# MULTIPLE AREA OSPF

Overview: Design of a network topology with multiple area OSPF, different VLANs, and routers on a stick.

**GOALS**:

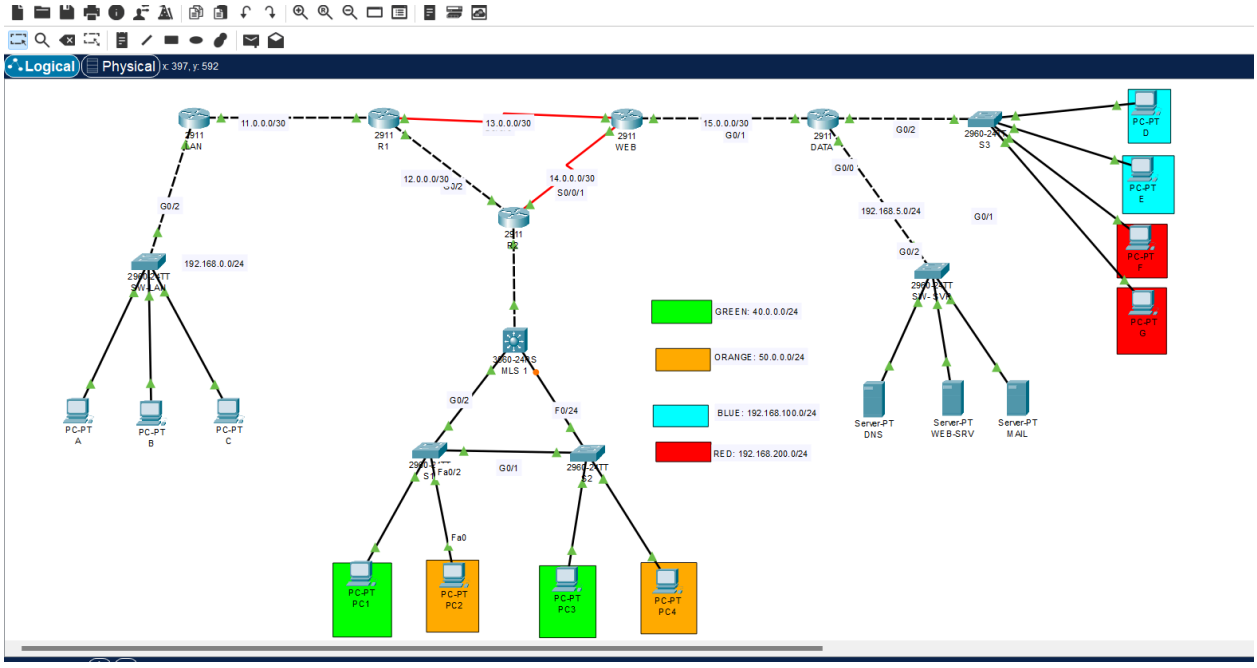
1. Host name of all devices according to the diagram.
2. Rapid PVST on switches with VLANS (S1, S2 & S3)
3. Access interface and Vlans
4. Trunk interfaces
5. Configuration of IP addresses on PCs, Servers and Router Interfaces
6. Configuration of routers on stick (R2 g0/1 & Data's g0/2 interfaces)
7. Configuring dynamic routing (OSPF) on all routers
8. Test for connectivity

**NB**:

> ip addresses on each of the connected router interfaces are different.
>command lines are highlighted in red.

**Network Topology Design**

Fig 1: Network topology.




**Network Plan**

**Required Devices:**

- Router (5)
- Switch (5)

- PCs (11)
- Multilayer Switch

**SUBNETS (VLANS)**

| VLAN | NAME | SUBNET | COLOUR |
|---|---|---|---|
| 40 | Human Resources | 40.0.0.0/24 | Green |
| 50 | Legal | 50.8.0.0/24 | Orange |
| 100 | Finance | 192.168.100.0/24 | Blue |
| 200 | Engineering | 192.168.200.0/24 | Red |

## CONFIGURATIONS

### STEP 1

Host name of all devices according to the diagram.

***enable***
***Configure terminal***
***Host name S1***

Fig 2:

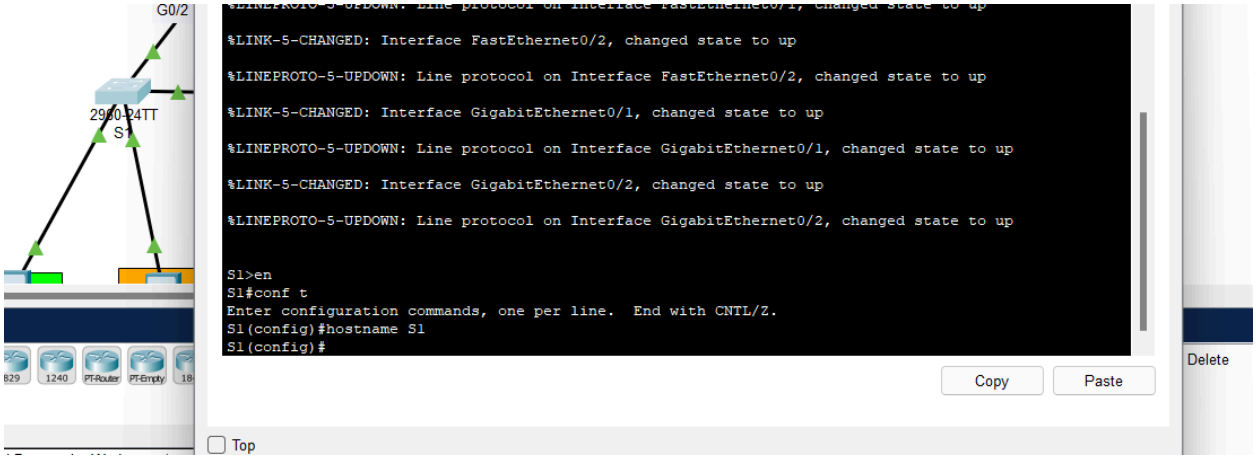



Fig 2. Configuring hostname on devices.

**(same for all devices with their respective assigned name)**

### STEP 2

Rapid PVST on switches with VLANS (S1, S2 & S3)

***Spanning-tree mode rapid-pvst***

**STEP 3**
Access interface and Vlans
On SW1

*interface FastEthernet 0/1*
*switchport mode access*
*switchport access VLAN 40*
*spanning-tree portfast*
*exit*
*interface FastEthernet 0/2*
*switchport mode access*
*switchport access VLAN 50*
*spanning-tree portfast*

(same for all switches with assigned VLANs)

**STEP 4**
Trunk interfaces
*interface range GigabitEthernet 0/1-2*
*switchport mode trunk*
*exit*

(same for all switches with assigned VLANs)

**STEP 5**
Configuration of ip addresses on PCs, Servers and Router Interfaces
On LAN router

*Interface gigabitethernet 0/1*
*Ip address 11.0.0.1 255.255.255.252*
*No shutdown*

(same for all connected routers interfaces except interfaces on a stick)

For configuring ip address on PCs an server
Click on the device>desktop>ip configuration>input the Ip address, default gateway and subnet mask'

**STEP 6**
Configuration of routers on stick (R2 g0/1 & Data's g0/2 interfaces)
For R2 g0/1 interface:

*Interface g0/1.40*
*Encapsulation dot1q 40*
*Ip address 40.0.0.1 255.255.255.0*
*Exit*

*Interface g0/1.50*
*Encapsulation dot1q 50*
*Ip address 50.0.0.1 255.255.255.0*
*Exit*

(same for Data's g0/2 interface with each VLANS)

**STEP 7**
Configuring dynamic routing (OSPF) on all routers
On router LAN

*Router ospf 1*
*Net 192.168.0.0 0.0.0.255 area 1*
*Net 11.0.0.0 0.0.0.3 area 0*
*Exit*

(Same for all routers with its connected network address and subnet mask)

**STEP 8**
Test connectivity
Eg. Ping from pc A to Server 1

**EXTRAS:**

> To check for routing table on routers on global configuration mode:

*Do show ip route*

Fig 3

```
R1(config)#Do 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

     11.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       11.0.0.0/30 is directly connected, GigabitEthernet0/1
L       11.0.0.2/32 is directly connected, GigabitEthernet0/1
     12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       12.0.0.0/30 is directly connected, GigabitEthernet0/2
L       12.0.0.1/32 is directly connected, GigabitEthernet0/2
     13.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       13.0.0.0/30 is directly connected, Serial0/0/0
L       13.0.0.1/32 is directly connected, Serial0/0/0
     14.0.0.0/30 is subnetted, 1 subnets
O       14.0.0.0/30 [110/65] via 12.0.0.2, 00:20:57, GigabitEthernet0/2
     15.0.0.0/30 is subnetted, 1 subnets
 --More--
```

> To check for configured VLANS on a switch

*Do show VLAN brief*

Fig 4 :

```
S1>en
S1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S1(config)#hostname S1
S1(config)#Do show VLAN brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                 Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                 Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                 Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                 Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                 Fa0/23, Fa0/24
40   VLAN0040                          active    Fa0/1
50   VLAN0050                          active    Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
S1(config)#
```

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