

SYCS CN

PRACTICAL 6

AIM :

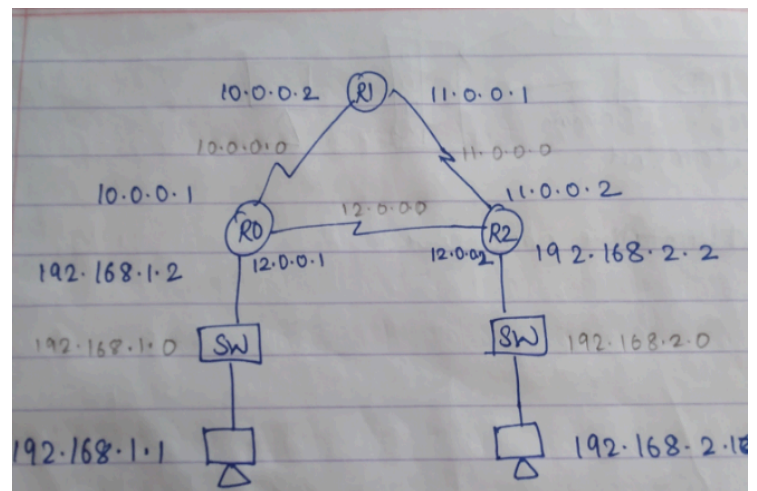
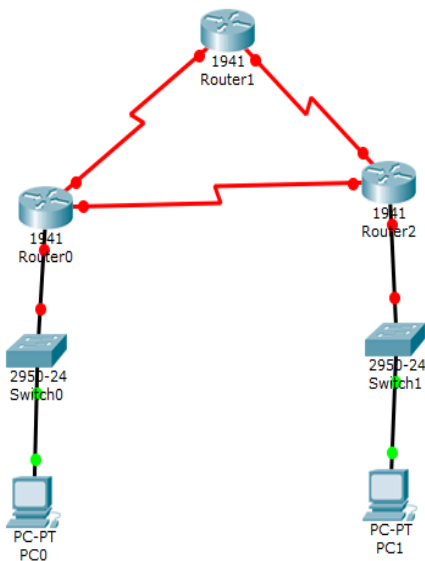
Using Packet Tracer, create a network with three routers with OSPF and each router associated network will have a minimum of three PCs. Show Connectivity.

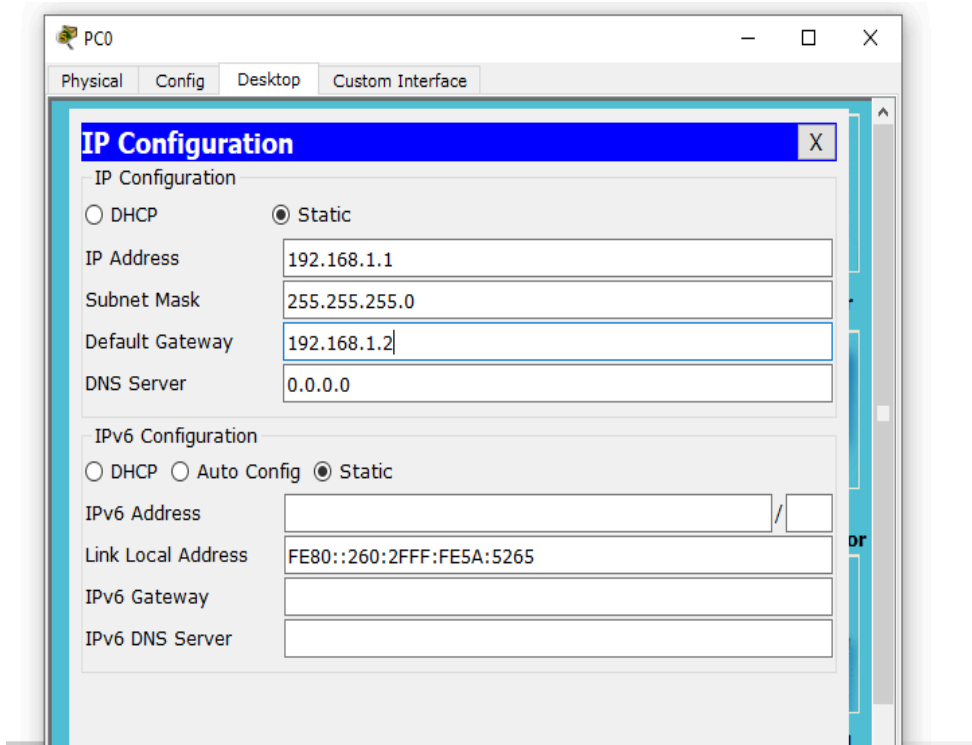
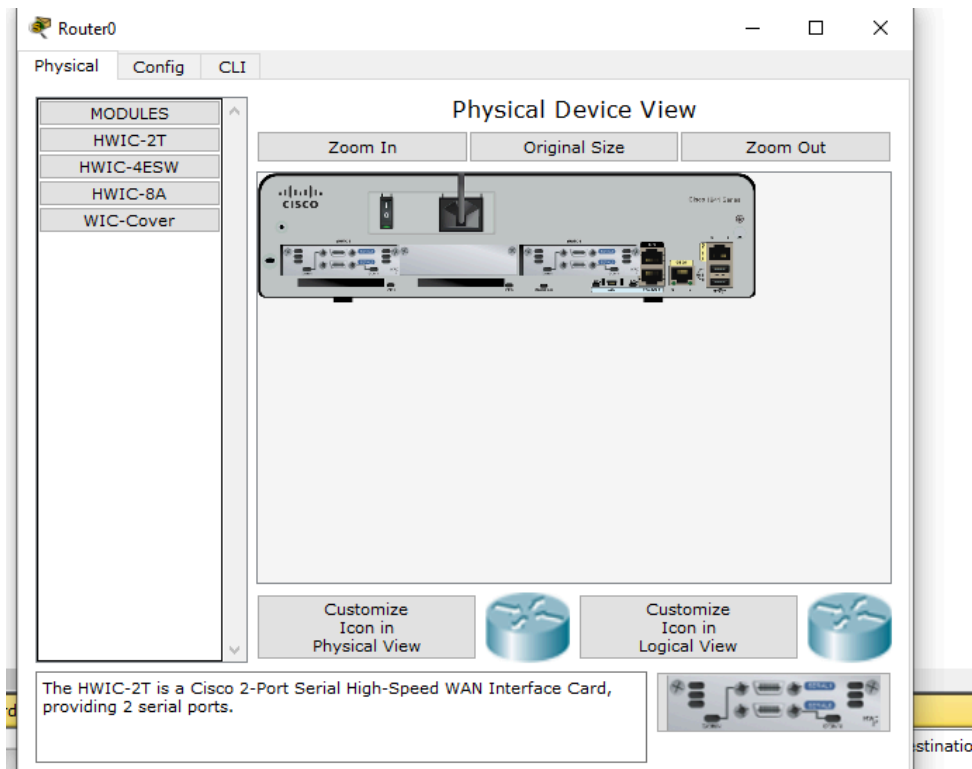
Open Shortest Path First (OSPF) is a routing protocol developed by Internet Engineering Task Force (IETF).

- OSPF is standards-based which means it is available on routers.
- OSPF divides its routing domain into smaller sub-divisions called areas. These OSPF areas are numbered and each may have several OSPF routers in it.
- OSPF area 0 is at the center of an OSPF domain and all other areas are connected to it. It is basically a star topology of OSPF areas, area 0 being at the center of the star.
- The advantage of OSPF areas is that most of the routing information is contained within an area and only summarized routing information is sent to routers in other areas.
- This makes OSPF very efficient in terms of usage of resources like processing power, memory, and bandwidth. The conservative resource usage in turn enables OSPF to scale well to very large topologies.
- The strength of the OSPF is that it is a hierarchical protocol using network areas. Routing information distribution becomes more structured and also simpler to troubleshoot.
- The first step done by the OSPF is to establish communications with the neighboring routers. The aim is to obtain all possible network devices and link information by the neighboring routers so as to build a complete picture of the whole network topology.
- Similarly, the neighboring routers will also receive information from other routers acting as neighbors. So that eventually all existing

information in a network can be learned by all existing routers in the network (a topology table is built).

- The event of routers establishing full communication with their neighbors (adjacency) is often referred to as Convergence.
- After all routers establish communication with their neighbors (neighbor adjacency – Convergence), then the routing information exchange process takes place with the help of some special packets that are in charge of carrying routing information.
- These packets are often referred to as Link State Advertisements (LSA packets). Apart from the hello packets, the OSPF routing protocol is also dependent on the LSA packets to work properly.
- The algorithm used by OSPF to determine the shortest path to a specific destination is called Shortest Path First (SPF) and is very effective. Although stretching many paths to a specific destination, OSPF can determine which path is best with great precision.





PC1

Physical Config Desktop Custom Interface

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.2.1

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.2

DNS Server

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::230:A3FF:FE0D:9302

IPv6 Gateway

IPv6 DNS Server

New Cluster Move Object Set Title

Router0

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/1/0

Serial0/1/1

GigabitEthernet0/0

Port Status ☒ On

Bandwidth ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☒ Half Duplex ☐ Full Duplex ☒ Auto

MAC Address 0030.A376.D401

IP Configuration

IP Address 192.168.1.2

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```

Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
ip address 192.168.1.2 255.255.255.0
Router(config-if)#
  
```

Router0

Physical Config CLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/1/0

Serial0/1/1

Serial0/0/0

Port Status ☒ On

Duplex ☒ Full Duplex

Clock Rate 2000000

IP Configuration

IP Address 10.0.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```

ip address 192.168.1.2 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#
  
```

Router1

Physical Config CLI

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**
- Static
- RIP
- SWITCHING**
- VLAN Database
- INTERFACE**
- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1
- Serial0/1/0
- Serial0/1/1

Serial0/1/1

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IP Address 11.0.0.2

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
ip address 10.0.0.2 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#
```

Router2

Physical Config CLI

GLOBAL

- Settings
- Algorithm Settings
- ROUTING**
- Static
- RIP
- SWITCHING**
- VLAN Database
- INTERFACE**
- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1
- Serial0/1/0
- Serial0/1/1

Serial0/1/1

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IP Address 11.0.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
%LINK-5-CHANGED: Line protocol on interface Serial0/0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#
```

Router2

PhysicalConfigCLI

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/1/0

Serial0/1/1

Serial0/0/0

Port Status

☒ On

Duplex

☐ Full Duplex

Clock Rate

Not Set

IP Configuration

IP Address

12.0.0.1

Subnet Mask

255.0.0.0

Tx Ring Limit

10

Equivalent IOS Commands

Router(config-if)#no shutdown

%LINK-S-CHANGED: Interface Serial0/1/1, changed state to down

Router(config-if)#ip address 11.0.0.1 255.0.0.0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface Serial0/0/0

Router(config-if)#ip address 12.0.0.1 255.0.0.0

Router(config-if)#

Router2

Physical Config CLI

GLOBAL

- Settings
- Algorithm Settings

ROUTING

- Static
- RIP

SWITCHING

- VLAN Database

INTERFACE

- GigabitEthernet0/0
- GigabitEthernet0/1
- Serial0/0/0
- Serial0/0/1
- Serial0/1/0
- Serial0/1/1

GigabitEthernet0/0

Port Status ☒ On

Bandwidth ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☒ Half Duplex ☐ Full Duplex ☒ Auto

MAC Address 00D0.BCE8.1601

IP Configuration

IP Address 192.168.2.2

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ip address 192.168.2.2 255.255.255.0
Router(config-if)#
```

Router0

Physical Config CLI

IOS Command Line Interface

```
Router>show ip interface brief
% Invalid input detected at '^' marker.

Router>show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0 192.168.1.2 YES manual up up
GigabitEthernet0/1 unassigned YES unset administratively down down
Serial0/0/0 10.0.0.1 YES manual up up
Serial0/0/1 unassigned YES unset administratively down down
Serial0/1/0 unassigned YES unset administratively down down
Serial0/1/1 12.0.0.1 YES manual up up
Vlan1 unassigned YES unset administratively down down
Router>
Router>
Router>
Router>
Router>
```


Router0

Physical Config CLI

IOS Command Line Interface

```
Router>
Router>
Router>
Router>
Router>
Router>
Router>
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#network 192.168.1.0 0.0.0.255 area 0
      ^
% Invalid input detected at '^' marker.

Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#network 120.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Router1

Physical Config CLI

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#
00:29:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.2 on Serial0/0/0 from LOADING
to FULL, Loading Done

Router(config-router)#network 11.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
exit
```

```
Router2
Physical Config CLI
IOS Command Line Interface

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#network 12.0.0.0 0.0.0.3 area 0
Router(config-router)#
00:55:17: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.2 on Serial0/0/0 from LOADING
to FULL, Loading Done

Router(config-router)#network 11.0.0.0 0.0.0.3 area 0
Router(config-router)#exit
Router(config)#
00:55:49: %OSPF-5-ADJCHG: Process 1, Nbr 11.0.0.2 on Serial0/0/1 from LOADING to
FULL, Loading Done
exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

