

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS**  
**COMPUTER ENGINEERING DEPARTMENT**

COE 344: Computer Networks

Term 251 (Spring 2025-2026)

Optional Course Project

Due Thursday, 11 December 2025 at 11:59pm

### 1. Description and Objective:

The goal of this project is to design and implement a network using Cisco Packet Tracer that demonstrates real-world routing and network service integration. Students will configure IP addressing, dynamic routing with OSPFv2, and essential services such as DHCP, DNS, and web hosting. By completing this project, students will gain practical experience in network planning, router configuration, and verifying end-to-end connectivity across multiple subnets and devices.

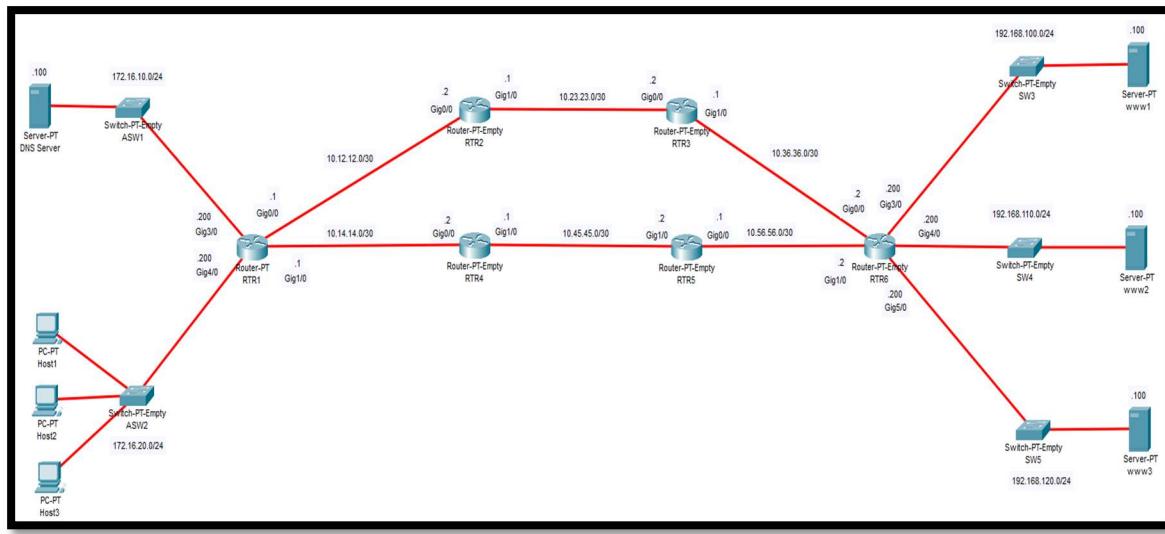
### 2. Network Topology:

Requirements:

- Windows OS.
- Cisco Packet Tracer (a link to a downloadable copy will be provided)

### 3. Network Topology:

Refer to the topology diagram below.



### 4. VLAN Requirement

No VLAN configuration is required for this assignment.

## 5. IP Addressing

Configure routers' interfaces and web servers according to the table below:

Device	Interface	IP Address	Subnet Mask	Network	Description
RTR1	Gig0/0	10.12.12.1	/30	10.12.12.0	Link to RTR2
	Gig1/0	10.14.14.1	/30	10.14.14.0	Link to RTR4
	Gig3/0	172.16.10.200	/24	172.16.10.0	To DNS Server Network
RTR2	Gig4/0	172.16.20.200	/24	172.16.20.0	To LAN (Hosts 1–3)
	Gig0/0	10.12.12.2	/30	10.12.12.0	Link to RTR1
RTR3	Gig1/0	10.23.23.1	/30	10.23.23.0	Link to RTR3
	Gig0/0	10.23.23.2	/30	10.23.23.0	Link to RTR2
RTR4	Gig1/0	10.36.36.1	/30	10.36.36.0	Link to RTR6
	Gig0/0	10.14.14.2	/30	10.14.14.0	Link to RTR1
RTR5	Gig1/0	10.45.45.1	/30	10.45.45.0	Link to RTR5
	Gig0/0	10.45.45.2	/30	10.45.45.0	Link to RTR4
RTR6	Gig1/0	10.56.56.1	/30	10.56.56.0	Link to RTR6
	Gig0/0	10.36.36.2	/30	10.36.36.0	Link to RTR3
Host1-3	Gig1/0	10.56.56.2	/30	10.56.56.0	Link to RTR5
	Gig3/0	192.168.100.200	/24	192.168.100.0	To Server1 (www1)
Server (www1)	Gig4/0	192.168.110.200	/24	192.168.110.0	To Server2 (www2)
	Gig5/0	192.168.120.200	/24	192.168.120.0	To Server3 (www3)
Server (DNS)	NIC	172.16.10.100	/24	172.16.10.0	DNS Server
Server (www2)	NIC	192.168.100.100	/24	192.168.100.0	Web Server 1
Server (www3)	NIC	192.168.110.100	/24	192.168.110.0	Web Server 2
Server (www3)	NIC	192.168.120.100	/24	192.168.120.0	Web Server 3

## 6. Router Configuration Tasks

Configure **OSPFv2** on all routers (RTR1–RTR6), assign Router IDs, and include all active interfaces in **area 0**.

## 7. DHCP Configuration

RTR1 should act as **DHCP server** for 172.16.20.0/24. Hosts should act as **DHCP clients**.

Each host should receive its IP address, subnet mask, default gateway, and DNS IP address from the DHCP server.

## 8. DNS Configuration

Configure **DNS server** (172.16.10.100) with A records for www1, www2, and www3. Use **coe344.edu** as a domain name to configure the DNS server with the A records.

## 9. Web Server Configuration

Configure www1, www2, and www3 as web servers in their respective LANs.

## 10. OSPF Path Preference Requirements

From Host1–Host3:

- www1, www2, and www3 reachable via RTR1–RTR4–RTR5–RTR6 as a **primary link**.
- www1, www2, and www3 reachable via RTR1–RTR2–RTR3–RTR6 as a **backup link**.

## 11. Verification Tasks and deliverables

1. Verify OSPF adjacencies between routers, with proof (Provide screenshot(s) for OSPF neighbor relationships).
2. Routing tables of each router, with proof (Provide screenshot(s) for the Routing Tables).
3. DHCP address assignment on the DHCP server, with proofs (Provide screenshot(s) of DHCP configuration commands on RTR1).
4. Dynamically assigned IP address, subnet mask, default gateway, and DNS server on each host, with proof (For each host, provide screenshot(s) showing IP address, subnet mask, default gateway, and DNS server obtained via DHCP).
5. DNS resolution on each host using the FQDN of each web server; **www1.coe344.edu**, **www2.coe344.edu**, and **www3.coe344.edu**.
6. Reachability between hosts and between hosts and web servers, with proof (Provide screenshot(s) of **Ping** command results showing successful communication:).
7. Path reachability between hosts and web servers using traceroute, with proof (Provide screenshot(s) showing that traffic follows the primary path (RTR1–RTR4–RTR5–RTR6).).

## 12. Submission Guidelines

In a zip file submit:

1. The .pkt file (Cisco Packet Tracer topology). Ensure all configurations are saved.
2. A pdf or word document, filled with answers and proofs.
3. A 15 minutes (max) video demonstrating each configuration's steps and successful execution.