Small Office Home Office (SOHO) Network Design

Project Overview
This project focuses on the design and implementation of a Small Office Home Office (SOHO) network for XYZ company, which is opening a branch in Bonalbo. The network setup includes four departments: Admin/IT, Finance/HR, Customer Service/Reception, and Logistics. Each department is connected via VLANs and wireless networks. The network has been designed to ensure efficient communication between the departments while adhering to company policies.

Key Requirements:

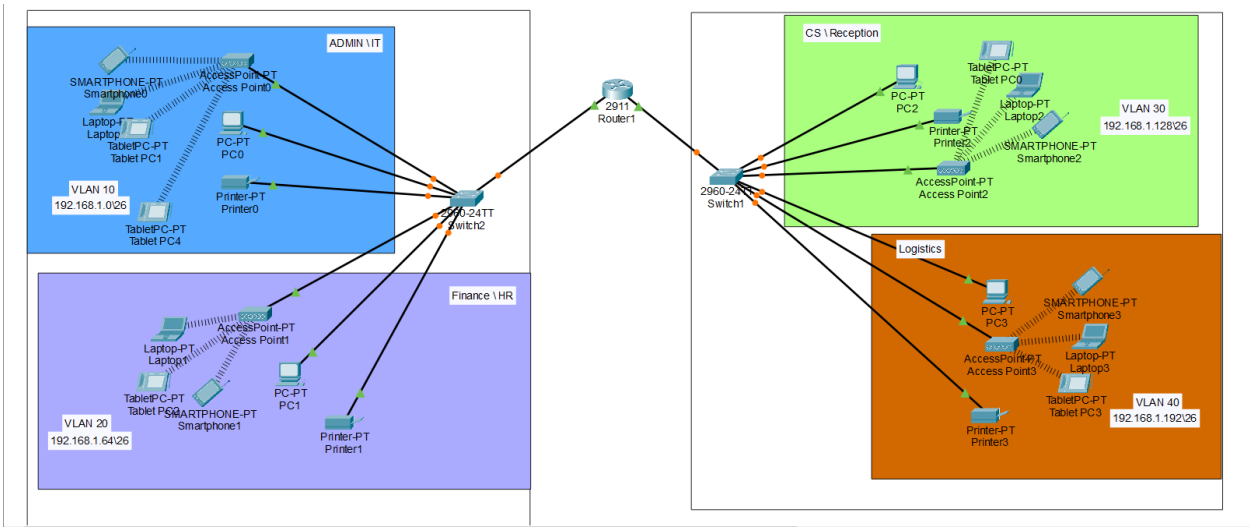
1. **Network Devices:**
    - Use one router and two switches, both Cisco products.
    - Each department is assigned a different VLAN for segregation.
    - Wireless access points for each department for wireless connectivity.
2. **Addressing:**
    - Devices need to obtain IPv4 addresses automatically via DHCP.
    - The ISP provided the base network 192.168.1.0/24.
3. **Inter-department Communication:**
    - Even though departments are segregated into different VLANs, they are required to communicate via Inter-VLAN Routing.

Implementation Details

1. VLAN Configuration VLANs were created to segment the network into four distinct departments:
    - **VLAN 10:** Admin/IT (192.168.1.0/26)
    - **VLAN 20:** Finance/HR (192.168.1.64/26)
    - **VLAN 30:** Customer Service/Reception (192.168.1.128/26)
    - **VLAN 40:** Logistics (192.168.1.192/26)

On the switches, interfaces were assigned to these VLANs, ensuring that each device is part of the appropriate department. The following configurations were made:

- Specified VLANs on a range of ports, ensuring the correct devices (PCs, printers, access points) were assigned to their respective VLANs.
- The switchport mode access command was used to ensure the ports were in access mode, which means each port can only communicate with one VLAN.



2. **Inter-VLAN Routing Configuration (Router on a Stick)**
   To allow devices in different VLANs to communicate, Inter-VLAN Routing was implemented using the router. A single physical interface on the router was configured to handle traffic for multiple VLANs using sub-interfaces:
   - Sub-interfaces were created for each VLAN (e.g., gig0/0.10, gig0/0.20, gig0/0.30, gig0/0.40).
   - Each sub-interface was assigned an IP address that acts as the default gateway for that VLAN.
   - Dot1Q encapsulation was configured to tag VLAN traffic on the router interface, ensuring that the router can properly route traffic between VLANs.
3. **DHCP Server Configuration**
   The router was configured as a DHCP server to assign IP addresses dynamically to devices in each department:
   - Four DHCP pools were created, one for each department (Admin/IT, Finance/HR, Customer Service/Reception, and Logistics).
   - Each pool was assigned a network range corresponding to the VLAN, a default gateway (router sub-interface), and DNS server details.

After configuring the DHCP server, devices within each VLAN were tested, and they successfully obtained IP addresses dynamically.

4. **Wireless Network Setup**
   Each department was provided with its own wireless network. Cisco Access Points were configured to provide wireless connectivity:
   - For each access point, the SSID was named according to the department: Admin-WIFI, Finance-WIFI, CS-WIFI, and Logistics-WIFI.
   - WPA2-PSK security was enabled on each SSID, and a unique passphrase was assigned (Admin@123, Finance@123, Customer@123, Logistics@123).
   - Mobile devices like phones, tablets, and laptops were connected to the respective wireless networks, and their network connection was verified.
5. **Testing and Verification**
   After setting up the network, the following tests were performed:
   - **IP Address Allocation:** All devices, including PCs, printers, and wireless devices, received IP addresses from the DHCP server, confirming correct DHCP configuration.
   - **Inter-VLAN Communication:** Devices in one department were able to communicate with devices in other departments, confirming that Inter-VLAN Routing was functioning as expected.
   - **Wireless Connectivity:** Mobile devices connected to the wireless networks successfully transferred data to other devices in their department and across VLANs, confirming proper wireless setup.
