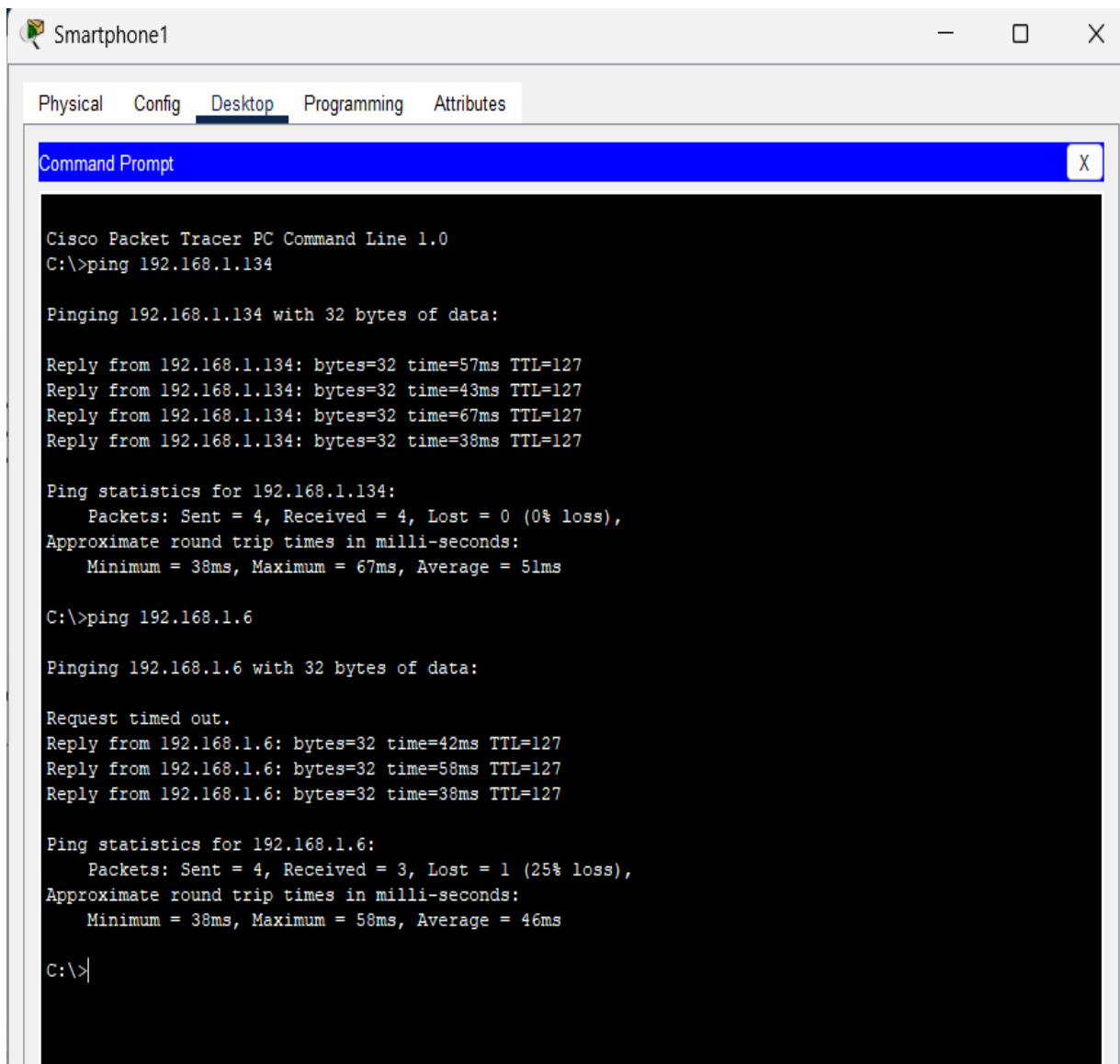
- **Obeservations :-**
  1. The network is segmented into multiple VLANs to separate departments and improve security
  2. Inter-VLAN routing is implemented to allow communication between all departments.
  3. DHCP is used to automatically assign IPv4 addresses to all devices.
  4. Each department has its own wireless network for user connectivity.
  5. A single Cisco router and switch are used to create a cost-effective and scalable network design.

- **Troubleshooting :-**
  1. Check VLAN configuration and port assignments if devices cannot access the network.
  2. Verify inter-VLAN routing and trunk configuration if departments cannot communicate.
  3. Confirm DHCP service and IP pool settings if hosts are not receiving IP addresses.
  4. Inspect wireless access point configuration if users are unable to connect to Wi-Fi.

- ## **Conclusion :-**

This project successfully fulfills all the required network objectives using a simple and efficient design. The network is well organized with VLANs, which improves security and performance. All departments are able to communicate with each other without any issues. Automatic IP addressing reduces manual work and makes management easier. Overall, the network is reliable, cost-effective, and suitable for future expansion.