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# Network Infrastructure Documentation

## Project Overview

This document outlines the network infrastructure of a software company with two branch offices located in different states and a central server hosted in a third state. The network is designed to ensure efficient communication between branches, departments, and servers using modern networking concepts such as VLANs, inter-VLAN routing, DHCP, WLAN, RIP routing, and more.

## Components and Services

1. Servers:

- DHCP & HTTP Server: Allocates dynamic IP addresses and hosts web services.  
- DNS Server: Resolves domain names and facilitates name-based routing.

2. Devices:

- Routers: Enable communication between branches using the RIP routing protocol.  
- Switches: Used for VLAN configuration and inter-VLAN communication.  
- Access Points: Support WLAN communication for specific departments.

3. Departments:

- Five departments across both branches (Finance, HR, Security, IT, Marketing).

## Concepts Used

The following concepts are implemented in the network:  
1. Static and Dynamic IP Allocation:  
 - Some departments use static IPs, while others use DHCP for dynamic allocation.  
2. VLAN and Inter-VLAN Routing:  
 - VLAN segmentation improves security and reduces broadcast traffic.  
 - Inter-VLAN routing facilitates communication between VLANs.  
3. WLAN:  
 - Wireless communication for specific departments.  
4. DHCP:  
 - Automated IP assignment for departments using dynamic IPs.  
5. HTTP and DNS Services:  
 - HTTP server hosts applications, and the DNS server provides domain name resolution.  
6. RIP Routing Protocol:  
 - Enables communication between branches over WAN.  
7. Subnetting:  
 - Subnets are created to optimize IP address usage and improve routing efficiency.

## IP Addressing and VLAN Configuration

### Branch 1 (B1)

1. Finance Department:

- Gateway: 192.168.2.1/27  
 - DNS: 192.168.1.10/24

2. HR Department:

- Gateway: 192.168.2.33/27  
 - DNS: 192.168.1.10/24

3. Security Department:

- Gateway: 192.168.2.65/27  
 - DNS: 192.168.1.10/24

4. IT Department (Group 1):

- Gateway: 192.168.2.97/27  
 - DNS: 192.168.1.10/24

5. Marketing Department (WLAN):

- Gateway: 192.168.2.129/27  
 - DNS: 192.168.1.10/24

### Branch 2 (B2)

1. Finance Department Group 1 (VLAN 1):

- Gateway: 192.168.3.1/27  
 - DNS: 192.168.1.10/24

2. Finance Department Group 2 (VLAN 2):

- Gateway: 192.168.3.161/27  
 - DNS: 192.168.1.10/24

3. HR Department:

- Gateway: 192.168.3.33/27  
 - DNS: 192.168.1.10/24

4. Security Department:

- Gateway: 192.168.3.65/27  
 - DNS: 192.168.1.10/24

5. IT Department:

- Gateway: 192.168.3.97/27  
 - DNS: 192.168.1.10/24

6. Marketing Department (WLAN):

- Gateway: 192.168.3.129/27  
 - DNS: 192.168.1.10/24

## VLANs

1. VLAN 1:

- Used by Finance Department (Group 1) and IT Department (Group 1).

2. VLAN 2:

- Used by Finance Department (Group 2) and IT Department (Group 2).

## Routing Protocol

- RIP (Routing Information Protocol):  
 - Configured on routers for dynamic routing between branches.  
 - Ensures efficient data transfer across different states.

## Services

1. DHCP Server:

- Provides dynamic IP allocation for devices in specified departments.  
 - Departments using DHCP: Finance, Marketing, IT.

2. HTTP Server:

- Hosts company web services.

3. DNS Server:

- Resolves hostnames to IP addresses.

## Subnetting

Subnets are created using /27 and /24 masks to optimize IP utilization and provide unique addresses for each department.

## Wireless LAN (WLAN)

Wireless communication is implemented for the Marketing Departments in both branches, ensuring mobility and flexibility.

## Static IP Allocation

Departments using static IPs (e.g., HR and Security) are manually configured for increased control and predictability.

## Conclusion

This network infrastructure leverages advanced networking concepts to provide a scalable, secure, and efficient environment for the software company. The integration of RIP routing, VLANs, and inter-VLAN routing ensures seamless communication between branches and departments, while DHCP, DNS, and HTTP servers enhance operational efficiency.