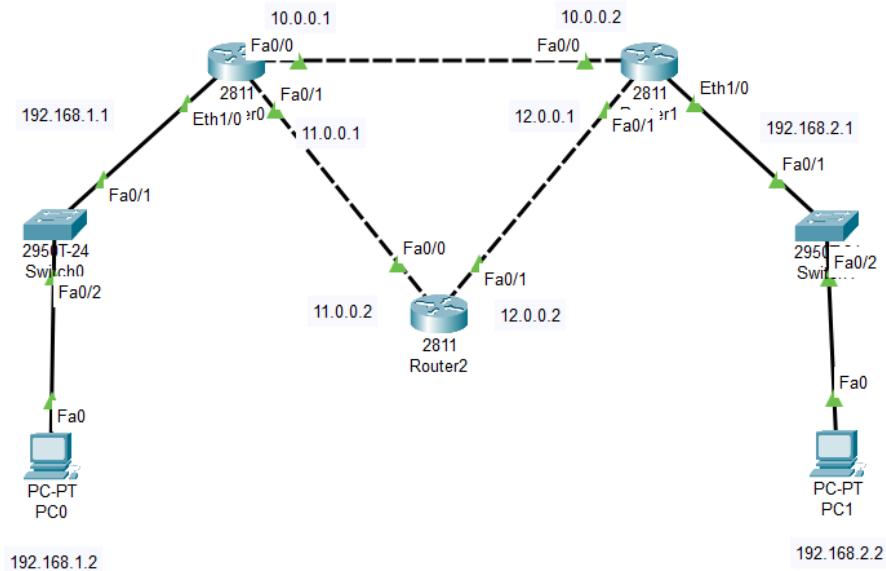


Practical No : 7

Aim : Configure a OSPF routing protocol with given scenario.



To configure **OSPF (Open Shortest Path First)** routing protocol for the given network topology, let's go through the **theory** and then move to **IP assignments, interfaces, and OSPF commands** for each router.

OSPF Routing Protocol - Theory (Overview)

OSPF is a **link-state dynamic routing protocol** used within a single Autonomous System (AS). It calculates the **shortest path** using **Dijkstra's algorithm** and has faster convergence compared to RIP.

Network Topology Overview (Based on Image)

There are:

- **3 Routers:** Router0, Router1, Router2
- **2 Switches**
- **2 PCs:** PC0 and PC1

IP Address and Interface Mapping:

Device	Interface	IP Address	Description
Router0	FastEthernet0/0	10.0.0.1	Link to Router1
	FastEthernet0/1	11.0.0.1	Link to Router2
	Ethernet1/0	192.168.1.1	Link to PC0 Network
Router1	FastEthernet0/0	10.0.0.2	Link to Router0
	FastEthernet0/1	12.0.0.1	Link to Router2
	Ethernet1/0	192.168.2.1	Link to PC1 Network
Router2	FastEthernet0/0	11.0.0.2	Link to Router0
	FastEthernet0/1	12.0.0.2	Link to Router1
PC0	FastEthernet0	192.168.1.2	Via Switch0
PC1	FastEthernet0	192.168.2.2	Via Switch1

OSPF Configuration - Basic Steps

► Router0 Configuration

```
Router> enable
```

```
Router# configure terminal
```

```
Router(config)# router ospf 1
```

```
Router(config-router)# network 10.0.0.0 0.0.0.255 area 0
```

```
Router(config-router)# network 11.0.0.0 0.0.0.255 area 0
```

```
Router(config-router)# network 192.168.1.0 0.0.0.255 area 0
```

```
Router(config-router)# exit
```

► Router1 Configuration

```
Router> enable
```

```
Router# configure terminal
```

```
Router(config)# router ospf 2
```

```
Router(config-router)# network 10.0.0.0 0.0.0.255 area 0
Router(config-router)# network 12.0.0.0 0.0.0.255 area 0
Router(config-router)# network 192.168.2.0 0.0.0.255 area 0
Router(config-router)# exit
```

► Router2 Configuration

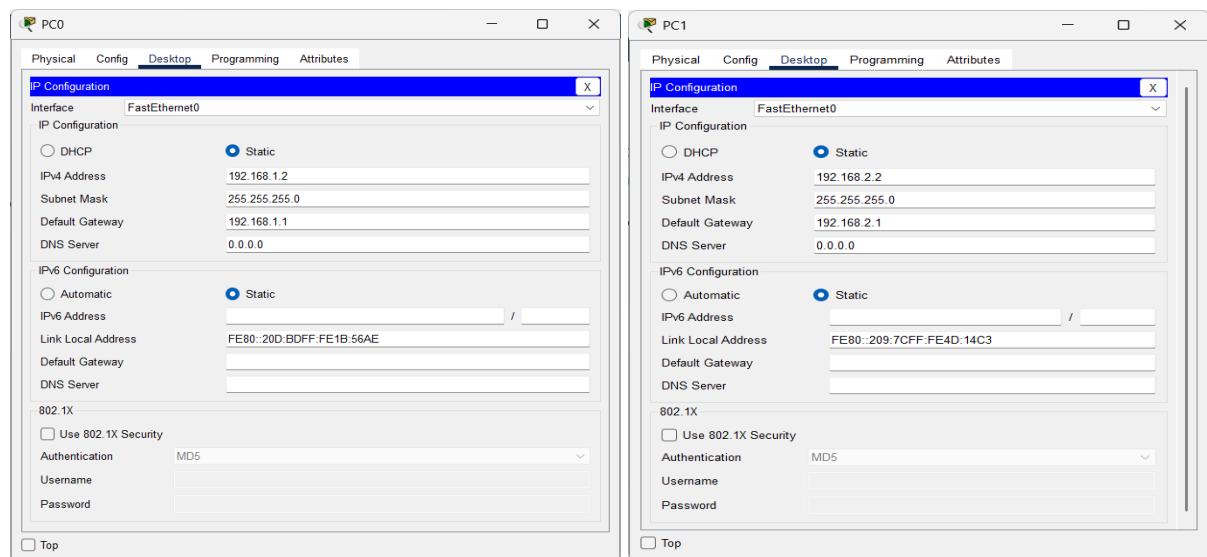
```
Router> enable
Router# configure terminal
Router(config)# router ospf 3
Router(config-router)# network 11.0.0.0 0.0.0.255 area 0
Router(config-router)# network 12.0.0.0 0.0.0.255 area 0
Router(config-router)# exit
```

Verification Commands :

On each router, after configuration:

```
Router# show ip route ospf
Router# show ip ospf neighbor
Router# ping <destination-ip>
```

E.g., from Router0: ping 192.168.2.2



Router

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Ethernet1/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Ethernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

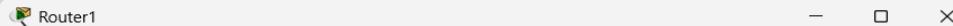
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

00:37:31: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

Top

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Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Ethernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#ip address 12.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#interface Ethernet1/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Ethernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#router ospf 2
Router(config-ospf-2)router ospf 2 router ospf 2 network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 12.0.0.0 0.255.255.255 area 0
Router(config-router)#network 12.0.0.0 0.255.255.255 area 0
00:37:18: %OSPF-5-ADJCHG: Process 2, Nbr 192.168.1.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done
```

Top

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Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

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

Router(config-if)#router ospf 3
Router(config-router)#network 11.0.0.0 0.255.255.255 area 0
Router(config-router)#network 12.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:42:22: %OSPF-5-ADJCHG: Process 3, Nbr 192.168.1.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done

Router(config)#
00:42:30: %OSPF-5-ADJCHG: Process 3, Nbr 192.168.2.1 on FastEthernet0/1 from LOADING to FULL,
Loading Done

Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

```

Top

