

**Project Name :-**

# Static Routing Configuration Lab – CCNA

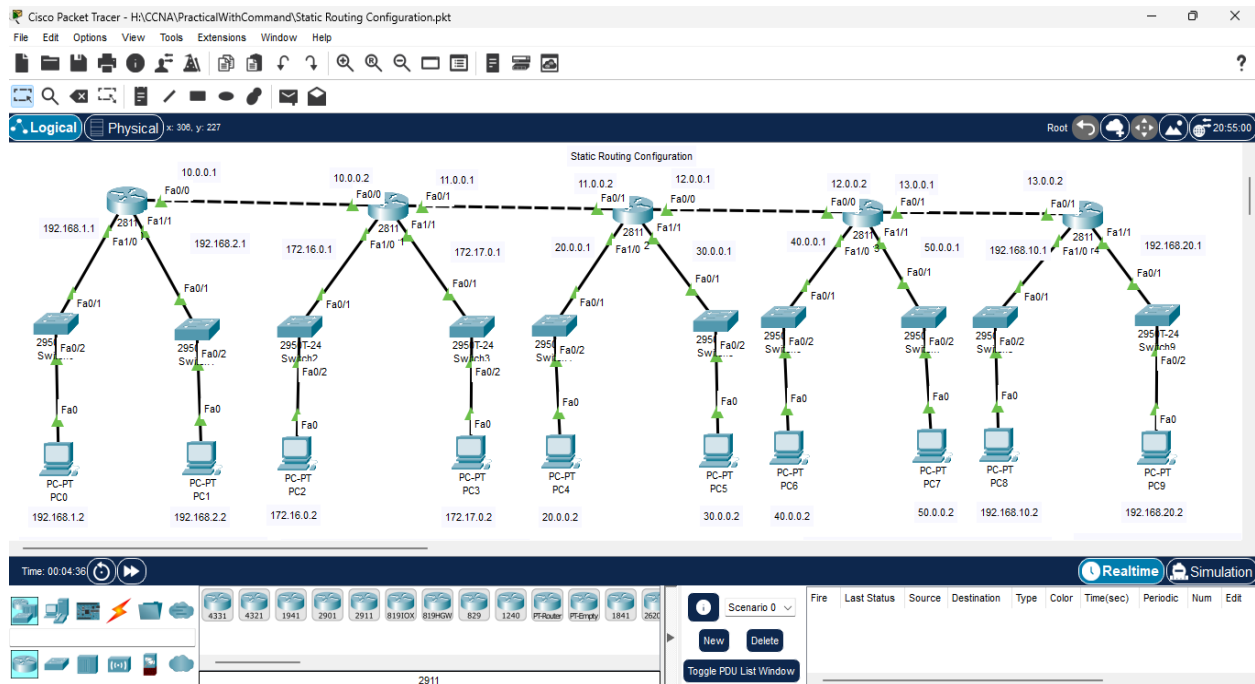
- **Name :-**

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- **Objective / Purpose :-**

Learn and implement static routing across multi-router topology.

## • Network Topology Diagram :-



• **Lab Setup :-**

Router	Interfaces	IP Address	Subnet Mask	Description
R1	Fa 0/0	10.0.0.1	255.0.0.0	Connected to R2
	Fa 1/0	192.168.1.1	255.255.255.0	Connected to S1
	Fa 1/1	192.168.2.1	255.255.255.0	Connected to S2
R2	Fa 0/0	10.0.0.2	255.0.0.0	Connected to R1
	Fa 0/1	11.0.0.1	255.0.0.0	Connected to R3
	Fa 1/0	172.16.0.1	255.255.0.0	Connected to S3
	Fa 1/1	172.17.0.1	255.255.0.0	Connected to S4
R3	Fa 0/0	12.0.0.1	255.0.0.0	Connected to R4
	Fa 0/1	11.0.0.2	255.0.0.0	Connected to R2
	Fa 1/0	20.0.0.1	255.0.0.0	Connected to S5
	Fa 1/1	30.0.0.1	255.0.0.0	Connected to S6
R4	Fa 0/0	12.0.0.2	255.0.0.0	Connected to R3
	Fa 0/1	13.0.0.1	255.0.0.0	Connected to R5
	Fa 1/0	40.0.0.1	255.0.0.0	Connected to S7
	Fa 1/1	50.0.0.1	255.0.0.0	Connected to S8
R5	Fa 0/1	13.0.0.2	255.0.0.0	Connected to R4
	Fa 1/0	192.168.10.1	255.0.0.0	Connected to S9
	Fa 1/1	192.168.20.1	255.0.0.0	Connected to S10

- **Configuration Steps :-**

- Configured IP addresses directly on router interfaces for each connected network.

- Implemented static routes using the “ip route [network] [mask] [next-hop]” command to enable inter-network communication.

**Router 1 :-**

```
>enable
```

```
#configure terminal
```

```
(config)# hostname R1
```

```
R1(config)# ip route 172.16.0.0 255.255.0.0 10.0.0.2
```

```
R1 (config)# ip route 172.17.0.0 255.255.0.0 10.0.0.2
```

```
R1 (config)# ip route 20.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 30.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 40.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 50.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 11.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 12.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 13.0.0.0 255.0.0.0 10.0.0.2
```

```
R1 (config)# ip route 192.168.10.0 255.255.255.0 10.0.0.2
```

```
R1 (config)# ip route 192.168.20.0 255.255.255.0 10.0.0.2
```

## Router 2 :-

```
>enable
```

```
#configure terminal
```

```
(config)# hostname R2
```

```
R2(config)# ip route 192.168.1.0 255.255.255.0 10.0.0.1
```

```
R2 (config)# ip route 192.168.2.0 255.255.255.0 10.0.0.1
```

```
R2 (config)# ip route 20.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 30.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 40.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 50.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 12.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 12.0.0.0 255.0.0.0 11.0.0.2
```

```
R2 (config)# ip route 192.168.10.0 255.255.255.0 12.0.0.2
```

```
R2 (config)# ip route 192.168.20.0 255.255.255.0 12.0.0.1
```

## Router 3 :-

```
>enable
```

```
#configure terminal
```

```
(config)# hostname R3
```

```
R3 (config)# ip route 192.168.1.0 255.255.255.0 11.0.0.1
```

```
R3 (config)# ip route 192.168.2.0 255.255.255.0 11.0.0.1
```

```
R3 (config)# ip route 172.16.0.0 255.255.0.0 11.0.0.1
```

```
R3 (config)# ip route 172.17.0.0 255.255.0.0 11.0.0.1
```

```
R3 (config)# ip route 10.0.0.0 255.0.0.0 11.0.0.1
```

```
R3 (config)# ip route 40.0.0.0 255.0.0.0 12.0.0.2
```

```
R3 (config)# ip route 50.0.0.0 255.0.0.0 12.0.0.2
```

```
R3 (config)# ip route 192.168.10.0 255.255.255.0 12.0.0.2
```

```
R3 (config)# ip route 192.168.20.0 255.255.255.0 12.0.0.2
```

```
R3 (config)# ip route 13.0.0.0 255.0.0.0 12.0.0.2
```

## Router 4 :-

```
>enable
```

```
#configure terminal
```

```
(config)# hostname R4
```

```
R4 (config)# ip route 192.168.1.0 255.255.255.0 12.0.0.1
```

```
R4 (config)# ip route 192.168.2.0 255.255.255.0 12.0.0.1
```

```
R4 (config)# ip route 172.16.0.0 255.255.0.0 12.0.0.1
```

```
R4 (config)# ip route 172.17.0.0 255.255.0.0 12.0.0.1
```

```
R4 (config)# ip route 20.0.0.0 255.0.0.0 12.0.0.1
```

```
R4 (config)# ip route 30.0.0.0 255.0.0.0 12.0.0.1
```

```
R4 (config)# ip route 10.0.0.0 255.0.0.0 12.0.0.1
```

```
R4 (config)# ip route 11.0.0.0 255.0.0.0 12.0.0.1
```

```
R4 (config)# ip route 192.168.10.0 255.255.255.0 13.0.0.2
```

```
R4 (config)# ip route 192.168.20.0 255.255.255.0 13.0.0.2
```



## Router 5 :-

```
>enable
```

```
#configure terminal
```

```
(config)# hostname R5
```

```
R5 (config)# ip route 192.168.1.0 255.255.255.0 13.0.0.1
```

```
R5 (config)# ip route 192.168.2.0 255.255.255.0 13.0.0.1
```

```
R5 (config)# ip route 172.16.0.0 255.255.0.0 13.0.0.1
```

```
R5 (config)# ip route 172.17.0.0 255.255.0.0 13.0.0.1
```

```
R5 (config)# ip route 20.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 30.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 40.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 50.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 10.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 11.0.0.0 255.0.0.0 13.0.0.1
```

```
R5 (config)# ip route 12.0.0.0 255.0.0.0 13.0.0.
```

## • Ping Test Section :-

The image shows a Cisco Packet Tracer interface with a network topology and a PC command prompt window.

**Network Topology:**

- A central router (R1) with IP 10.0.0.1 is connected to three switches (S1, S2, S3) via Fa0/0.
- Each switch is connected to a PC (PC0, PC1, PC2) via Fa0/24.
- The switches have the following IP addresses: S1 (192.168.1.1), S2 (192.168.2.1), and S3 (172.16.0.1).
- The PCs have the following IP addresses: PC0 (192.168.1.2), PC1 (192.168.2.2), and PC2 (172.16.0.2).

**PC Command Prompt (PC8):**

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=251
Reply from 192.168.1.1: bytes=32 time=10ms TTL=251
Reply from 192.168.1.1: bytes=32 time<1ms TTL=251
Reply from 192.168.1.1: bytes=32 time=10ms TTL=251

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 5ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time<1ms TTL=123
Reply from 192.168.2.2: bytes=32 time=3ms TTL=123
Reply from 192.168.2.2: bytes=32 time<1ms TTL=123
Reply from 192.168.2.2: bytes=32 time=10ms TTL=123

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 3ms

C:\>ping 172.17.0.2

Pinging 172.17.0.2 with 32 bytes of data:

Request timed out.
Reply from 172.17.0.2: bytes=32 time=10ms TTL=124
Reply from 172.17.0.2: bytes=32 time=13ms TTL=124
Reply from 172.17.0.2: bytes=32 time=11ms TTL=124
```

The image shows a Cisco Packet Tracer interface with a network topology and a PC0 command prompt window.

**Network Topology:**

- A central router (R1) with IP 10.0.0.1 is connected to three switches (S1, S2, S3) via Fa0/0.
- Each switch is connected to a PC (PC0, PC1, PC2) via Fa0/24.
- The switches have the following IP addresses: S1 (192.168.1.1), S2 (192.168.2.1), and S3 (172.16.0.1).
- The PCs have the following IP addresses: PC0 (192.168.1.2), PC1 (192.168.2.2), and PC2 (172.16.0.2).

**PC0 Command Prompt:**

```
C:\>ping 50.0.0.2

Pinging 50.0.0.2 with 32 bytes of data:

Reply from 50.0.0.2: bytes=32 time=2ms TTL=124
Reply from 50.0.0.2: bytes=32 time=11ms TTL=124
Reply from 50.0.0.2: bytes=32 time<1ms TTL=124
Reply from 50.0.0.2: bytes=32 time=11ms TTL=124

Ping statistics for 50.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 6ms

C:\>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=11ms TTL=252
Reply from 40.0.0.1: bytes=32 time=15ms TTL=252
Reply from 40.0.0.1: bytes=32 time<1ms TTL=252
Reply from 40.0.0.1: bytes=32 time=11ms TTL=252

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 15ms, Average = 9ms

C:\>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time=13ms TTL=251
Reply from 192.168.20.1: bytes=32 time=11ms TTL=251
Reply from 192.168.20.1: bytes=32 time=23ms TTL=251
Reply from 192.168.20.1: bytes=32 time=11ms TTL=251

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

The image displays the Cisco Packet Tracer interface for a static routing configuration lab. The main window shows a network topology with three routers (R1, R2, R3) and three PCs (PC0, PC1, PC2). The routers are connected in a triangle topology. R1 is connected to R2 and R3. R2 is connected to R1 and R3. R3 is connected to R1 and R2. The PCs are connected to the routers: PC0 to R1, PC1 to R2, and PC2 to R3. The IP addresses for the routers and PCs are shown. The command prompt window is open, showing the results of a ping command from PC0 to 30.0.0.2. The output shows that the ping was successful, with a TTL of 125 and a round trip time of 14ms. The command prompt also shows the results of a ping command from PC0 to 20.0.0.2, which was also successful, with a TTL of 125 and a round trip time of 12ms.

**Command Prompt Output:**

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 30.0.0.2: bytes=32 time=20ms TTL=125
Reply from 30.0.0.2: bytes=32 time=11ms TTL=125
Reply from 30.0.0.2: bytes=32 time=15ms TTL=125
Reply from 30.0.0.2: bytes=32 time=11ms TTL=125

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 11ms, Maximum = 20ms, Average = 14ms

C:\>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 20.0.0.2: bytes=32 time=10ms TTL=125
Reply from 20.0.0.2: bytes=32 time=11ms TTL=125
Reply from 20.0.0.2: bytes=32 time=11ms TTL=125
Reply from 20.0.0.2: bytes=32 time=16ms TTL=125

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 16ms, Average = 12ms

C:\>
```

- **Observations :-**

1. Successfully configured static routes between all routers.
2. Static routing works well for small networks.
3. Ping test confirmed end-to-end connectivity.

- **Challenges / Troubleshooting :-**

1. Some ping tests initially failed → resolved by verifying next-hop Ips.
2. Keeping track of multiple routes for multi-router topology required careful planning.