Hotel Management System: Designing and Implementing a Hotel Network

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***Abstract*—This report details the modern Hotel network project, which involves designing and implementing a modern hotel network with three floors and various departments. The project includes considerations like routers connecting each floor, specific VLANs for each department, Wi-Fi networks, printers, OSPF routing protocol, DHCP server configuration, SSH setup, and port security with a test PC. We emphasize the increasing complexity of each project, seeking viewer support through subscriptions and engagement.**

***Index Terms*—VLAN, Packet Tracer, OSPF, DHCP, SSH**

I. Introduction

The Modern Hotel network project aims to establish a robust and reliable computer network infrastructure tailored to the specific needs of a hotel with diverse departments on each floor. The goal is to enhance hotel operations by improving communication, resource management, and the overall guest experience. The proposed network design incorporates a hierarchical topology, dividing the network into layers for scalability and efficient resource management. This includes access switches on each floor, distribution switches for interconnecting these access switches, and a core layer for high-speed backbone connectivity. To ensure seamless inter-floor connectivity, three routers will be strategically placed, utilizing OSPF as the routing protocol. VLANs will be created for each department, enhancing security and facilitating efficient traffic management. DHCP will dynamically assign IP addresses to devices within each VLAN, and inter-VLAN routing will be implemented to enable communication between different departments while maintaining network segmentation for security.

Thorough testing and verification of network communication will be conducted post-implementation to ensure performance expectations are met. The entire design and implementation process will be documented comprehensively, serving as a valuable resource for future reference and troubleshooting. This comprehensive approach aims to deliver a stable, secure, and easily manageable network infrastructure that enhances the overall experience for hotel guests and staff, positioning the hotel competitively in the hospitality industry. a network design and implementation project that aims to provide a seamless and secure network infrastructure for hotels. The project is implemented using Packet Tracer, a network simulation tool developed by Cisco Systems. The project involves designing a network topology for a hotel that includes different departments such as reception, housekeeping, and restaurant. The network topology is designed to provide internet connectivity, VoIP telephony services, and other network services to the hotel staff and guests. The project is an excellent example of how network simulation tools such as Packet Tracer can be used to design and implement complex network infrastructures. The project provides a hands-on experience in designing and implementing a network infrastructure for hotels.

II. Proposed Work

As a part of the networking project, we are aiming to design and implement a Modem Hotel network. The hotel has three floors, in the first floor there three departments (Reception, store and Logistics), in the second floor there are three departments (Finance, HK and Sales Marketing), While the third floor hosts the IT and Admin. Therefore, certain considerations has to be made during the design and implementation of a modem hotel. There should be three routers connecting each floor (all placed in the server room in IT department). All routers should be connected to each other using serial DCE cable. The network between the routers should be 10.10.10.0/30, 10.10.10.4/30, 10.10.10.8/30 and each floor is expected to have one switch (placed in the respective floor). Each floor is expected to have WIFI networks connected to laptops and phones and each department has a printer.

Each department is expected to be in different VLAN with the following details.

- **1st Floor:**
  - Reception- VLAN 80, Network of 192.168.8.0/24
  - Store- VLAN 70, Network of 192.168.7.0/24
  - Logistics- VLAN 60, Network of 192.168.6.0/24
- **2nd Floor:**
  - Finance- VLAN 50, Network of 192.168.5.0/24
  - HR- VLAN 40, Network of 192.168.4.0/24
  - Sales- VLAN 30, Network of 192.168.3.0/24
- **3rd Floor:**
  - Admin- VLAN 20, Network of 192.168.2.0/24
  - IT- VLAN 10, Network of 192.168.1.0/24

Using OSPF as the routing protocol to advertise routes and all the devices in the network are expected to obtain IP address dynamically with their respective router configured as the DHCP seraver. Making all the devices in the network to communicate with each other. Configure the SSH in all the routers for remote login and configure port security to IT-dept switch to allow only Test-PC to access port fa0/1.

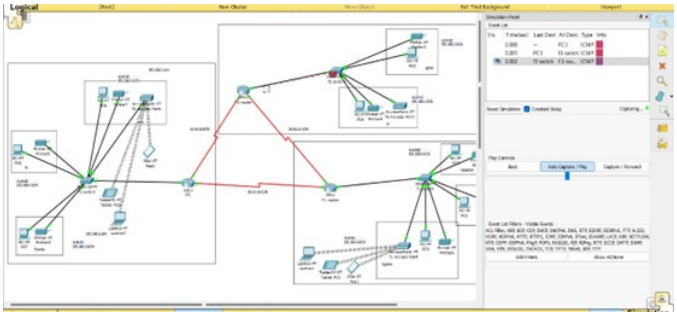

Fig. 1. Physical Topology for Hotel Management System.

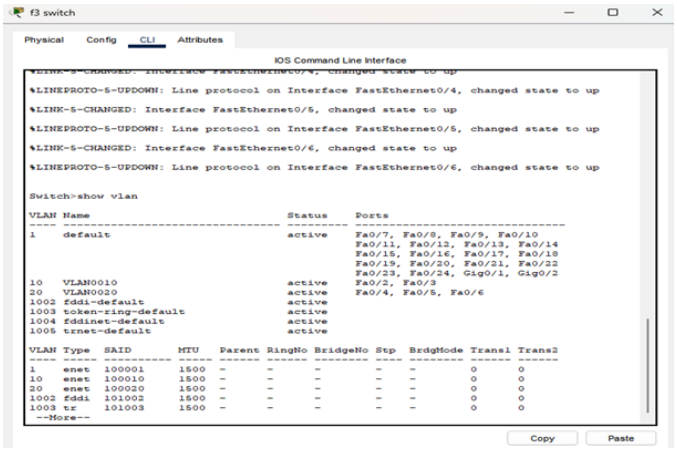

Fig. 2. VLAN Configuration for f3 switch.

III. Implementation and Results

The successful implementation of Vic Modern Hotel's network involved a step-by-step configuration process, ensuring that each element of the proposed design was meticulously executed. This section provides a detailed account of the implementation, accompanied by screenshots to elucidate key steps and outcomes.

A. Physical Connectivity

The initial step in the implementation process involved the physical connectivity of routers, switches, and access points. Routers for each floor were placed in the server room within the IT department, and serial DCE cables were used to interconnect them, forming the backbone of the network. Each floor's switch was connected to its respective router, creating a hierarchical structure [**?**].

B. VLAN Configuration

VLANs were configured on each router to logically separate departments on each floor. This involved assigning VLAN IDs, names, and associating specific subnets with each VLAN. The configuration ensures that devices within a VLAN can communicate seamlessly while maintaining isolation from devices in other VLANs [**?**].

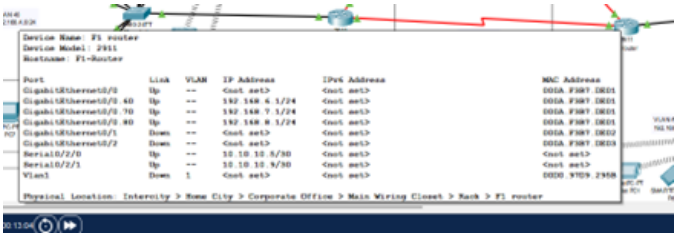

Fig. 3. OSPF Configuration of f1 router.

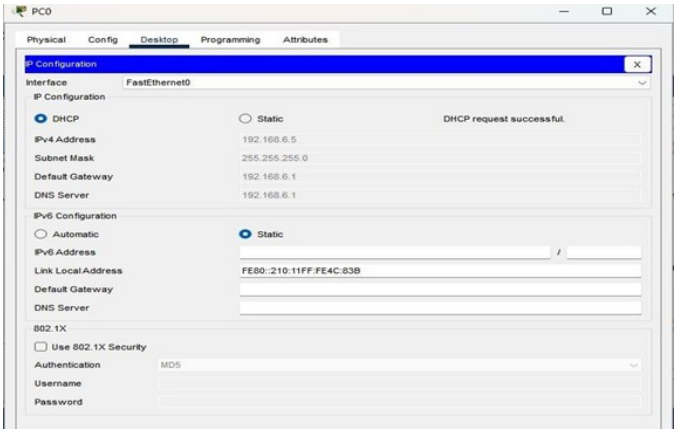

Fig. 4. Dynamically allocated IPv4 address configuration of pc0.

C. Routing Configuration with OSPF

OSPF was configured as the routing protocol to facilitate dynamic routing between routers. This involved specifying OSPF process IDs, configuring router interfaces, and defining network areas. The OSPF configuration ensures that routers can effectively communicate and share routing information, enabling optimal path selection [**?**].

D. DHCP Server Configuration

Each router was configured as a DHCP server for its respective floor, dynamically allocating IP addresses to devices within each VLAN. DHCP configurations included specifying IP address pools, default gateways, and DNS servers. This centralized DHCP management streamlines IP address assignment [**?**].

E. Secure Remote Access with SSH

Secure Shell (SSH) was configured on all routers to enable secure remote access. This involved setting up authentication parameters, including usernames and passwords. SSH ensures that authorized personnel can remotely manage network devices securely [**?**].

F. Port Security Measures

Port security was implemented on the IT department's switch to allow only the designated Test-PC to access port fa0/1. This configuration prevents unauthorized devices from connecting to critical network resources [**?**].

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Fig. 5. Wireless Network Configuration.

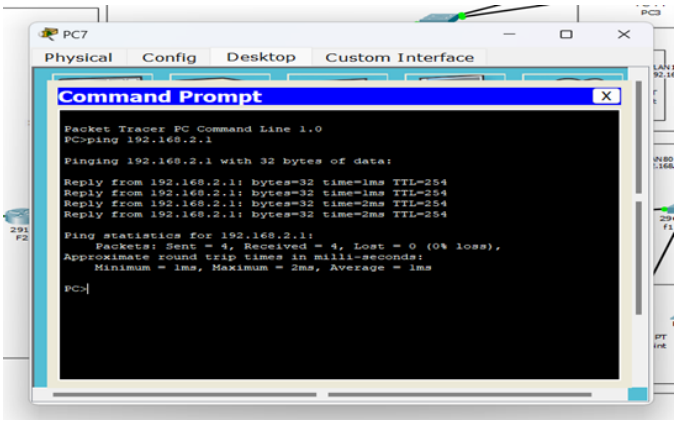

Fig. 6. Ping status.

G. Wireless Network Configuration

Wireless networks were configured on each floor using Cisco Access Points. This involved specifying SSIDs, security protocols, and associating each wireless network with the corresponding VLAN. The configuration ensures reliable and secure wireless communication [**?**].

H. Testing and Verification

After the configuration was completed, thorough testing was conducted to verify network communication, DHCP functionality, secure remote access, and port security measures. Ping tests, traceroutes, and remote login attempts were executed to ensure the network's robustness [**?**].

A hierarchical network topology that connects different departments across different floors of the hotel. Implementation of OSPF as the routing protocol to advertise routes between the routers. Creation of different VLANs for each department with their own unique IP address range. Configuration of DHCP servers on the routers to assign IP addresses dynamically to devices. Configuration of SSH for secure remote access to network devices. Implementation of port security on the switches to limit access to the network by allowing only authorized devices. Creation of wireless networks for each floor to connect laptops and phones. All devices in the network can communicate with each other.

IV. Conclusion

In conclusion, the Hotel Management Networking Project is a network design and implementation project that aims to provide a seamless and secure network infrastructure for hotels. The project is implemented using Packet Tracer, a network simulation tool developed by Cisco Systems. This project involves designing a network topology for a hotel that includes different departments such as reception, housekeeping, and restaurant. The network topology is designed to provide internet connectivity, VoIP telephony services, and other network services to the hotel staff and guests. This project is an excellent example of how network simulation tools such as Packet Tracer can be used to design and implement complex network infrastructures. The project provides a hands-on experience in designing and implementing a network infrastructure for hotels.

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