Lab 6: OSPF multi area:

Router 0:

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 10
Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
Router(config-router)#
02:05:12: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on FastEthernet0/1 from LOADING to FULL,
Loading Done

02:05:23: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on FastEthernet0/1 from FULL to DOWN,
Neighbor Down: Dead timer expired

02:05:23: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on FastEthernet0/1 from FULL to DOWN,
Neighbor Down: Interface down or detached

02:05:28: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on FastEthernet0/1 from LOADING to FULL,
Loading Done
```

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Router 1:

```
Router#
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)#ne
02:05:07: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done

% Ambiguous command: "ne"
Router(config-router)#network 192.
02:05:18: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on FastEthernet0/0 from FULL to DOWN,
Neighbor Down: Dead timer expired

02:05:18: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on FastEthernet0/0 from FULL to DOWN,
Neighbor Down: Interface down or detached       •

02:05:23: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done

                              ^
% Invalid input detected at '^' marker.

Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#
02:08:27: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.4.1 on FastEthernet0/1 from LOADING to FULL,
Loading Done
```
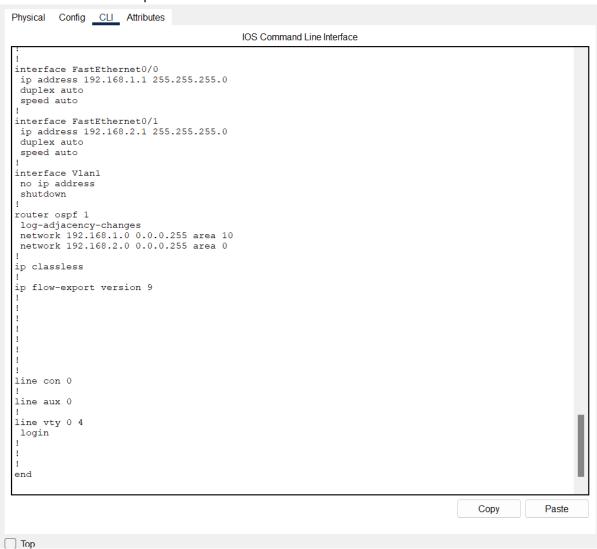
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Router 2:

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 192.168.4.0 0.0.0.255 area 20
Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
Router(config-router)#
02:08:23: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.3.1 on FastEthernet0/0 from LOADING to FULL,
Loading Done
```

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Show run command output router 0:

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
!
!
interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.1.0 0.0.0.255 area 10
 network 192.168.2.0 0.0.0.255 area 0
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end
```
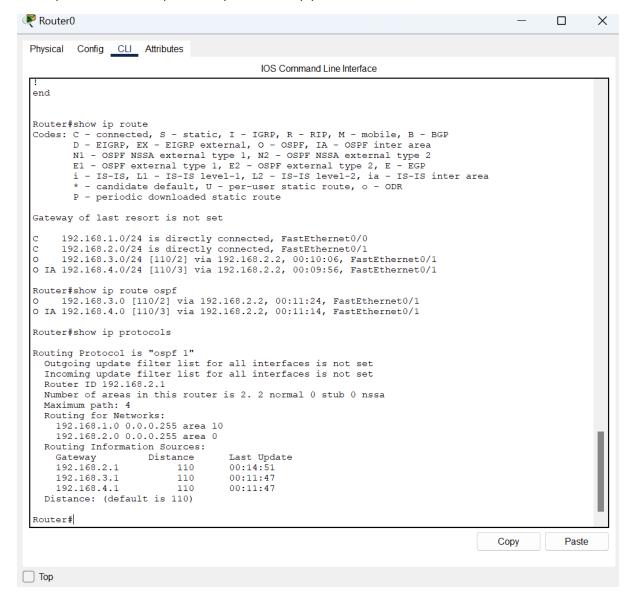
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Show run router 2:

```
!
interface FastEthernet0/0
 ip address 192.168.3.2 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.4.1 255.255.255.0
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.4.0 0.0.0.255 area 20
 network 192.168.3.0 0.0.0.255 area 0
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
```

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Show run for router 3:

```
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.2.2 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 192.168.3.1 255.255.255.0
 duplex auto
 speed auto
!
interface Vlan1
 no ip address                    •
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 192.168.2.0 0.0.0.255 area 0
 network 192.168.3.0 0.0.0.255 area 0
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
 --More--
```

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show ip route R1#show ip route ospf R1#show ip protocols

Router0   —   □   ✕

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
!
end


Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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

C    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/1
O    192.168.3.0/24 [110/2] via 192.168.2.2, 00:10:06, FastEthernet0/1
O IA 192.168.4.0/24 [110/3] via 192.168.2.2, 00:09:56, FastEthernet0/1

Router#show ip route ospf
O    192.168.3.0 [110/2] via 192.168.2.2, 00:11:24, FastEthernet0/1
O IA 192.168.4.0 [110/3] via 192.168.2.2, 00:11:14, FastEthernet0/1

Router#show ip protocols

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.2.1
  Number of areas in this router is 2. 2 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
    192.168.1.0 0.0.0.255 area 10
    192.168.2.0 0.0.0.255 area 0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.2.1          110      00:14:51
    192.168.3.1          110      00:11:47
    192.168.4.1          110      00:11:47
  Distance: (default is 110)

Router#
```

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Show ip ospf database:

```
Router#show ip ospf database
            OSPF Router with ID (192.168.2.1) (Process ID 1)

                Router Link States (Area 0)

Link ID         ADV Router      Age         Seq#        Checksum Link count
192.168.2.1     192.168.2.1     1003        0x80000004 0x00ff9e 1
192.168.3.1     192.168.3.1     819         0x80000006 0x00d4d9 2
192.168.4.1     192.168.4.1     819         0x80000002 0x000495 1

                Net Link States (Area 0)
Link ID         ADV Router      Age         Seq#        Checksum
192.168.2.2     192.168.3.1     1019        0x80000001 0x00754f
192.168.3.2     192.168.4.1     819         0x80000001 0x000439

                Summary Net Link States (Area 0)
Link ID         ADV Router      Age         Seq#        Checksum
192.168.1.0     192.168.2.1     1104        0x80000001 0x00b6d0
192.168.4.0     192.168.4.1     825         0x80000001 0x0087fa

                Router Link States (Area 10)

Link ID         ADV Router      Age         Seq#        Checksum Link count
192.168.2.1     192.168.2.1     1107        0x80000002 0x009d71 1

                Summary Net Link States (Area 10)
Link ID         ADV Router      Age         Seq#        Checksum
192.168.2.0     192.168.2.1     1098        0x80000001 0x00abda
192.168.3.0     192.168.2.1     927         0x80000002 0x00a8da
192.168.4.0     192.168.2.1     803         0x80000003 0x00a5da
Router#
```

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Show ip interface fa 0/0

```
 192.168.4.0     192.168.2.1     803         0x80000003 0x00a5da
Router#show ip interface fa0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Internet address is 192.168.1.1/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is disabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP Fast switching turbo vector
  IP multicast fast switching is disabled
  IP multicast distributed fast switching is disabled
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Probe proxy name replies are disabled
  Policy routing is disabled
  Network address translation is disabled
  BGP Policy Mapping is disabled
  Input features: MCI Check
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
```

Show ip ospf neighbour:

```
Router#
Router#show ip ospf neighbor


Neighbor ID      Pri   State          Dead Time   Address       Interface
192.168.3.1        1   FULL/DR        00:00:39    192.168.2.2   FastEthernet0/1
Router#
```

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Ping output:

```
C:\>ping 192.168.4.4

Pinging 192.168.4.4 with 32 bytes of data:

Request timed out.
Reply from 192.168.4.4: bytes=32 time=1ms TTL=125
Reply from 192.168.4.4: bytes=32 time<1ms TTL=125
Reply from 192.168.4.4: bytes=32 time<1ms TTL=125

Ping statistics for 192.168.4.4:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.4.4

Pinging 192.168.4.4 with 32 bytes of data:

Reply from 192.168.4.4: bytes=32 time<1ms TTL=125
Reply from 192.168.4.4: bytes=32 time<1ms TTL=125
Reply from 192.168.4.4: bytes=32 time<1ms TTL=125
Reply from 192.168.4.4: bytes=32 time=8ms TTL=125

Ping statistics for 192.168.4.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>
```