

**COMPUTER NETWORKS LAB**

**PROJECT DOCUMENTATION**

**LAB 10**

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**Telecommunication Network Company Documentation**

**1. Organization Overview**

* **Organization Name:** Telecommunication Network Company
* **Number of Floors:** 3
* **Devices Count:**
  + **1st Floor:**
    - **Logistic (VLAN 30):** 1 Access Point, 1 Printer, 1 PCs
    - **Reception (VLAN 40):** 1 Printer, 1 PCs
    - **Store (VLAN 50):** 1 Printer, 1 Server, 1 PCs
  + **2nd Floor:**
    - **Sales (VLAN 60):** 1 Access Point, 1 Printer, 1 PCs
    - **Finance (VLAN 70):** 1 Printer, 1 PCs
    - **HR (VLAN 80):** 1 Printer, 1 Server, 1 PCs
  + **3rd Floor:**
    - **IT (VLAN 10):** 1 Printer, 1 PCs
    - **Admin (VLAN 20):** 1 Access Point, 1 Printer, 1 PCs

**Total Devices:**

* PCs: 8
* Printers: 7
* Servers: 2
* Access Points: 3

**2. Project Features**

1. **VLANs:** Segmentation of the network for security and efficient traffic management.
2. **Routing:** Inter-VLAN routing using Layer 3 routers to enable communication between VLANs.
3. **DHCP:** Automated IP address allocation to devices within each VLAN.
4. **DNS:** Mapping of domain names to IP addresses for easy access.

**3. Network Design**

The organization is structured with **three routers**, each responsible for a floor. Each department on a floor has its VLAN with specific subnet allocations. Inter-VLAN routing is configured on Layer 3 switches/routers to enable communication.

**VLAN and Subnet Allocation**

| **Floor** | **Department** | **VLAN ID** | **Subnet** | **Devices** |
| --- | --- | --- | --- | --- |
| 1st | Logistic | 30 | 192.168.3.0/24 | AP, Printer, 2 PCs |
|  | Reception | 40 | 192.168.4.0/24 | Printer, 2 PCs |
|  | Store | 50 | 192.168.5.0/24 | Printer, Server, 2 PCs |
| 2nd | Sales | 60 | 192.168.6.0/24 | AP, Printer, 2 PCs |
|  | Finance | 70 | 192.168.7.0/24 | Printer, 2 PCs |
|  | HR | 80 | 192.168.8.0/24 | Printer, Server, 2 PCs |
| 3rd | IT | 10 | 192.168.1.0/24 | Printer, 3 PCs |
|  | Admin | 20 | 192.168.2.0/24 | AP, Printer, 3 PCs |

**4. Configuration Details**

**A. VLAN Configuration**

Each switch is configured with VLANs to separate traffic. Below is an example configuration for a switch:

VLAN Configuration on Switch

Switch(config)# vlan 10

Switch(config-vlan)# name IT

Switch(config-vlan)# exit

Switch(config)# vlan 20

Switch(config-vlan)# name Admin

Switch(config-vlan)# exit

Switch(config)# vlan 30

Switch(config-vlan)# name Logistic

Switch(config-vlan)# exit

**B. Inter-VLAN Routing**

Inter-VLAN routing is set up on Layer 3 switches or routers to allow communication between VLANs.

Router-on-a-Stick Configuration

interface GigabitEthernet0/1

no shutdown

interface GigabitEthernet0/1.10

encapsulation dot1Q 10

ip address 192.168.1.1 255.255.255.0

interface GigabitEthernet0/1.20

encapsulation dot1Q 20

ip address 192.168.2.1 255.255.255.0

interface GigabitEthernet0/1.30

encapsulation dot1Q 30

ip address 192.168.3.1 255.255.255.0

**C. DHCP Configuration**

A DHCP server is configured to dynamically assign IP addresses to each VLAN.

DHCP Configuration

ip dhcp pool VLAN30

network 192.168.3.0 255.255.255.0

default-router 192.168.3.1

dns-server 8.8.8.8

ip dhcp pool VLAN40

network 192.168.4.0 255.255.255.0

default-router 192.168.4.1

dns-server 8.8.8.8

**D. DNS Configuration**

DNS resolves hostnames to IP addresses. The configuration is applied to a DNS server.

DNS Server Configuration

ip dns server

ip host logistic-printer 192.168.3.10

ip host reception-pc1 192.168.4.20

**5. Testing and Verification**

**A. VLAN Connectivity Test**

Use the ping command to test communication within the same VLAN:

ping 192.168.3.10

**B. Inter-VLAN Routing Test**

Use ping to test communication between different VLANs:

ping 192.168.2.10

**C. DHCP Verification**

Ensure IP addresses are assigned dynamically:

show ip dhcp binding

**D. DNS Verification**

Test hostname resolution:

ping logistic-printer

**6. Summary**

This network project for **Telecommunication Network Company** ensures:

* Efficient use of resources via VLANs.
* Secure and segregated traffic management.
* Automated IP allocation and DNS resolution.
* Seamless communication across floors and departments.