Hotel Management Network Design Using OSPF – Project Report

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1. Introduction

In today's hospitality industry, a reliable and efficient network infrastructure is crucial for smooth hotel operations, guest satisfaction, and the integration of smart services. This project focuses on designing and simulating a hotel management network using the Open Shortest Path First (OSPF) routing protocol. The network architecture is built using a hybrid topology model—ring topology at the router level for inter-floor communication and star topology within each floor for device-level connectivity. The proposed system ensures high availability, resilience, and ease of management, addressing the dynamic needs of a modern hotel environment.

2. Motivation

Hotels operate with a variety of services that depend heavily on real-time communication and seamless connectivity—from front-desk management systems to internal communications and guest Wi-Fi. Any downtime can result in service disruption, customer dissatisfaction, and operational inefficiencies.

The motivation behind this project was to create a network that:

- **Ensures uninterrupted communication** across all hotel departments, even during partial network failures.

- **Supports scalability** as the hotel expands, either by adding more floors or integrating new technologies.

- **Simplifies troubleshooting and maintenance**, reducing the burden on IT personnel.

- **Demonstrates efficient routing behavior**, using OSPF, which uses the Dijkstra's Shortest Path algorithm, to dynamically manage paths and prevent loops.

Using a combination of OSPF and robust physical topology designs, the system aims to maintain consistent connectivity while being flexible enough to adapt to future growth.

3. Methodology

The design was conceptualized based on a three-floor hotel structure, with each floor having its own networking segment. The methodology includes the following components:

a. Topology Design

- **Inter-Floor Ring Topology:**
  The hotel has three routers, each representing one floor. These routers are interconnected in a ring topology, forming a closed loop. This setup ensures that even if one link fails, the OSPF routing protocol will dynamically reroute traffic through the alternate path, maintaining connectivity between all routers.

- **Intra-Floor Star Topology:**
  Each floor contains a central switch connected to multiple end devices such as reception computers, staff workstations, VoIP phones, and smart hotel systems. This star topology is ideal for localized device connectivity, offering easy manageability and isolation of faults.

b. Routing Protocol – OSPF:

OSPF was chosen due to its support for large, hierarchical networks and its fast convergence capabilities. In this project, all routers operate under a single OSPF area for simplicity. Each router advertises its connected networks into the OSPF domain, allowing automatic route computation and path optimization.
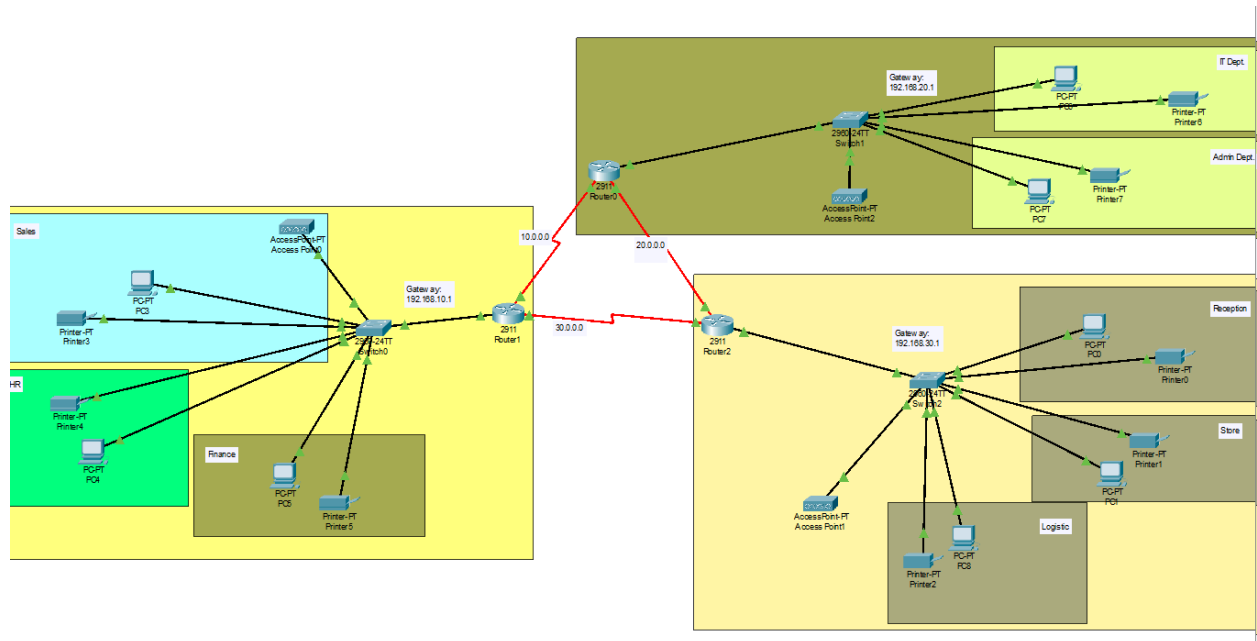
c. Simulation Setup:

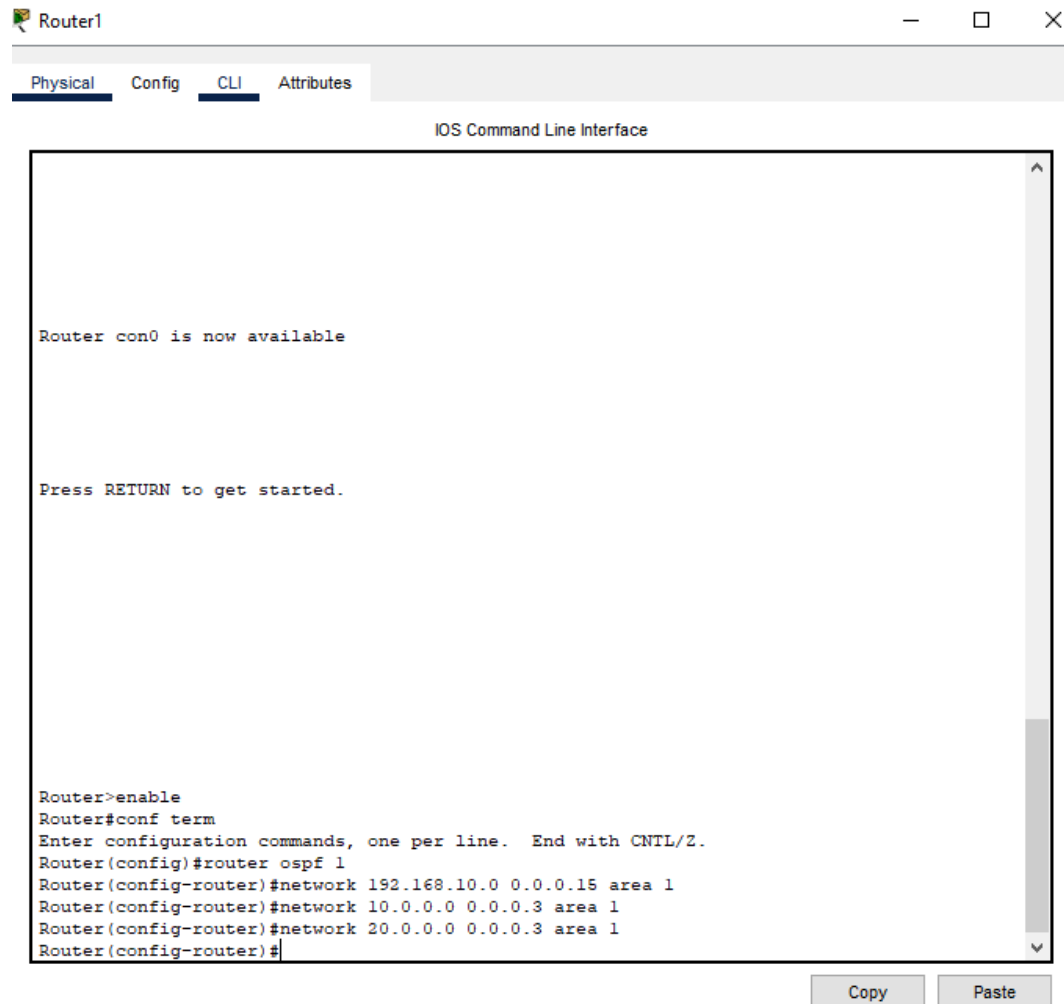The entire network was simulated using Cisco Packet Tracer. The setup included:

- Three Cisco routers arranged in a logical ring.

- Three switches acting as central hubs for each floor.

- A variety of end devices to simulate hotel functions such as reception, logistics, sales, HR and finance..

4. Simulation and Results

Network diagram:

CLI Command for Router 1:

Router1   —   □   ×

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
Router con0 is now available




Press RETURN to get started.







Router>enable
Router#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.10.0 0.0.0.15 area 1
Router(config-router)#network 10.0.0.0 0.0.0.3 area 1
Router(config-router)#network 20.0.0.0 0.0.0.3 area 1
Router(config-router)#
```

Copy   Paste

Sales Department Pc and Printer Configuration :

PC3   — □ ✕

Physical   Config   Desktop   Programming   Attributes

IP Configuration   X

Interface   FastEthernet0   ⌄

IP Configuration

○ DHCP   ◉ Static

IPv4 Address   192.168.10.2

Subnet Mask   255.255.255.240

Default Gateway   192.168.10.1

DNS Server   0.0.0.0

IPv6 Configuration

○ Automatic   ◉ Static

IPv6 Address   /

Link Local Address   FE80::290:CFF:FE42:1347

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication   MD5   ⌄

Username

Password

5. Conclusion

The hotel management network designed in this project successfully demonstrates how a combination of thoughtful topology planning and dynamic routing protocols can lead to a highly reliable and efficient infrastructure. The use of OSPF enables fast adaptation to network changes, while the ring and star topologies ensure redundancy and straightforward connectivity.

This design offers a strong foundation for real-world hotel networking scenarios, supporting current operations and allowing for future scalability. Through simulation and testing, the network was shown to perform well under normal and fault conditions, making it a practical solution for modern hospitality environments.