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S23-127
NL assignment
28/03/2024

AIM : The case study to design and configure any organization

Layout: In this organization we will be using Hybrid topology to connect all the labs and classrooms of 9,10,11 floor

To design and configure a network for the organization with three floors (9th, 10th, and 11th) with specific requirements, we'll opt for a hybrid network topology. To incorporate a hybrid topology with a tree topology for each floor. This design will combine the advantages of both topologies, providing scalability, redundancy, and efficient management.

Network Components:

1. **Switches:** Managed switches will be used for each floor to facilitate connectivity.
2. **Routers:** A router will be placed at each floor to manage inter-floor communication.
3. **Cables:** Ethernet cables (Cat6) will be used for wired connections.
4. **Servers:** A central server room will be established on the 9th floor to manage data and facilitate network operations.
5. **Computers:** Desktop computers will be distributed across labs and classrooms on each floor.
6. **Printers:** Network printers will be strategically placed for shared access.
7. **Wireless Access Points (APs):** Wireless APs will be installed on each floor to provide Wi-Fi connectivity.

Network Design:

9th Floor:

- **Tree Topology:**
- **Root Node (Switch):** Connected to the router and serves as the root of the tree.
- **Branch Nodes (Switches):** Connected to the root switch and serve individual labs and classrooms.
- **Leaf Nodes (Devices):** Computers and printers connected to each branch switch. • **Server Room:** Connected to the root switch for centralized management and data access.

10th Floor:

- **Tree Topology:**
- **Root Node (Switch):** Connected to the router.
- **Branch Nodes (Switches):** Connected to the root switch, serving labs and classrooms.
- **Leaf Nodes (Devices):** Computers and printers connected to each branch switch.

11th Floor:

- **Tree Topology:**
- **Root Node (Switch):** Connected to the router.
- **Branch Nodes (Switches):** Connected to the root switch, serving classrooms.

- **Leaf Nodes (Devices):** Computers connected to each branch switch.

2. IPv4 Addressing and Class C Network:

a. IPv4 Addressing: The Internet Protocol version 4 (IPv4) will be used to assign unique addresses to each device on the network. These addresses will consist of 32 bits, divided into network and host portions.

b. Class C Network: A class C network will be employed, as it allows for a maximum of 254 hosts. The network address will be assigned as follows:

Network Prefix: 192.168.x.0

Network Mask: 255.255.255.0

3. Network Organization:

a. Server Room (Room 902):

i. IP Address: 192.168.x.1 ii.

Subnet Mask: 255.255.255.0 iii.

Default Gateway: 192.168.x.1

iv. DHCP Server: Assign IP addresses to devices on the network

b. Floors 9, 10, and 11:

i. Floor Layout: Tree Layout

ii. Device Assignment: Assign IP addresses to devices on each floor, ensuring they fall within the available host range (2-254) for the class C network.

Hybrid Topology:

Inter-Floor Connectivity:

- Each floor's router will act as a central point connecting to the server room's switch on the 9th floor.
- Inter-floor communication will be facilitated through these routers, creating a hybrid star/bus topology for connectivity between floors.

Tree Topology on Each Floor:

- Each floor will follow a tree topology with switches serving as distribution points.
- Switches will connect to a central router on the floor, which will manage communication within the floor and provide connectivity to other floors.

Conclusions: This document outlines the design and configuration of a network for a multifloor organization using a hybrid topology approach. By incorporating tree topologies within each floor and utilizing routers for inter-floor communication, the network achieves scalability, redundancy, and efficient management. The use of managed switches, routers, cables, servers, computers, printers, and wireless access points ensures comprehensive connectivity and support for various network operations. Additionally, the IPv4 addressing scheme with a Class C network facilitates unique addressing for devices while enabling efficient IP management. Overall, this network design meets the specific requirements of the organization, providing a robust and reliable infrastructure for seamless communication and data management.