**lab 3: configuring network interfaces**

**Overview**

This lab is designed to help you learn how to configure network interfaces, set up VLANs, create static routes, and manage DNS settings. You will be stepping into a role of a Network Administrator at Gourmet, a company specializing in smart kitchen appliances and recipe apps and you've been tasked with configuring the network for a new office location. Your mission is to set up the network infrastructure to support their operations efficiently and securely.

Understanding these basic networking concepts helps you separate network traffic for smooth communication and availability, whether in a business or at home with IoT devices. This improves security and ensures reliable access to your devices. Throughout this lab, you will be working in a real-world simulated environment faced by Network Administrators and by configuring this network you will be gaining valuable skills for managing and configuring a network.

**Objectives**

By the end of this lab, you will be able to:

- Configure IPv4 addresses on network interfaces using nmcli
- Set up VLANs for department isolation
- Manage network connections and profiles
- Configure static routes for inter-office communication
- Set up DNS settings for internal and external services
- Verify network configurations

**Instructions**

Now that we know what we are working with, we can begin to work on configuring the network and separate the different department network traffics with VLANs. Make sure you read and follow the instructions carefully, and if you ever feel like you're stuck, you can go to the end of the lab to find the solutions.

**Part One: Configuring Main Network Interface**

In this section, you'll configure the main network interface (eth0) with IPv4 settings. Proper configuration is essential for ensuring that the server can communicate effectively within the network and access external resources.

1.  **Configure IPv4 settings:**
    -   Address: 192.168.1.10/24
    -   Gateway: 192.168.1.1
    -   Method: Manual
        Note: This static IP configuration ensures consistent connectivity and accessibility within the local network.

**Part Two: Setting Up VLANs for Departments**

Next, you'll set up VLANs to separate traffic for each department. VLANs enhance network performance and security by isolating broadcast domains, reducing congestion, and improving data privacy.

1.  **Create VLAN interfaces:**
    -   R&D: VLAN 10
    -   Marketing: VLAN 20
    -   Customer Support: VLAN 30
        Note: Separate VLANs allow each department to manage its own traffic without interference from others.

2.  **Configure IP addresses for each VLAN:**
    -   R&D: 192.168.10.0/24
    -   Marketing: 192.168.20.0/24
    -   Customer Support: 192.168.30.0/24
        Note: Assigning specific IP ranges to each VLAN ensures effective communication while maintaining departmental separation.

**Part Three: Configuring Static Routes**

Add a static route to facilitate communication with the company's main office network.

1.  **Configure a static route:**
    -   Destination network: 10.0.0.0/8

- o   Gateway: 192.168.1.254

     Note: This route enables seamless access to shared resources between the new office and the main office network.

**Part Four: Setting Up DNS**

Configure DNS settings for all connections to ensure proper domain name resolution, making it easier to access services by name rather than IP address.

1. **Set DNS servers:**
   - o   Primary: 8.8.8.8
   - o   Secondary: 8.8.4.4

        Note: Using reliable DNS servers ensures fast and accurate resolution of domain names for both internal and external services.

2. **Set DNS search domain:**
   - o   Domain: gourmet.local

        Note: Specifying a search domain simplifies hostname resolution within the local network, facilitating easier access to internal services.

**Part Five: Verifying Configurations**

Finally, verify all network configurations to ensure everything is set up correctly and functioning as intended.

1. Display detailed information about all configured connections.
2. Verify IP configurations for all interfaces.
3. Check the routing table to ensure the static route is properly set.

   Note: Verifying configurations is crucial for troubleshooting potential issues and ensuring that all network components operate smoothly, ultimately supporting effective business operations.

**Part Six: Environmental Cleanup**

After completing the lab tasks and verifying the configurations, it's important to clean up the environment and revert the changes made. This ensures that the system is returned to its original state, preventing any unintended effects on other systems or future lab exercises.

1. **Remove VLAN Configurations:**
   - o   Delete the VLAN interfaces created for each department

2. **Revert Main Network Interface Settings:**

- Reset the main network interface (eth0) to its original configuration or set it back to DHCP

3. **Remove Static Routes:**

- Delete the static route added during the lab

4. **Reset DNS Settings:**

- Restore DNS settings to their defaults

5. **Verify Cleanup:**

- After performing the cleanup, verify that all changes have been reverted

# Solutions for Lab 3: Configuring Network

**Part One: Configuring Main Network Interface**

1. **Configure IPv4 settings:**

   - `sudo nmcli connection modify eth0 ipv4.addresses 192.168.1.10/24 ipv4.gateway 192.168.1.1 ipv4.method manual`
   - `sudo nmcli connection up eth0`

**Part Two: Setting Up VLANs for Departments**

1. **Create VLAN interfaces:**

   - `sudo nmcli connection add type vlan con-name VLAN10 ifname VLAN10 dev eth0 id 10`
   - `sudo nmcli connection add type vlan con-name VLAN20 ifname VLAN20 dev eth0 id 20`
   - `sudo nmcli connection add type vlan con-name VLAN30 ifname VLAN30 dev eth0 id 30`

2. **Configure IP addresses for each VLAN:**

   - `sudo nmcli connection modify VLAN10 ipv4.addresses 192.168.10.1/24 ipv4.method manual`
   - `sudo nmcli connection modify VLAN20 ipv4.addresses 192.168.20.1/24 ipv4.method manual`
   - `sudo nmcli connection modify VLAN30 ipv4.addresses 192.168.30.1/24 ipv4.method manual`

3. **Activate the VLANs:**

   - `sudo nmcli connection up VLAN10`
   - `sudo nmcli connection up VLAN20`
   - `sudo nmcli connection up VLAN30`

**Part Three: Configuring Static Routes**

1.  **Configure a static route:**

    - `sudo nmcli connection modify eth0 +ipv4.routes "10.0.0.0/8 192.168.1.254"`

    - `sudo nmcli connection up eth0`

**Part Four: Setting Up DNS**

1.  **Set DNS servers and search domain:**

    - `sudo nmcli connection modify eth0 ipv4.dns "8.8.8.8 8.8.4.4" ipv4.dns-search "gourmet.local"`

    - `sudo nmcli connection modify VLAN10 ipv4.dns "8.8.8.8 8.8.4.4" ipv4.dns-search "gourmet.local"`

    - `sudo nmcli connection modify VLAN20 ipv4.dns "8.8.8.8 8.8.4.4" ipv4.dns-search "gourmet.local"`

    - `sudo nmcli connection modify VLAN30 ipv4.dns "8.8.8.8 8.8.4.4" ipv4.dns-search "gourmet.local"`

2.  **Apply the changes:**

    - `sudo nmcli connection up eth0`

    - `sudo nmcli connection up VLAN10`

    - `sudo nmcli connection up VLAN20`

    - `sudo nmcli connection up VLAN30`

**Part Five: Verifying Configurations**

- `sudo nmcli connection show`

- `ip  -c -br addr`

- `cat /etc/resolv.conf`

**Part Six: Environmental Cleanup**

6.  **Remove VLAN Configurations:**

    - nmcli con delete "VLAN10"

    - nmcli con delete "VLAN 20"

    - nmcli con delete "VLAN 30"

7.  **Revert Main Network Interface Settings:**

- nmcli con mod eth0 ipv4.method auto

8. **Remove Static Routes:**

    - nmcli connection modify eth0 -ipv4.routes "10.0.0.0/8 192.168.1.254"

9. **Reset DNS Settings:**

    - nmcli con mod eth0 ipv4.dns ""

    - nmcli con mod eth0 ipv4.dns-search ""

10. **Verify Cleanup:**

- `sudo nmcli connection show`

- `ip  -c -br addr`

- `cat /etc/resolv.conf`