



Project Title:

Configuration of a Multi-Router Network with DHCP and DNS Services using Cisco Packet Tracer

Course Code and Name: CSE438/EEE331/ETE331

Section: 01

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1. Objective

The objective of this project was to design and implement a network in Cisco Packet Tracer consisting of three routers, two switches, a DHCP server, a DNS server, and three PCs. The network supports dynamic IP allocation through DHCP, domain name resolution through DNS, and inter-network communication via RIP routing.

2. Network Components

- 3 × Cisco 1941 Routers (with HWIC-2T module for serial connections)
 - 2 × Switch-PT
 - 1 × DHCP Server
 - 1 × DNS Server
 - 3 × PCs
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3. Network Design & IP Addressing

3.1 Router Configuration Steps

Step 1: Add Serial Ports

Cisco 1941 routers do not have built-in serial ports, so the **HWIC-2T** module was added for each router. The port status was set to **"On"**.

Step 2: Example Configuration (Router 2)

Network Address Used: 192.168.16.0/24

- **GigabitEthernet0/0:**
 - Status: On
 - IP Address: 192.168.16.1
 - Subnet Mask: 255.255.255.0
- **GigabitEthernet0/1:**
 - Status: Off
- **Serial0/0/0:** (Router 2 → Router 1)
 - Status: On
 - IP Address: 192.168.100.1
 - Subnet Mask: 255.255.255.252

- Clock Rate: 2000000
 - **Serial0/0/1: (Router 2 → Router 3)**
 - Status: On
 - IP Address: 12.0.0.1
 - Subnet Mask: 255.255.255.252
 - Clock Rate: 2000000
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3.2 RIP Routing Configuration

The following networks were added to Router 2's RIP configuration:

```
nginx
CopyEdit
network 12.0.0.0
network 192.168.16.0
network 192.168.100.0
```

Reason:

RIP requires adding all networks that are connected to the router's interfaces.

3.3 DHCP Relay Configuration

Since PCs obtain their IPs dynamically, the router must forward DHCP requests:

```
nginx
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ip helper-address 192.168.16.10
```

(192.168.16.10 is the DHCP server's IP; change according to your network.)

4. DHCP Server Configuration

- **IP Configuration:**
 - IP Address: 192.168.16.10
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 192.168.16.1
 - DNS Server: 20.16.0.10 (or leave blank if DNS not used)
- **DHCP Service: On**
- **Custom Pool Example (Pool Name: pool192):**
 - Default Gateway: 192.168.16.1
 - DNS Server: 20.16.0.10

- Start IP: 192.168.16.11
 - Subnet Mask: 255.255.255.0
 - Max Users: 30
 - **Default Server Pool (Modified):**
 - Default Gateway: 0.0.0.0
 - DNS Server: 20.16.0.10
 - Start IP: 0.0.0.0
 - Subnet Mask: 0.0.0.0
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5. DNS Server Configuration

- **IP Configuration:**
 - IP Address: 20.16.0.10
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 20.16.0.1 (Router 3 IP)
 - DNS: 0.0.0.0
 - **DNS Service: On**
 - **Resource Record:**
 - Name: www.localhost.com
 - Type: A Record
 - Address: 192.168.16.10
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6. Final Network Overview

1. Three routers connected via serial links with correct clock rates.
 2. RIP routing enabled for all connected networks.
 3. DHCP server providing IP addresses dynamically to PCs.
 4. DNS server resolving domain names to IP addresses.
 5. Proper gateway and subnet mask configurations ensuring smooth connectivity.
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7. Conclusion

This project demonstrated the complete setup of a small-scale multi-router network in Cisco Packet Tracer with DHCP and DNS services. The key learning outcomes included:

- Configuring serial interfaces and assigning clock rates.
- Implementing RIP routing for inter-network communication.
- Setting up DHCP for automatic IP allocation.

- Configuring DNS to resolve hostnames to IP addresses.

This practical exercise enhanced our understanding of IP addressing, routing protocols, and network service configurations in a simulated environment.