National Telecommunication Institute

CCNA Final Project

Hotel Network System

Ziad Ayman Rehan

Supervised by: Eng. Asmaa Ali

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1. Project Overview

This project simulates a hotel network infrastructure designed and implemented using Cisco Packet Tracer as part of the CCNA final project at NTI. The network is segmented logically into VLANs across three floors, representing various departments. The design incorporates inter-VLAN routing via router-on-a-stick, DHCP server configuration, subnetting of Class A addresses, and dynamic routing using OSPF.

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2. Network Structure

The network is designed for a three-floor hotel building with the following departmental layout:

- **Floor 1:** Reception, Store, Logistics
- **Floor 2:** Finance, Human Resources (HR), Sales
- **Floor 3:** Administration, IT

Each department is assigned a dedicated VLAN for enhanced security and network efficiency.

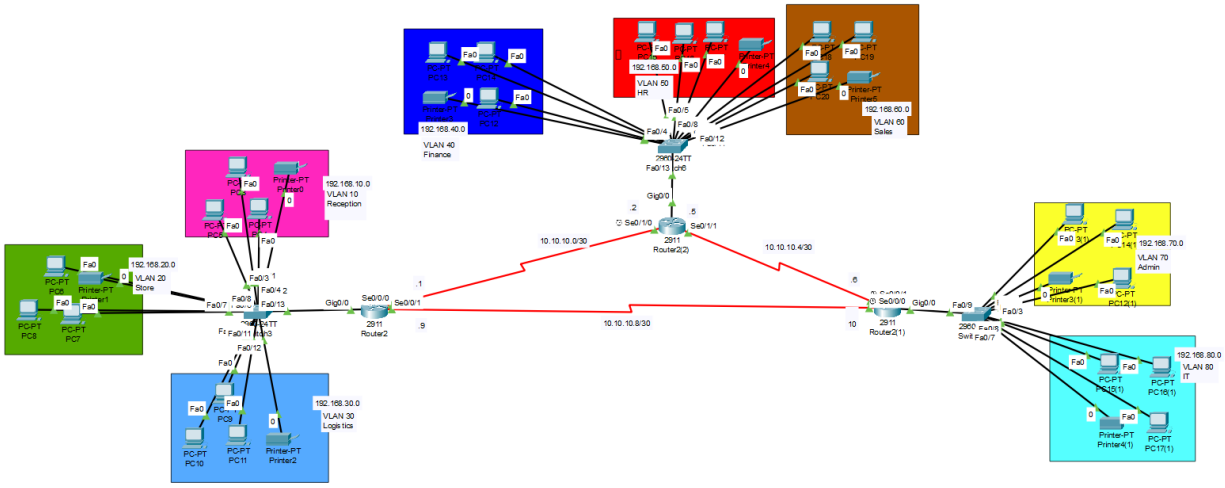

Figure 1:Network Topology

3. Implemented Features

- **Basic Device Configuration:** Initial setup of switches and routers including hostname and interface descriptions.
- **VLAN Configuration:** Creation of VLANs for each department to separate broadcast domains.
- **Inter-VLAN Routing (Router-on-a-Stick):** Sub-interfaces configured on the router to enable communication between VLANs.
- **DHCP Server:** Dynamic IP address allocation for VLAN hosts using DHCP pools configured on the router.
- **OSPF Dynamic Routing:** Implementation of OSPF protocol to enable dynamic route exchange over point-to-point serial links between routers.
- **Subnetting:** Class A address space (10.10.10.0/8) subnetted appropriately for WAN links and VLANs.

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4. IP Addressing and VLANs

VLAN ID	Department	IP Subnet	Description
10	Reception	192.168.10.0/24	Floor 1 Reception
20	Store	192.168.20.0/24	Floor 1 Store
30	Logistics	192.168.30.0/24	Floor 1 Logistics
40	Finance	192.168.40.0/24	Floor 2 Finance
50	HR	192.168.50.0/24	Floor 2 Human Resources
60	Sales	192.168.60.0/24	Floor 2 Sales
70	Administration	192.168.70.0/24	Floor 3 Administration
80	IT	192.168.80.0/24	Floor 3 IT

5. Subnetting for Serial Links

The serial point-to-point links between routers are subnetted using /30 subnets from the 10.10.10.0/8 range:

Link	Network	Host 1	Host 2	Broadcast
n1	10.10.10.0/30	10.10.10.1	10.10.10.2	10.10.10.3
n2	10.10.10.4/30	10.10.10.5	10.10.10.6	10.10.10.7
n3	10.10.10.8/30	10.10.10.9	10.10.10.10	10.10.10.11

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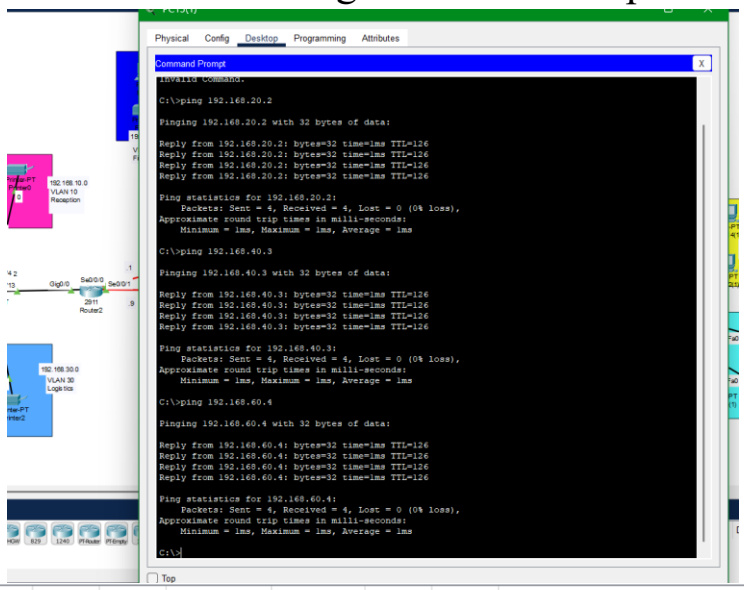
6. Testing and Verification

- **Connectivity Tests:** Ping tests conducted within VLANs and across VLANs to verify routing functionality.
- **VLAN Verification:** Used show vlan command on switches to confirm VLAN assignments.
- **Routing Table Checks:** Used show ip route on routers to verify OSPF routes.
- **OSPF Neighbors:** Confirmed OSPF neighbor relationships using show ip ospf neighbor.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC11	PC13(1)	ICMP		0.000	N	12	(edit)	(delete)
	Successful	PC6	PC17(1)	ICMP		0.000	N	13	(edit)	(delete)
	Successful	PC13	PC3	ICMP		0.000	N	14	(edit)	(delete)
	Successful	PC17	PC13(1)	ICMP		0.000	N	15	(edit)	(delete)

Figure 2:Network Pingable

7. Additional Notes

- All switches are Layer 2 devices, configured with trunk ports for VLAN tagging.
- DHCP pools exclude gateway addresses to avoid IP conflicts.
- The design is scalable and can be expanded to include more floors or departments by adding additional VLANs and subnets.

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8. Conclusion

- In conclusion, this project successfully demonstrates the design and implementation of a structured, scalable, and secure hotel network using Cisco Packet Tracer. By applying key networking concepts such as VLAN segmentation, inter-VLAN routing (Router-on-a-Stick), dynamic IP allocation via DHCP, and OSPF for dynamic routing, we were able to simulate a real-world enterprise network across multiple departments and floors.
- The use of proper subnetting, clear IP planning, and logical organization ensures that the network can be maintained and expanded easily in the future. All components of the network were tested and verified, ensuring full connectivity and proper functionality across all devices and departments.
- This project not only reflects a practical understanding of CCNA-level networking principles but also provides a strong foundation for managing real-life enterprise networks.