

Static Routing With 2 Router Connections

Objective:

The objective of this lab is to demonstrate the implementation of static routing on Cisco routers to enable communication between two different subnets connected through a point-to-point WAN link.

Theory:

Static routing involves manually configuring routing entries in the routing table of each router. These entries map destination networks to the appropriate next-hop IP addresses or interfaces. Static routing is suitable for small networks with relatively stable topologies, as manual intervention is required to update the routing table whenever there are network changes.

Connections:

The network topology consists of the following components:

- Routers:
 - 2 Cisco routers (Router1 and Router2)
- Switches:
 - 2 switches (Switch1 and Switch2)
- End Devices:
 - 2 PCs (PC0 and PC1) connected to Switch1
 - 2 Laptops (Laptop2 and Laptop3) connected to Switch2

Interconnections:

- Router1 and Router2 are connected via a point-to-point WAN link using IP addresses 10.1.1.0/24.
- Router1 (192.168.10.100/24) is connected to Switch1 with subnet 192.168.10.0/24.
- Router2 (172.16.1.100/16) is connected to Switch2 with subnet 172.16.1.0/16.
- PC0 (192.168.10.10/24) and Laptop2 (192.168.10.11/24) are connected to Switch1.
- PC1 (172.16.1.10/16) and Laptop3 (172.16.1.11/16) are connected to Switch2.

IP Addressing:

- **Router**
 - Router1: LAN - 192.168.10.100/24, WAN - 10.1.1.0/24
 - Router2: LAN - 172.16.1.100/16, WAN - 10.1.1.0/24

- **Switch**

- Switch1: 192.168.10.0/24
- Switch2: 172.16.1.0/16

- **End Devices**

- PC0: 192.168.10.10/24
- Laptop2: 192.168.10.11/24
- PC1: 172.16.1.10/16
- Laptop3: 172.16.1.11/16

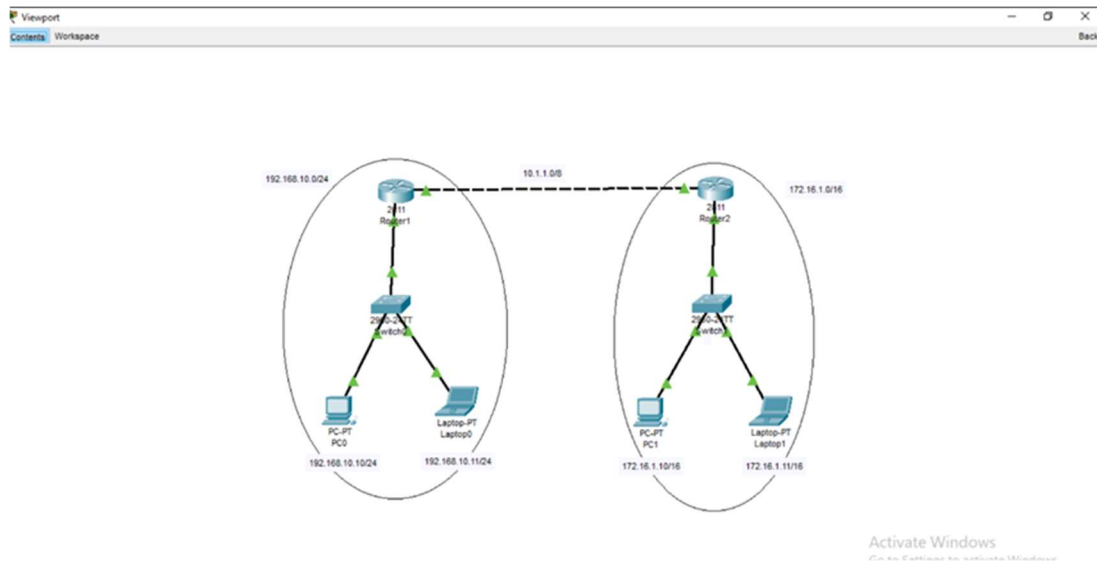
Default Gateways:

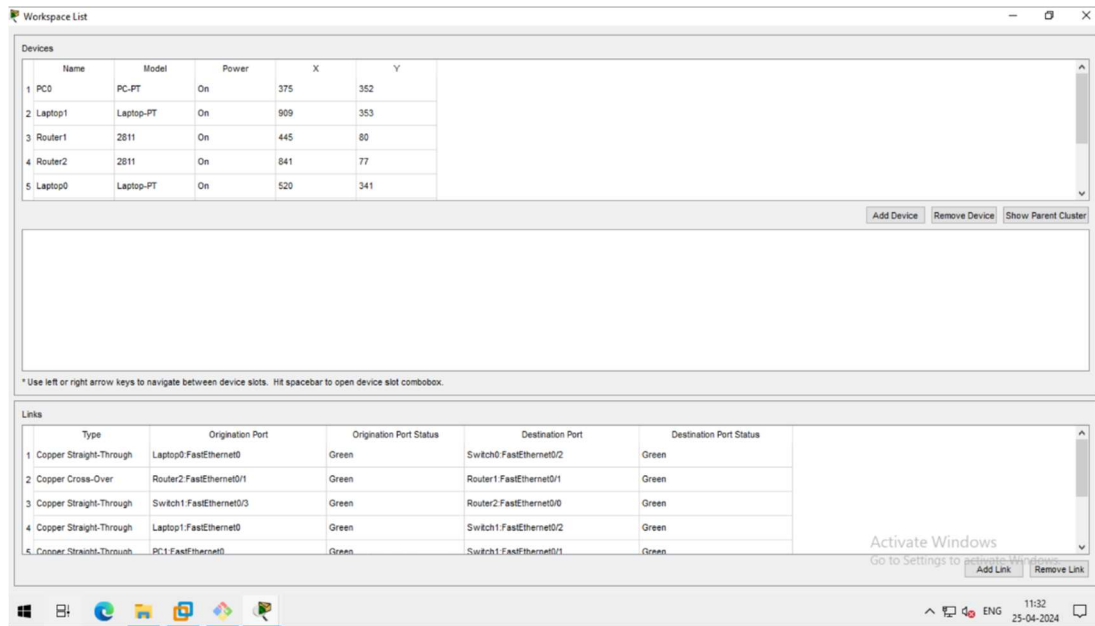
- Devices in the 192.168.10.0/24 subnet use Router1 (192.168.10.100/24) as the default gateway.
- Devices in the 172.16.1.0/16 subnet use Router2 (172.16.1.100/16) as the default gateway.

LAN Interfaces:

- **Router1:** fa0/0 (192.168.10.100/24)
- **Router2:** fa0/0 (172.16.1.100/16)

The connections between the routers and switches are likely made using Ethernet cables, while the WAN link between the routers may use dedicated serial cables depending on the specific implementation.



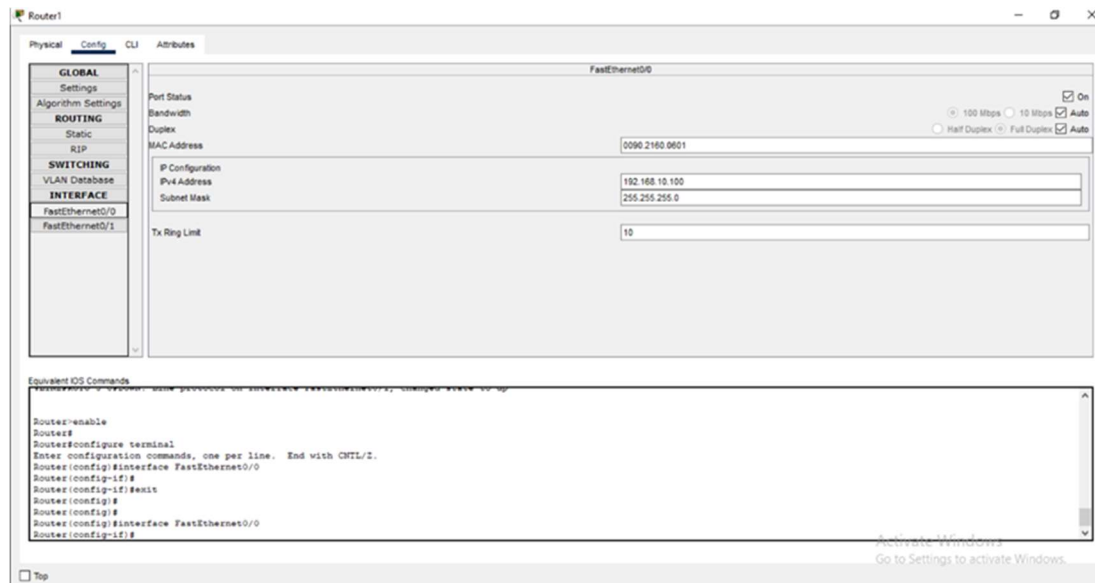


Configuration:

To enable communication between the two subnets, static routes need to be configured on each router, pointing to the appropriate next-hop IP address for reaching the other subnet.

On Router1, the following static route would be configured:

Router1(config)# ip route 172.16.1.0 255.255.0.0 10.1.1.0



Router1

Physical Config CLI Attributes

GLOBAL Settings Algorithm Settings ROUTING Static RIP SWITCHING VLAN Database INTERFACE FastEthernet0/0 FastEthernet0/1

FastEthernet0/1

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0090.2160.0602

IP Configuration

Pv4 Address 10.1.1.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#

```

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Activate Windows
Go to Settings to activate Windows.

On Router2, the following static route would be configured:

Router2(config)# ip route 192.168.10.0 255.255.255.0 10.1.1.0

Router2

Physical Config CLI Attributes

GLOBAL Settings Algorithm Settings ROUTING Static RIP SWITCHING VLAN Database INTERFACE FastEthernet0/0 FastEthernet0/1

FastEthernet0/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0060.4737.C001

IP Configuration

Pv4 Address 172.16.1.100

Subnet Mask 255.255.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```

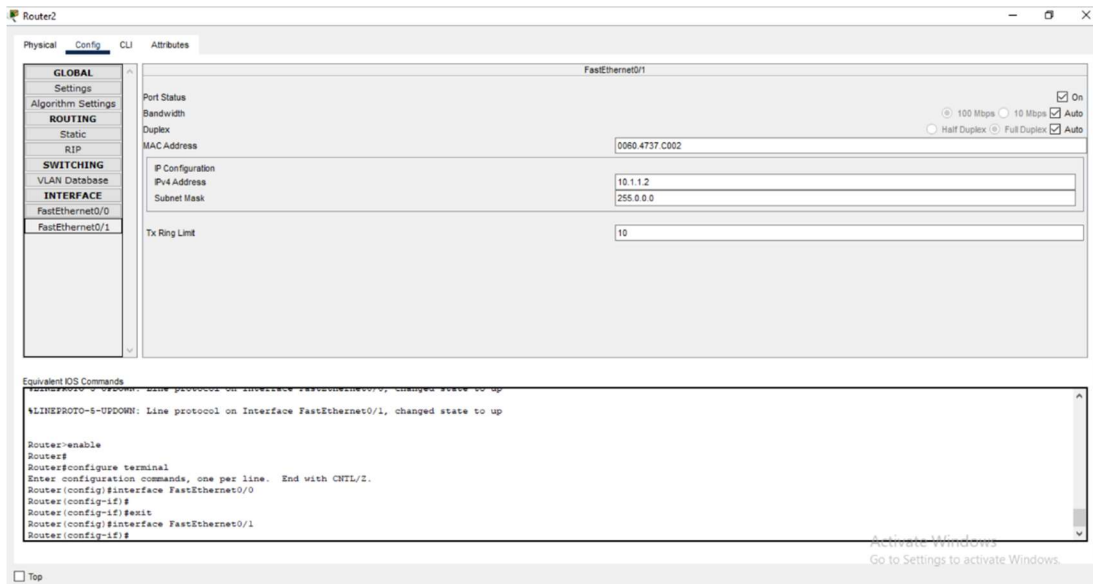
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#

```

☐ Top

Activate Windows
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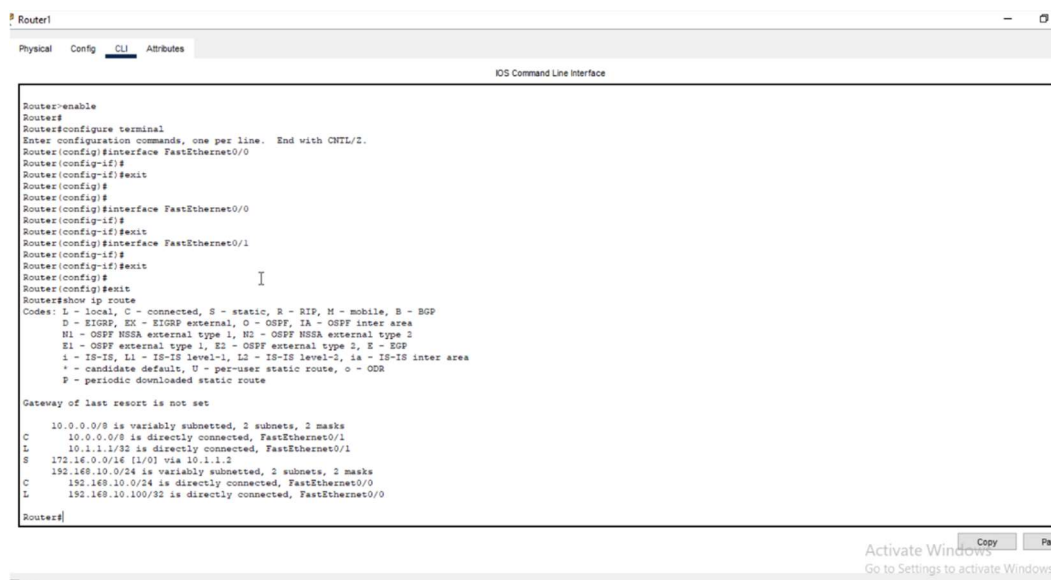


After each Router configuration, need to save the configuration from the settings.

These static routes inform the routers about the path to reach the remote subnet through the next-hop IP address on the WAN link.

Verification:

After configuring the static routes, you can verify the routing table using the "show ip route" command on each router. The output will display the configured static routes along with the directly connected networks.



```
Router2
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router#enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#
Router(config)#exit
Router#show ip route
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    10.0.0.0/8 is directly connected, FastEthernet0/1
L    10.1.1.2/32 is directly connected, FastEthernet0/1
L    172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    172.16.0.0/16 is directly connected, FastEthernet0/0
L    172.16.1.100/32 is directly connected, FastEthernet0/0
S    192.168.10.0/24 [1/0] via 10.1.1.1

Router#
```

Connectivity between the end devices in different subnets can be tested using tools like ping

Output:

