Lab Report: OSPF Multi-Area Network Configuration

1. Objective

To configure and verify **Open Shortest Path First (OSPF)** in a multi-area network topology using Cisco Packet Tracer.

The purpose of this lab is to demonstrate how OSPF dynamically learns and advertises routes between multiple network areas, ensuring efficient routing and network scalability.

2. Topology Overview

Network Structure:

Area	Router	Connected Networks	Description
Area 0 (Backbone)	Router0	192.168.4.0/24, 192.168.5.0/24	Central area connecting others
Area 1	Router1	192.168.1.0/24, 192.168.4.0/24	LAN users + backbone link
Area 2	Router2	192.168.2.0/24, 192.168.5.0/24	LAN users + backbone link

3. Equipment Used

Component	Quantity	Purpose
Cisco Router (Router-PT)	3	Inter-area routing
Cisco Switch (2960-24TT)	2	LAN connectivity
PC	4	Host devices for testing

Component	Quantity	Purpose
Cisco Packet Tracer	1	Network simulation tool

4. Topology Diagram
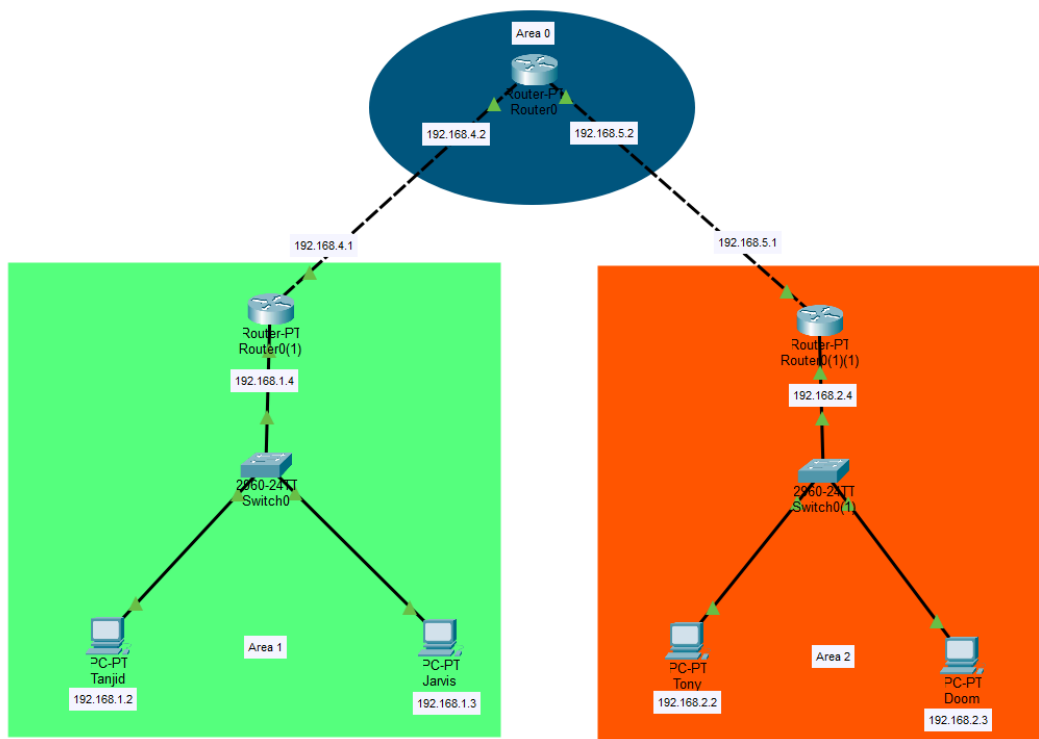
5. Network Addressing Table

Device	IP Address	Subnet Mask	Area
Router0	192.168.4.2	255.255.255.0	0
Router0	192.168.5.2	255.255.255.0	0
Router1	192.168.1.4	255.255.255.0	1
Router1	192.168.4.1	255.255.255.0	0
Router2	192.168.2.4	255.255.255.0	2

Device	IP Address	Subnet Mask	Area
Router2	192.168.5.1	255.255.255.0	0
PC Tanjid	192.168.1.2	255.255.255.0	1
PC Jarvis	192.168.1.3	255.255.255.0	1
PC Tony	192.168.2.2	255.255.255.0	2
PC Doom	192.168.2.3	255.255.255.0	2

6. Steps Performed

A. Configure Router0 (Backbone / Area 0)

```
enable
configure terminal
hostname Router0

interface g0/0
 ip address 192.168.4.2 255.255.255.0
 no shutdown
exit

interface g0/1
 ip address 192.168.5.2 255.255.255.0
 no shutdown
exit

router ospf 1
 router-id 1.1.1.1
 network 192.168.4.0 0.0.0.255 area 0
 network 192.168.5.0 0.0.0.255 area 0
exit

wr
```

B. Configure Router1 (Area 1)

```
enable
configure terminal
hostname Router1

interface g0/0
 ip address 192.168.1.4 255.255.255.0
 no shutdown
exit

interface g0/1
 ip address 192.168.4.1 255.255.255.0
 no shutdown
exit

router ospf 1
 router-id 2.2.2.2
 network 192.168.1.0 0.0.0.255 area 1
 network 192.168.4.0 0.0.0.255 area 0
exit

wr
```

C. Configure Router2 (Area 2)

```
enable
configure terminal
hostname Router2

interface g0/0
 ip address 192.168.2.4 255.255.255.0
 no shutdown
exit
```

```
interface g0/1
 ip address 192.168.5.1 255.255.255.0
 no shutdown
exit

router ospf 1
 router-id 3.3.3.3
 network 192.168.2.0 0.0.0.255 area 2
 network 192.168.5.0 0.0.0.255 area 0
exit

wr
```

7. Verification

Fire	Last Status	Source	Destination	Type	Color	Time(sec	Periodic	Num	Edit	Delete
⬤	Successful	Tanjid	Tony	ICMP	◼	0.000	N	0	(edit)	(delete)
⬤	Successful	Jarvis	Doom	ICMP	◼	0.000	N	1	(edit)	(delete)
⬤	Successful	Tanjid	Doom	ICMP	◼	0.000	N	2	(edit)	(delete)
⬤	Successful	Jarvis	Tony	ICMP	◼	0.000	N	3	(edit)	(delete)

8. Conclusion

The OSPF multi-area configuration was successfully implemented using Cisco Packet Tracer.

All routers exchanged LSAs and built a shared link-state database.

Inter-area communication was verified successfully, proving that OSPF supports hierarchical and scalable routing for large networks.