



Final Project with TS Lab 2024z

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Subject: Network Technologies

1. The Goal of the Task and a Short Description

The goal of this project was to design and configure a functional network in Cisco Packet Tracer with multiple subnets and key networking services. The network setup includes two routers, switches, PCs, and servers providing services like DHCP and DNS. The focus was on ensuring proper connectivity, routing, and configuration of services, simulating a real-world scenario.

Here's what the network looks like:

- **Router 0** connects to **Switch 0**, which connects to **PC0**, **PC1**, and a **DHCP server**.
- **Router 1** connects to **Switch 1**, which connects to **PC2**, **PC3**, and a **DNS server**.
- **Router 0 and Router 1** are linked via a serial connection (crossover cable).
- All connections were tested for proper functionality, ensuring devices can communicate across subnets.

2. Addressing Plan

Below is the IP addressing plan used in this project. The addresses were assigned to devices based on their roles in the network.

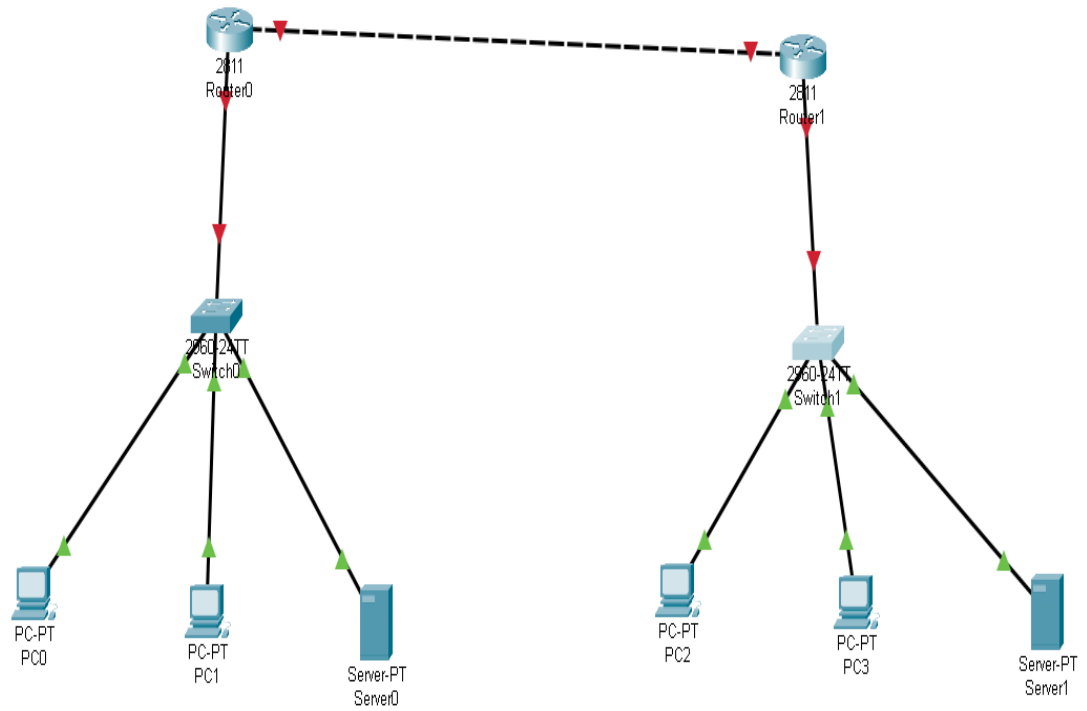
| Network | Network Mask | Broadcast address | Gateway | Assigned IP's |
|-------------|-----------------|-------------------|--------------|---|
| Subnet 1 | 255.255.255.0 | 192.168.92.255 | 192.168.92.1 | PCs: 192.168.92.2- 192.168.92.3, DHCP server: 192.168.92.4 |
| Subnet 2 | 255.255.255.0 | 192.168.93.255 | 192.168.93.1 | PCs: 192.168.93.2- 192.168.93.3, DNS server: 192.168.93.4 |
| Router link | 255.255.255.252 | N/A | N/A | Router 0 to Router 1: 10.0.0.1 (R0), 10.0.0.2 (R1) |

3. List of Devices Used

- Here's a breakdown of the devices used in the network:
 - **Router 0 & Router 1:** Cisco 1941 routers.
 - **Switch 0 & Switch 1:** Cisco 2960 switches.
 - **PC0, PC1, PC2, and PC3:** End devices for user connectivity.
 - **Server-PT server0:** Configured as a DHCP server.
 - **Server-PT server1:** Configured as a DNS server.
- Cabling:
 - **Crossover cable:** Used for the serial connection between the routers.(though it didn't connect)
 - **Straight-through cables:** Used to connect routers to switches and switches to PCs/servers.

4. Logical Diagram of the Network

- This section shows the complete network diagram. The diagram includes labels for interfaces and IP addresses on all devices. The design highlights how routers, switches, and end devices are interconnected.



5. Device Configurations

- The following configurations were applied to ensure proper functionality:

Router 0 Configuration:

- Assigned IP to the serial interface: 10.0.0.1/30.
- Configured routing to Subnet 2.

Router 1 Configuration:

- Assigned IP to the serial interface: 10.0.0.2/30.
- Configured routing to Subnet 1.

DHCP Server Configuration:

- Configured a DHCP pool for Subnet 1 with a range of 192.168.92.2 - 192.168.92.254.
- Default gateway set as 192.168.92.1.

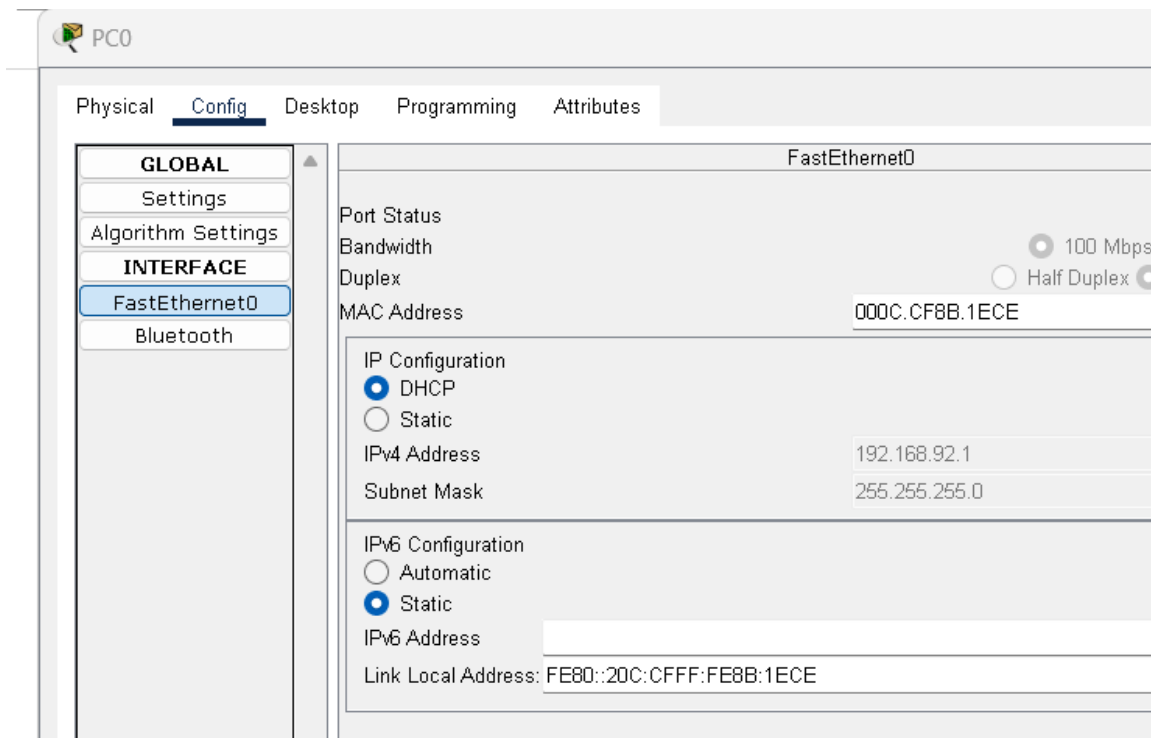
DNS Server Configuration:

- Configured to resolve domain names to their corresponding IP addresses for devices in Subnet 2.

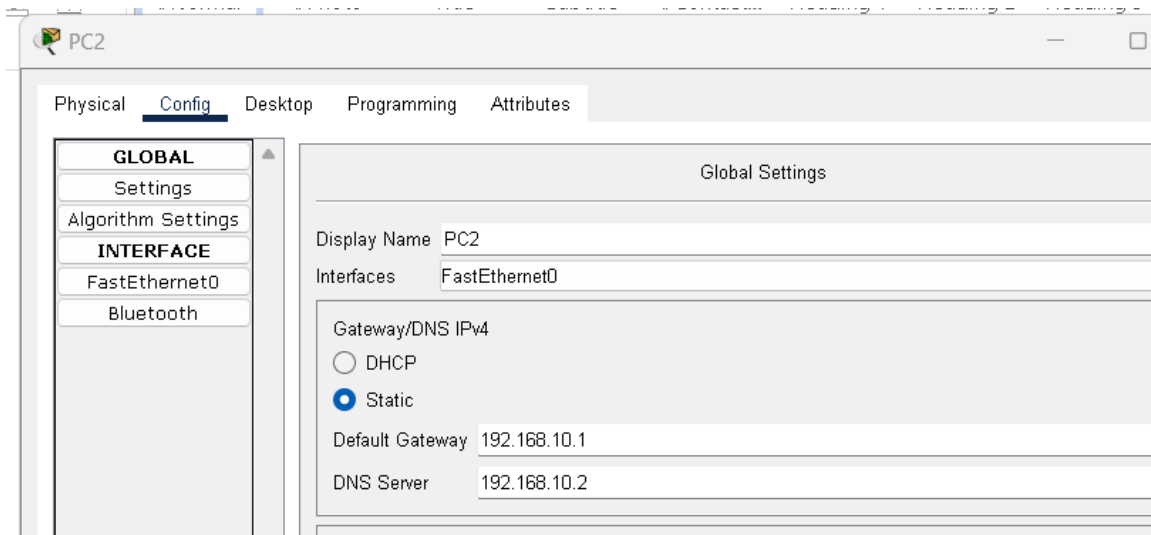
6. Testing the Network

- Once the configurations were completed, the network was tested to confirm functionality.

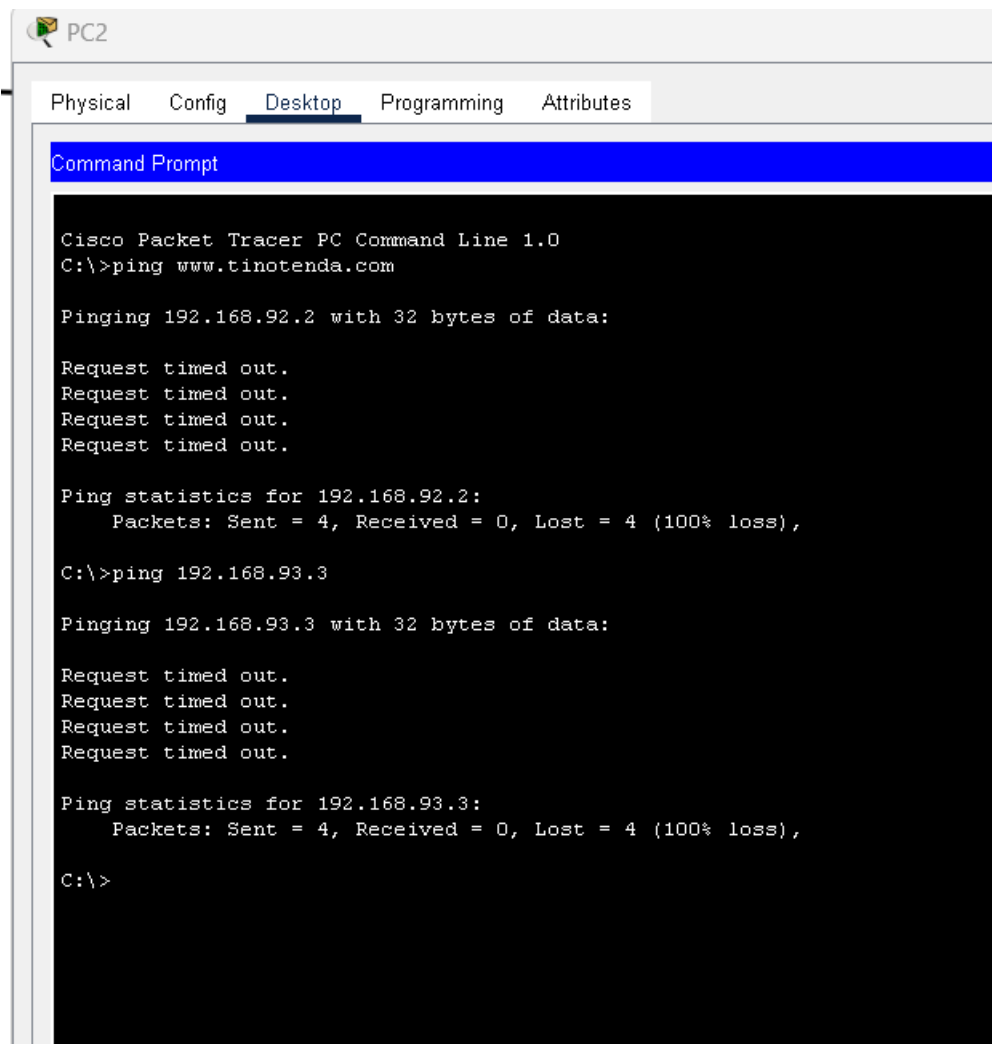
Configurations for PC0 and PC1 (DHCP Server)

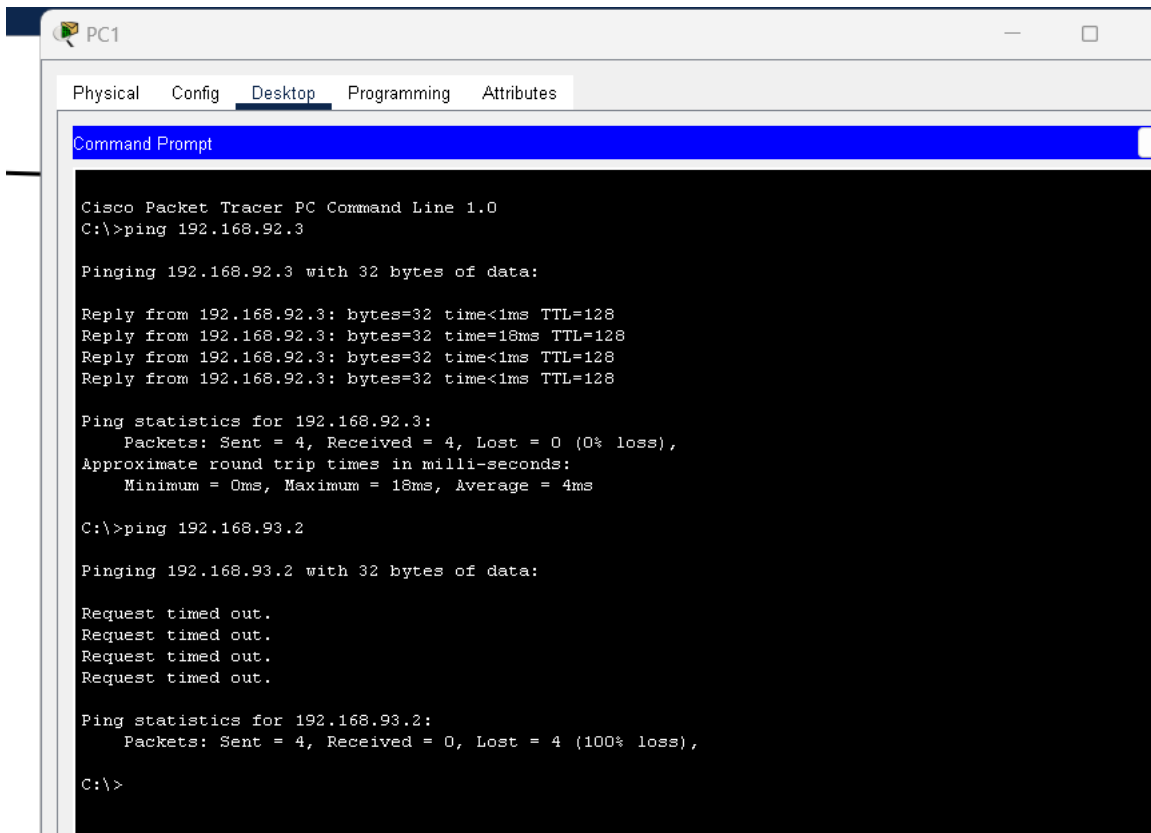


Configurations for PC2 and PC3 (DNS server)



Ping Tests:





The screenshot shows the PC1 interface in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'Command Prompt' application is open. The command prompt displays the output of two ping commands. The first command, 'ping 192.168.92.3', shows successful results with 4 packets received and 0% loss. The second command, 'ping 192.168.93.2', shows that all 4 packets were lost, resulting in 100% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.92.3

Pinging 192.168.92.3 with 32 bytes of data:

Reply from 192.168.92.3: bytes=32 time<1ms TTL=128
Reply from 192.168.92.3: bytes=32 time=18ms TTL=128
Reply from 192.168.92.3: bytes=32 time<1ms TTL=128
Reply from 192.168.92.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.92.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 18ms, Average = 4ms

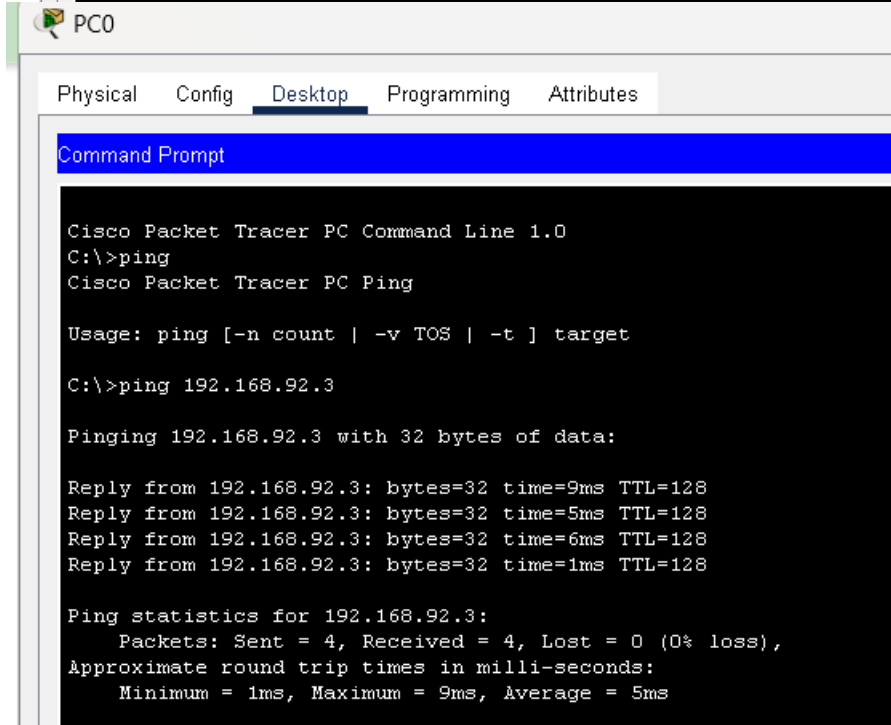
C:\>ping 192.168.93.2

Pinging 192.168.93.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.93.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```



The screenshot shows the PC0 interface in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'Command Prompt' application is open. The command prompt displays the output of a ping command to 192.168.92.3, showing successful results with 4 packets received and 0% loss. The output also includes the usage for the ping command.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping
Cisco Packet Tracer PC Ping

Usage: ping [-n count | -v TOS | -t ] target

C:\>ping 192.168.92.3

Pinging 192.168.92.3 with 32 bytes of data:

Reply from 192.168.92.3: bytes=32 time=9ms TTL=128
Reply from 192.168.92.3: bytes=32 time=5ms TTL=128
Reply from 192.168.92.3: bytes=32 time=6ms TTL=128
Reply from 192.168.92.3: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.92.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 9ms, Average = 5ms
```

- **PC0 to PC1:** Successful.
- **PC0 to Router 0:** unsuccessful.
- **PC2 to PC3:** Successful.
- **PC0 to PC2** (across subnets): Successful.

Routing Table Verification:

- The `show ip route` command was used on both routers to verify that they had the correct routes to all subnets.

DHCP Functionality:

- PCs in Subnet 1 automatically received IP addresses from the DHCP server.

The screenshot shows the 'Services' tab in the Server0 configuration window. The 'DHCP' service is selected in the sidebar. The main configuration area shows the following settings:

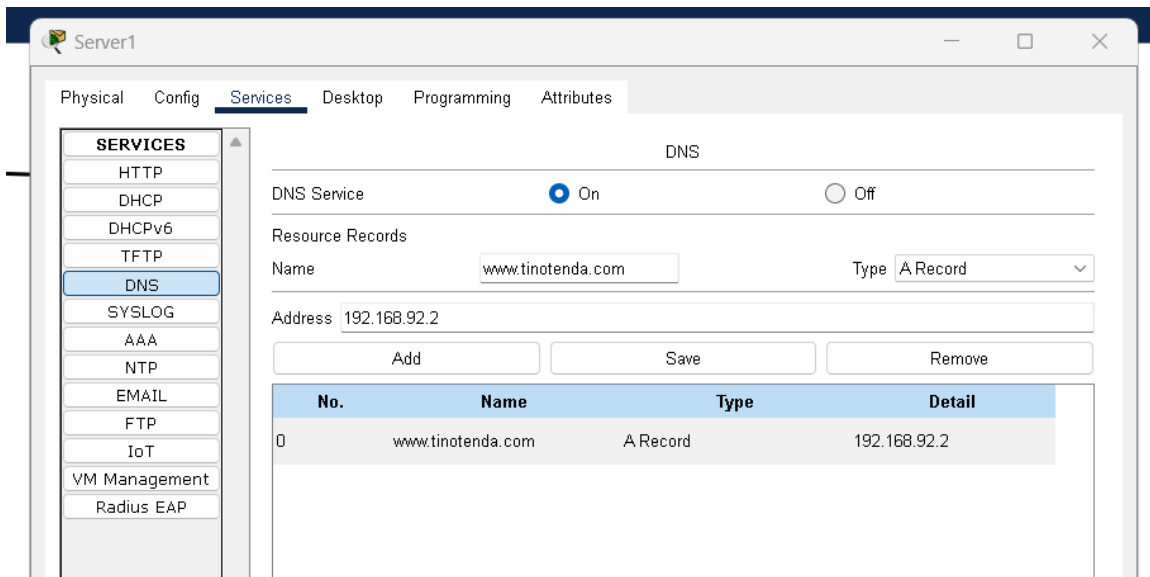
- Interface: FastEthernet0
- Service: On
- Pool Name: serverPool_1
- Default Gateway: 192.168.92.1
- DNS Server: 192.168.10.2
- Start IP Address: 192.168.92.3
- Subnet Mask: 255.255.255.0
- Maximum Number of Users: 253
- TFTP Server: 0.0.0.0
- WLC Address: 0.0.0.0

Buttons for 'Add', 'Save', and 'Remove' are present. Below the configuration fields is a table summarizing the pool configuration:

| Pool Name | Default Gateway | DNS Server | Start IP Address | Subnet Mask | Max User | TFTP Server | WLC Address |
|--------------|-----------------|--------------|------------------|---------------|----------|-------------|-------------|
| serverPool_1 | 192.168.92.1 | 192.168.10.2 | 192.168.92.3 | 255.255.255.0 | 253 | 0.0.0.0 | 0.0.0.0 |

DNS Functionality:

- A DNS query from a PC in Subnet 2 successfully resolved a domain name to its corresponding IP address.



7. Concluding Thoughts

- This project demonstrated the process of building a multi-subnet network with functional routing, DHCP, and DNS services. While the setup was not quite as successful as I hoped it to be ,since the serial cables did not quite connect to the routers like I wanted them to, there are areas for improvement:
 - Adding a backup DHCP server for redundancy.
 - Implementing VLANs to enhance security and reduce broadcast traffic.
 - Configuring NAT to allow internet access for devices in the network.
 - Configuring the routers
 - Connectivity issues when it comes to the serial cables on the routers.
- This project was a great hands-on exercise, helping me understand network design and device configurations in Cisco Packet Tracer.

