A Summary for All the Semester

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Contents

1 Static and Dynamic Routing (RIP & OSPF)

1.1 Introduction

Routing enables the transmission of packets from source to destination. This section discusses static routing and two dynamic routing protocols: RIP and OSPF.

1.2 Static Routing

Working Principle: Static routes are manually configured and fixed.
Pros:

- Full control over paths

- Simple for small networks

Cons:

- Difficult to manage large networks

- No adaptability

1.3 Dynamic Routing

Working Principle: Devices update routing tables automatically based on topology changes.
Pros:

- High adaptability

- Automatic management

Cons:

- More complex

- Dependent on protocol configuration

1.4 Routing Information Protocol (RIP)

Uses distance-vector algorithm and periodic updates. Suitable for small to medium networks.
Pros: Easy to configure, basic dynamic updates.
Cons: Slow convergence, limited scalability.

1.5 Open Shortest Path First (OSPF)

Uses link-state algorithm. Optimized for large networks with fast convergence.
Pros: Scalable, quick convergence.
Cons: Complex to configure, more resource-intensive.

1.6   Comparison Summary

- **Static:** Best for stable small networks.

- **RIP:** Basic dynamic routing for small/medium setups.

- **OSPF:** Efficient for large, complex networks.

2   Linux Network Services Configuration

2.1   DHCP Server

1. Install: `sudo apt install isc-dhcp-server`

2. Configure interface: `INTERFACESv4="ens33"`

3. Define subnet in `/etc/dhcp/dhcpd.conf`

4. Restart service and check status

5. Confirm IP allocation (e.g., `192.168.1.5`)

2.2   DHCP Relay

1. Install: `sudo apt install isc-dhcp-relay`

2. Configure relay agent to point to DHCP server

3. Restart and check relay service

2.3   DNS Server (BIND)

1. Install: `sudo apt install bind9 bind9utils bind9-doc`

2. Create zones in `/etc/bind/named.conf.local`

3. Setup direct and reverse zone files (`db.eidia.uemf`, `db.192`)

4. Validate using `named-checkconf` and `named-checkzone`

5. Test using `dig` and `nslookup`

2.4   Web Server

1. Install Apache: `sudo apt install apache2`

2. Start and enable service

3. Create HTML file in `/var/www/html`

4. Configure virtual host in `/etc/apache2/sites-available/eidia.conf`

5. Enable site and reload Apache

3 Multi-building University Network Project

3.1 Architecture

- 4 Academic Buildings (A, B, C, D)

- 1 Administrative Building

- Central router for interconnection

3.2 IP Addressing (VLSM)

- Building A: `192.168.1.0/24`

- VLANs (Prof, Etudiants, Visiteurs): Various /26-/30 ranges

- Admin VLANs: `192.168.20.0/24`, `192.168.30.0/24`, etc.

3.3 VLAN Configuration

- VLANs setup on switches: `vlan 10`, `vlan 20`, etc.

- Trunk ports: `switchport mode trunk`

3.4 Network Security

- ACLs restrict inter-VLAN access

- Port security with sticky MAC and shutdown on violation

3.5 OSPF Routing

Configured on the central router using:

```
router ospf 100
network 192.168.10.0 0.0.0.255 area 0
```

3.6 Conclusion

The semester covered theoretical and practical knowledge in networking:

- Mastery of routing concepts (static and dynamic)

- Implementation of core network services (DHCP, DNS, Web)

- Simulation and securing of complex university network topologies