

Project Overview – Enterprise Network Design and Simulation (Cisco CCNA)

1. Project Objective

The objective of this project is to design and simulate a small enterprise network using **Cisco Packet Tracer**, based on **CCNA-level networking concepts**.

The project focuses on:

- Network segmentation using VLANs
- Inter-VLAN communication
- Structured IP addressing
- Basic network security
- Connectivity testing and validation

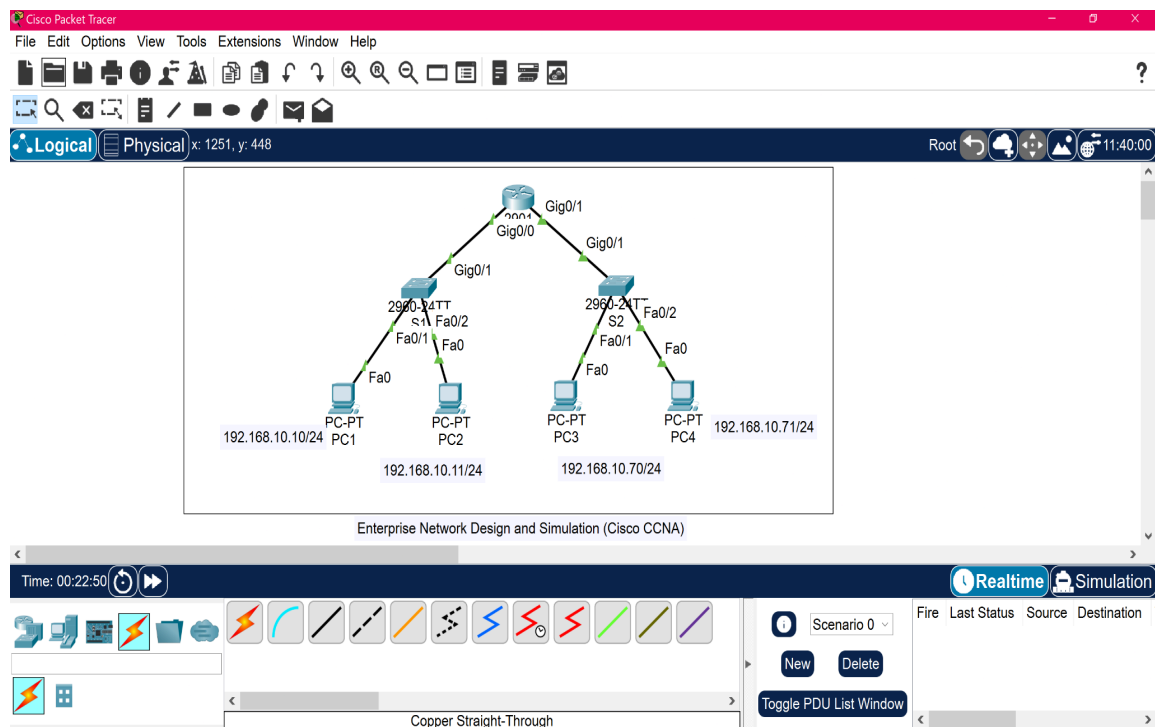
This project was developed to strengthen practical networking skills and demonstrate the ability to design and implement a functional enterprise network.

2. Network Topology Overview

The simulated network represents a small company infrastructure composed of:

- **1 Cisco Router (2911)**
- **2 Cisco Switches (2960)**
- **4 End Devices (PCs)**

The router is responsible for **inter-VLAN routing**, while the switches handle **VLAN segmentation** for different departments.

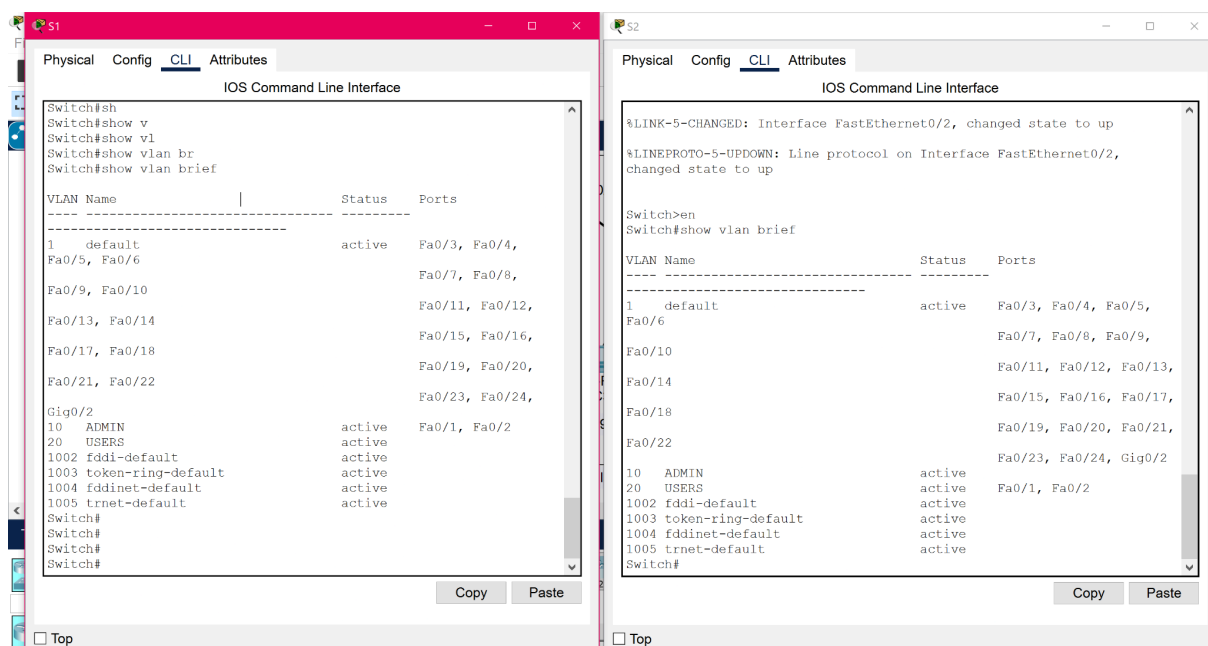


3. VLAN Design

To improve network organization and security, the network is divided into two VLANs:

VLAN ID	VLAN Name	Description
10	ADMIN	Administration department
20	USERS	Employees / Users

Each VLAN is assigned to specific switch ports to ensure proper traffic separation.

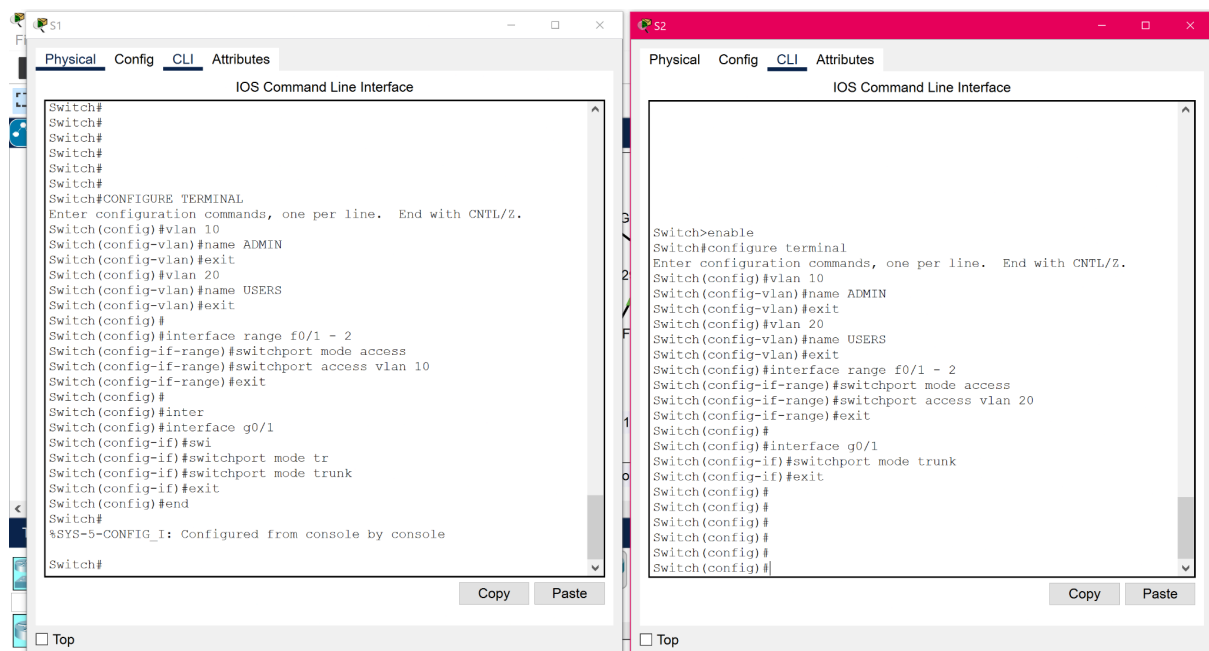


4. IP Addressing Plan

A structured IP addressing scheme was implemented using private IPv4 addresses.

VLAN	Network Address	Subnet Mask	Default Gateway
10 (ADMIN)	192.168.10.0	255.255.255.192 (/26)	192.168.10.1
20 (USERS)	192.168.10.64	255.255.255.192 (/26)	192.168.10.65

All end devices were configured with **static IP addresses** to ensure full control and clarity during testing.



5. Technologies and Tools Used

- Cisco Packet Tracer 8.2.2
- Cisco Router 2911
- Cisco Switch 2960
- VLAN configuration
- Inter-VLAN routing (Router-on-a-Stick)
- Static IP addressing
- Basic network security configurations
- ICMP testing (Ping)

6. Configuration and Implementation

The following configurations were implemented:

- Creation and naming of VLANs on switches
- Assignment of access ports to specific VLANs
- Configuration of trunk links between switches and router
- Configuration of router sub-interfaces for each VLAN
- Assignment of IP addresses and default gateways

These steps ensure correct communication within and between VLANs.

pkt R1

Physical Config CLI Attributes

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int g0/0
Router(config-if)#nu sh
      ^
% Invalid input detected at '^' marker.

Router(config-if)#no sh
Router(config-if)#exit
Router(config)#int g0/1
Router(config-if)#no sh
Router(config-if)#exit
Router(config)#int g0/0.10
Router(config-subif)#en
Router(config-subif)#encapsulation d
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip add 192.168.10.1 255.255.255.192
Router(config-subif)#exit
Router(config)#int g0/1.20
Router(config-subif)#encapsulation dot1Q
% Incomplete command.
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip add 192.168.10.65 255.255.255.192
Router(config-subif)#exit
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

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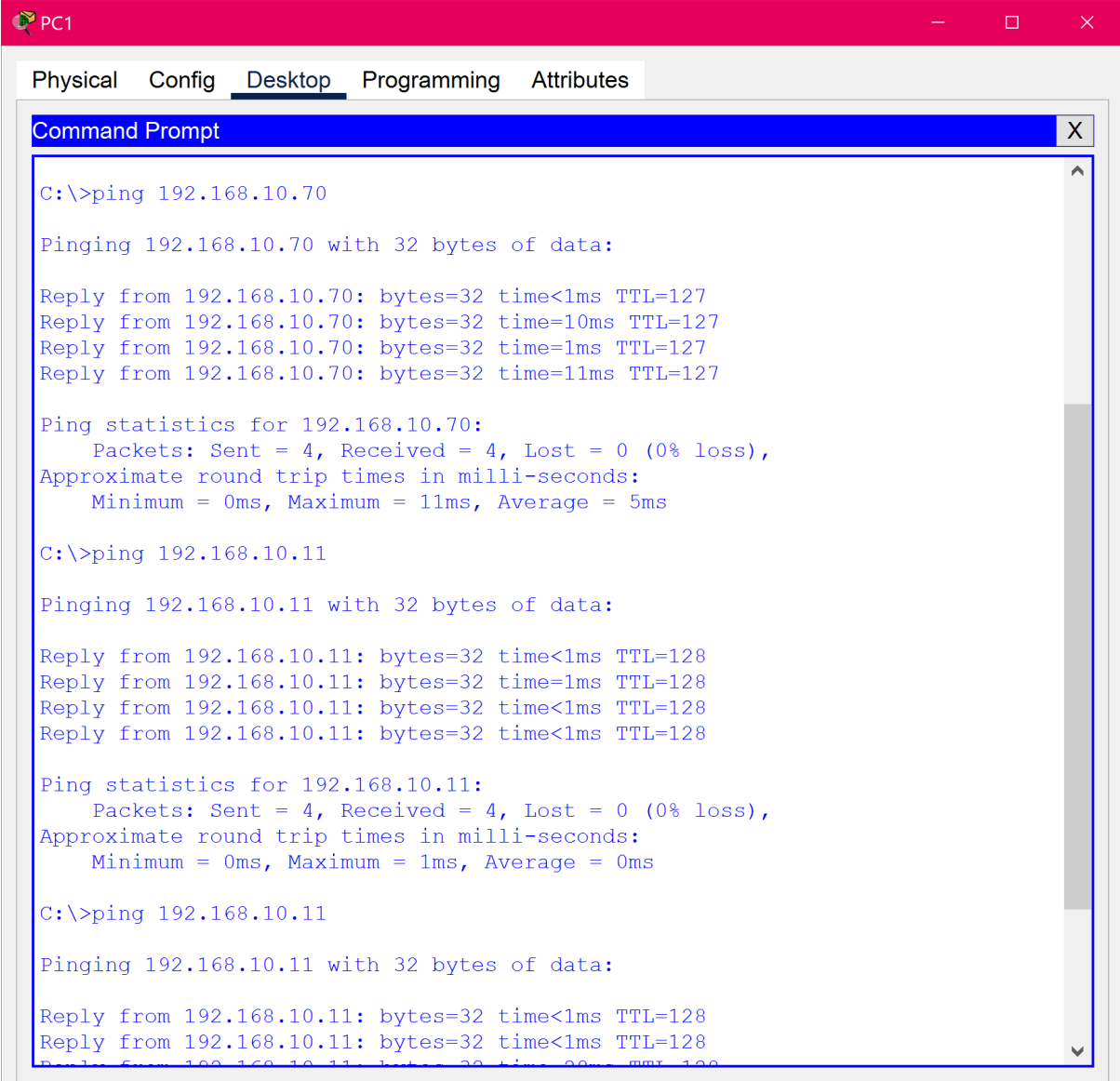
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7. Testing and Validation

Network connectivity was verified using **ICMP (ping)** tests:

- Communication between devices in the same VLAN
- Communication between devices in different VLANs

All tests were successful, confirming proper VLAN configuration and inter-VLAN routing.



The screenshot shows a Windows-style window titled "PC1" with a red header bar. Inside the window, there are tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows the following text:

```
C:\>ping 192.168.10.70

Pinging 192.168.10.70 with 32 bytes of data:

Reply from 192.168.10.70: bytes=32 time<1ms TTL=127
Reply from 192.168.10.70: bytes=32 time=10ms TTL=127
Reply from 192.168.10.70: bytes=32 time=1ms TTL=127
Reply from 192.168.10.70: bytes=32 time=11ms TTL=127

Ping statistics for 192.168.10.70:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 5ms

C:\>ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:

Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time=1ms TTL=128
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:

Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time<1ms TTL=128
Reply from 192.168.10.11: bytes=32 time=20ms TTL=128
```

8. Conclusion

This project demonstrates the ability to design, configure, and validate a small enterprise network using Cisco technologies.

It highlights a solid understanding of **network fundamentals**, **VLAN segmentation**, and **routing concepts**, in line with **Cisco CCNA standards**.

This project serves as a practical example of entry-level network engineering skills and readiness for real-world networking environments.
