


# Chapters 6 – 10: OSPF Exam Answers (CCNPv8 ENARSI)

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April 8, 2021

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## CCNP Enterprise: Advanced Routing (Version 8.0) – OSPF Exam

**1. Which two commands will configure OSPFv2 MD5 authentication on a router interface? (Choose two.)**

- default-information originate
- area 0 authentication message-digest
- **ip ospf authentication message-digest**
- router ospf 10
- **ip ospf message-digest-key 1 md5 CISCO-ABC**
- ip ospf priority 255

**Explanation:** The area 0 authentication message-digest command configures OSPF MD5 authentication globally. The router ospf 10 , default-information originate , and ip ospf priority 255 commands configure general OSPF routing functions that are not related to authentication.

**2. At which OSPF state are neighbor routers converged and able to exchange routing updates?**

- ExStart
- Exchange
- Two-Way
- **Full**

**Explanation:** OSPF neighbors that reach the Full state are converged and can exchange routing information.

**3. What will an OSPF router prefer to use first as a router ID?**

- a loopback interface that is configured with the highest IP address on the router
- the highest active interface IP that is configured on the router
- **any IP address that is configured using the router-id command**
- the highest active interface that participates in the routing process because of a specifically configured network statement

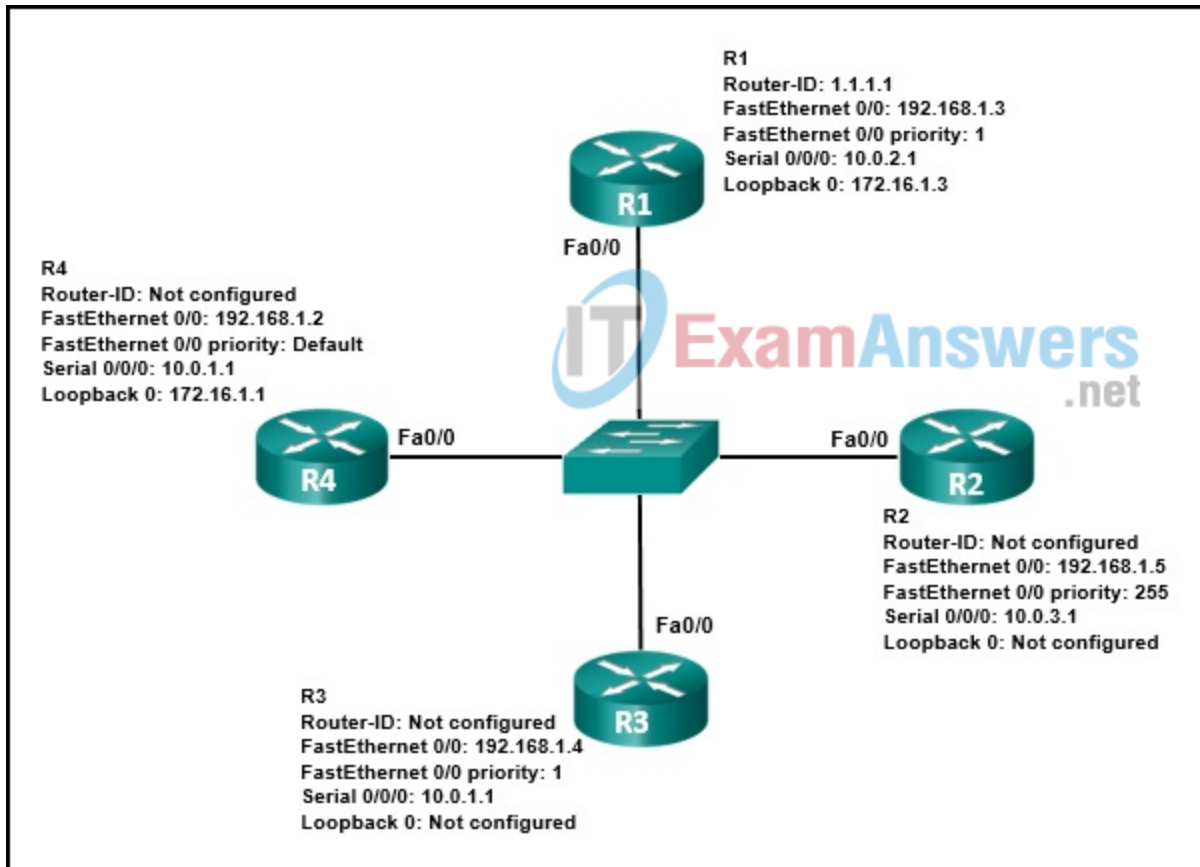
**Explanation:** The first preference for an OSPF router ID is an explicitly configured 32-bit address. This address is not included in the routing table and is not defined by the network command. If a router ID that is configured through the router-id command is not available, OSPF routers next use the highest IP address available on a loopback interface, as loopbacks used as router IDs are also not routable addresses. Lacking either of these alternatives, an OSPF router will use the highest IP address from its active physical interfaces.

**4. What are three entries that are displayed by the show ip ospf neighbor command? (Choose three.)**

- the OSPF process ID used to establish the adjacency
- **the OSPF state of each interface**
- the route metric and neighbor next hop address
- **the router ID of the neighboring routers**
- the OSPF area number shared by the neighbor routers
- **the IP address of the neighbor router interface to which this router is directly connected**

**Explanation:** The route metric and neighbor next hop address are routing table entries that are displayed by the show ip route command. The show ip ospf neighbor command does not display the OSPF process ID or the OSPF area number.

**5. Refer to the exhibit. Which three statements describe the results of the OSPF election process of the topology that is shown in the exhibit? (Choose three.)**



- The router ID on R2 is the loopback interface.
- **R2 will be elected DR.**
- **R3 will be elected BDR.**
- R1 will be elected BDR.
- **The R4 router ID is 172.16.1.1.**
- The R4 FastEthernet 0/0 priority is 128.

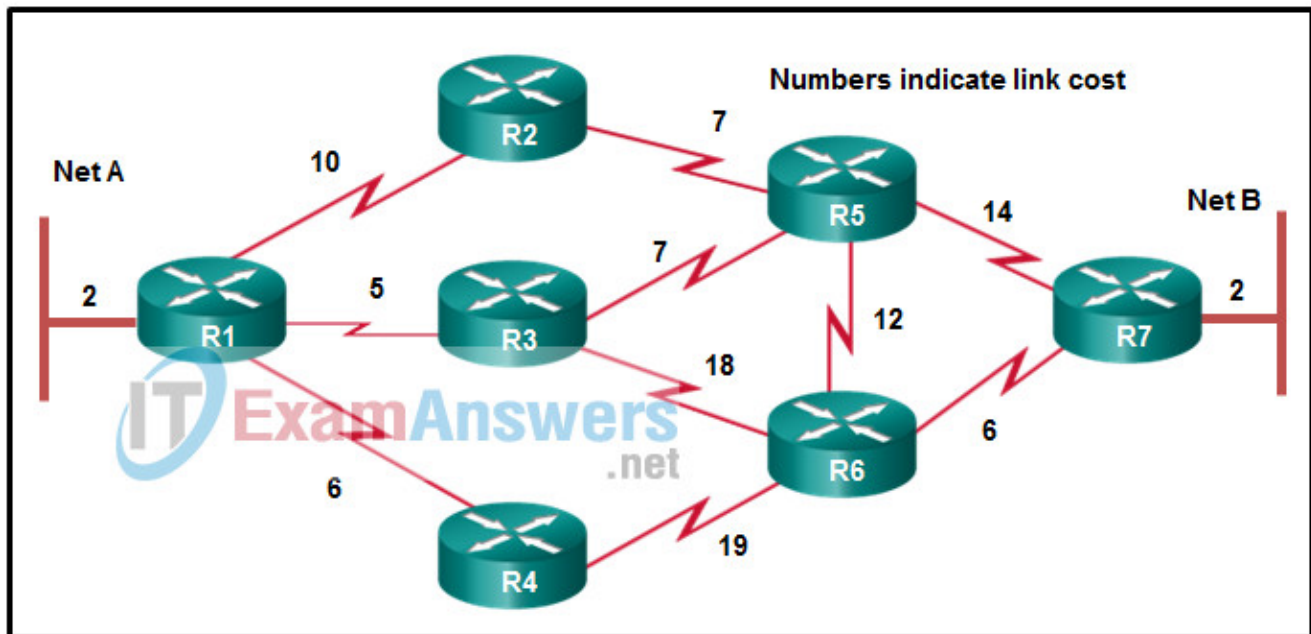
**Explanation:** R2 will be elected DR because it has the highest priority of 255, all of the others have a priority of 1. R3 will be elected BDR because it has the numerically highest router-ID of 192.168.1.4. The R4 router-ID is 172.16.1.1 because it is the IPv4 address attached to the loopback 0 interface.

**6. In which two situations would an OSPF point-to-multipoint configuration be used? (Choose two.)**

- **Frame Relay WAN**
- loopback network
- **Layer 2 VPN**
- ARP-based LAN
- multiaccess LAN

**Explanation:** Frame Relay and Layer 2 VPN topologies can use a point-to-multipoint OSPF network type. This type of network is connected in a hub-and-spoke configuration and uses the same IP subnet.

**7. Refer to the exhibit. OSPF is used in the network. Which path will be chosen by OSPF to send data packets from Net A to Net B?**



- R1, R3, R5, R7
- R1, R3, R5, R6, R7
- R1, R3, R6, R7
- R1, R4, R6, R7
- R1, R2, R5, R7

**Explanation:** OSPF uses the shortest path first algorithm to select the best path to forward packets. Each path is labeled with a value for cost and this algorithm accumulates costs along each path, from source to destination. The path chosen from Net A to Net B is R1-R3-R5-R7, that is equal to  $5+7+14+2=28$ , the shortest cost.

**8. Which OSPF router or routers would require the following command to define a stub area?**

```
router(config-router)# area [ area-id ] stub
```

- only the ASBR attached to the stub area
- only the ABR for the stub area
- **all routers in the stub area**
- only the DR and BDR routers in the stub area

**Explanation:** The area type flag in hello packets must match between adjacent OSPF routers. For this reason, all routers in the stub area must be configured as a stub area.

**9. A network engineer new to a company notices that a particular Layer 3 device participating in routing OSPF networks has an interface the engineer has not seen before in the output of the show ip ospf interface brief command. The interface is listed as VLo and has a state of P2P with an OSPF neighbor. Which OSPF feature is the company using?**

- a virtual interface
- a summarization of OSPF virtual interfaces
- an OSPF VPN
- **a virtual link**

**Explanation:** When two Layer 3 devices are each configured with the area area-id virtual-link endpoint-RID command, a virtual link is formed. To verify that the virtual link is up, use the show ip ospf virtual-links command. The virtual link also appears as an OSPF VL interface within the output of the show ip ospf interface [brief] command.

**10. What are the only two roles that permit an OSPF router to be configured for summarization? (Choose two.)**

- designated router
- **area border router**
- backbone router
- **autonomous system boundary router**
- internal router

**Explanation:** Because the LSDBs on every router within an area must be the same, OSPF summarization can only be done between areas, or between autonomous systems. For this reason, only an ABR or an ASBR can be configured to perform summarization. An ABR can summarize interarea routes between areas, and an ASBR can summarize external routes as they enter the OSPF domain.

**11. Which three statements describe features of the OSPF topology table? (Choose three.)**

- The topology table contains feasible successor routes.
- Its contents are the result of running the SPF algorithm.
- After convergence, the table only contains the lowest cost route entries for all known networks.
- **When converged, all routers in an area have identical topology tables.**
- **It is a link-state database that represents the network topology.**
- **The table can be viewed via the show ip ospf database command.**

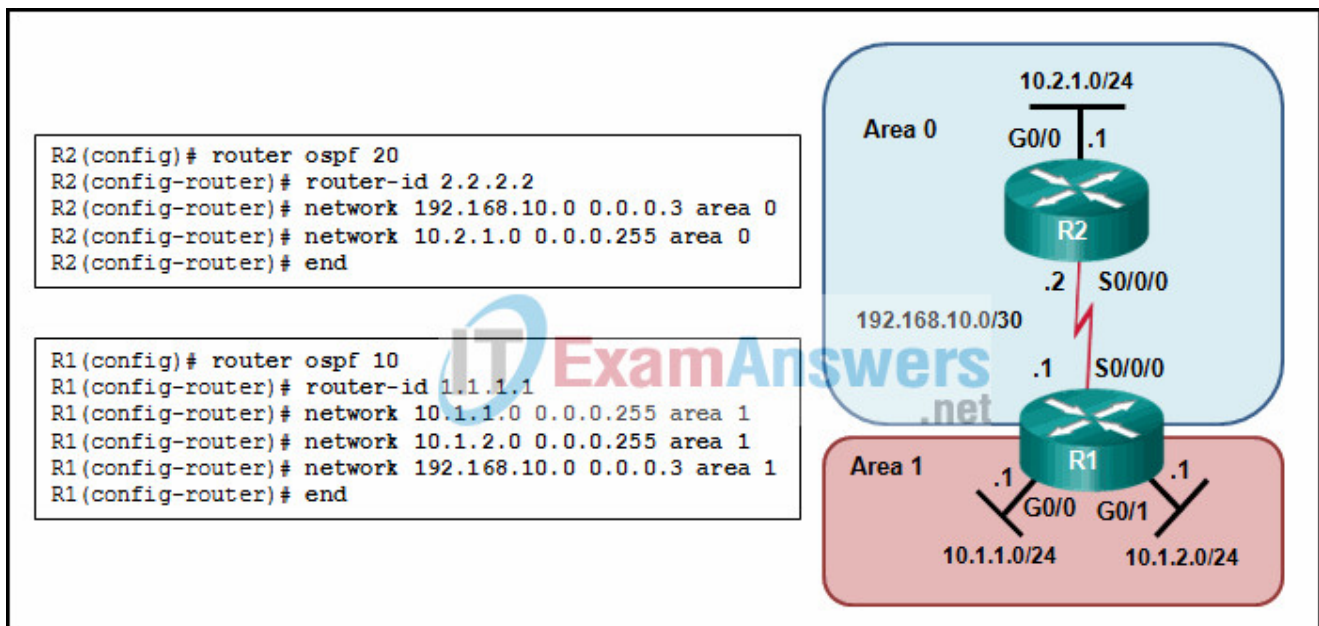
**Explanation:** The topology table on an OSPF router is a link-state database (LSDB) that lists information about all other routers in the network, and represents the network topology. All routers within an area have identical link-state databases, and the table can be viewed using the show ip ospf database command. The EIGRP topology table contains feasible successor routes. This concept is not used by OSPF. The SPF algorithm uses the LSDB to produce the unique routing table for each router which contains the lowest cost route entries for known networks.

**12. Which type of OSPF LSA represents an external route and is propagated across the entire OSPF domain?**

- type 1
- type 2
- type 3
- type 4
- **type 5**

**Explanation:** Type 5 LSAs are used for external routes and are generated by an ASBR. They are forwarded into other areas by ABRs.

**13. Refer to the exhibit. Why are routers R1 and R2 not able to establish an OSPF adjacency?**



- A backbone router cannot establish an adjacency with an ABR router.
- The router ID values are not the same in both routers.
- The process numbers are not the same in both routers.
- **The serial interfaces are not in the same area.**

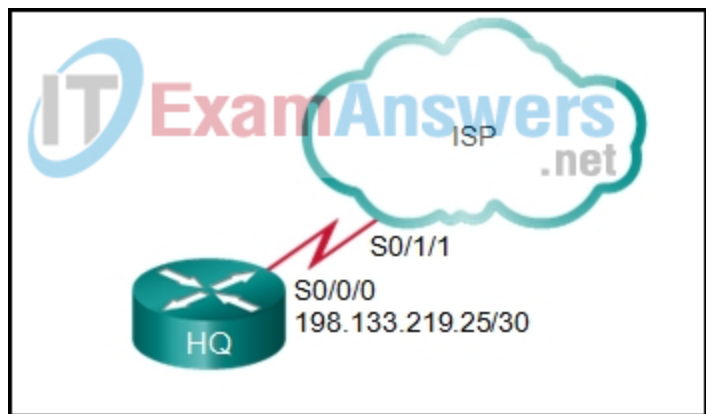
**Explanation:** On router R1, the network 192.168.10.0/30 is defined in the wrong area (area 1). It has to be defined in area 0 in order to establish adjacency with router R2, which has the network 192.168.10.0/30 defined in area 0.

**14. Refer to the exhibit. A company uses OSPF as its internal routing protocol. No routing protocol is used between the company and the ISP. The network administrator enters the following command on the router that connects to the ISP.**

```
ip route 0.0.0.0 0.0.0.0 S0/0/0 120
```

**The router does not show a default route and packets that are destined for noncompany networks are being dropped. What is the problem?**

- **There is a problem with the link.**
- The next-hop argument should be used instead of the exit-interface argument.
- The administrative distance is too high.
- A network statement is missing from router configuration mode.
- The wrong interface is used in the command.



**Explanation:** The administrative distance does not matter in this case because (1) there is not an equal route in OSPF and (2) because the company is not running OSPF with the ISP. The interface is the correct one and using an exit interface is acceptable on a serial link. No network statements are required for static routes. A link must be up in order for a static route that uses the link to be shown in the routing table.

**15. What are two reasons that will prevent two routers from forming an OSPFv2 adjacency? (Choose two.)**

- **mismatched OSPF Hello or Dead timers**
- use of private IP addresses on the link interfaces
- one router connecting to a FastEthernet port on the switch and the other connecting to a GigabitEthernet port
- **mismatched subnet masks on the link interfaces**
- a mismatched Cisco IOS version that is used

**Explanation:** There may be several reasons why two routers running OSPF will fail to form an OSPF adjacency, including these:

The subnet masks do not match, causing the routers to be on separate networks.

OSPF Hello or Dead Timers do not match.

OSPF network types do not match.

There is a missing or incorrect OSPF network command.

Mismatched IOS versions, the use of private IP addresses, and different types of interface ports used on a switch are not causes for an OSPF adjacency failing to form between two routers.

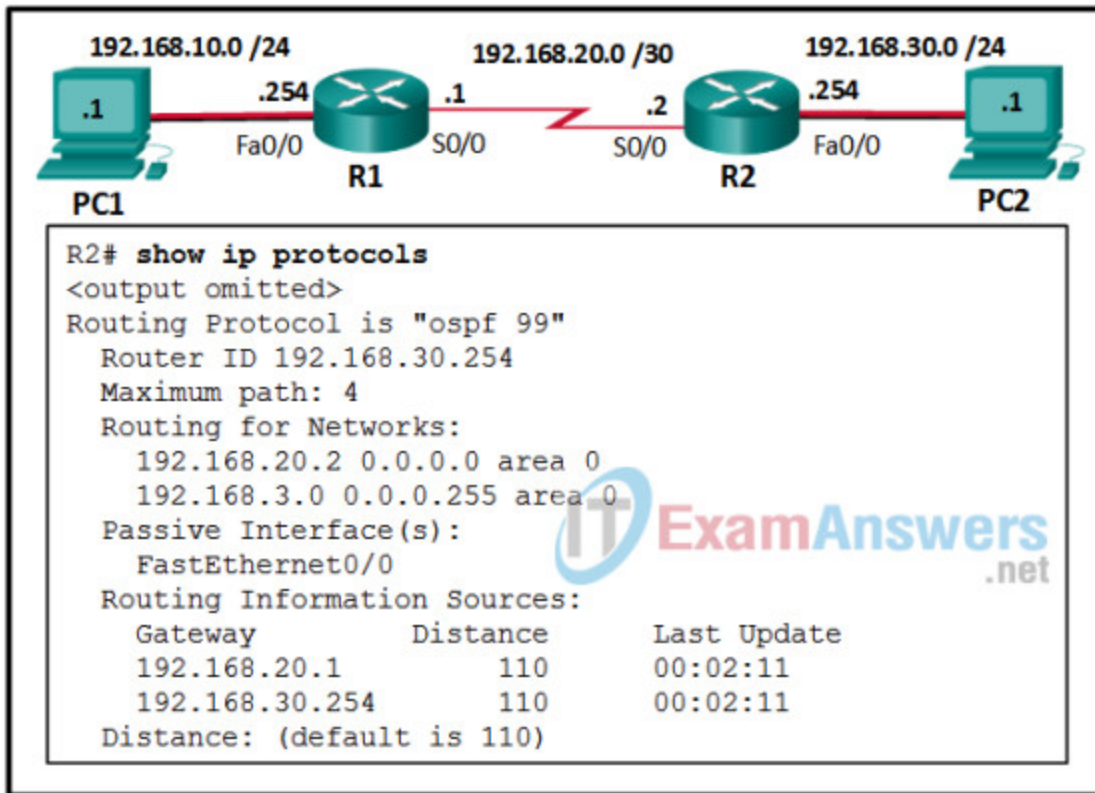
**16. A network engineer is troubleshooting convergence and adjacency issues in an OSPFv2 network and has noted that some expected network route entries are not displayed in the routing table. Which two commands will provide additional information about the state of router adjacencies, timer intervals, and the area ID? (Choose two.)**

- **show ip ospf interface**
- show running-configuration
- show ip route ospf
- show ip protocols
- **show ip ospf neighbor**

**Explanation:** The show ip ospf interface command will display routing table information that is already known. The show running-configuration and show ip protocols commands will display aspects of the OSPF configuration on the router but will not display adjacency state details or timer interval details.

**17. Refer to the exhibit. A network administrator has configured OSPFv2 on the two Cisco routers but PC1 is unable to connect to PC2. What is the most likely problem?**

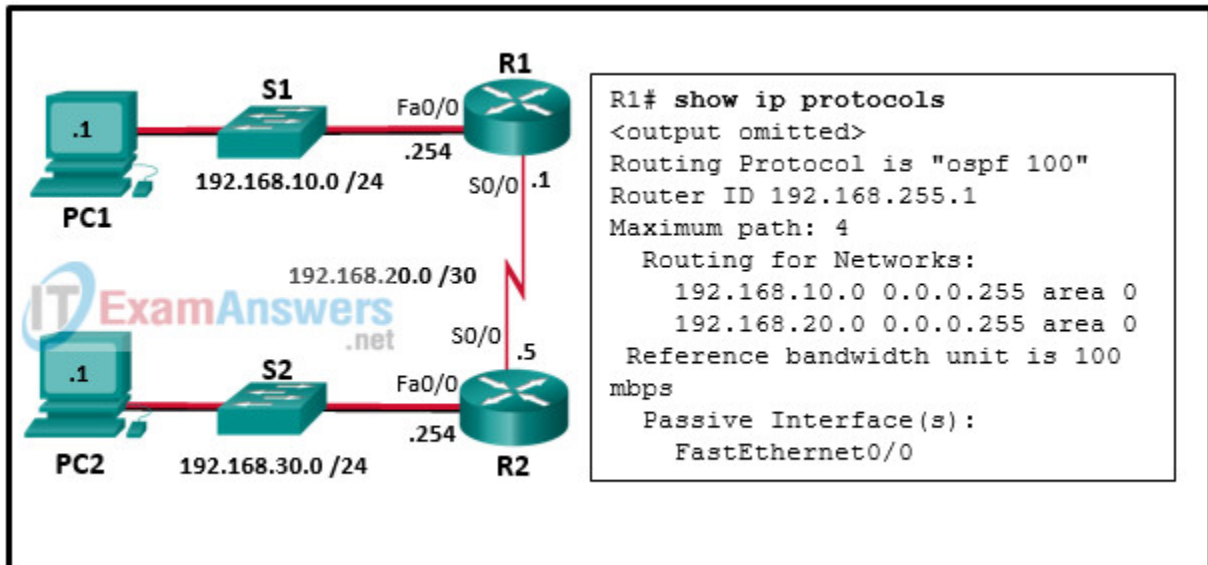




- Interface So/o is configured as a passive-interface on router R2.
- Interface Fao/o is configured as a passive-interface on router R2.
- **Interface Fao/o has not been activated for OSPFv2 on router R2.**
- Interface so/o has not been activated for OSPFv2 on router R2.

**Explanation:** If a LAN network is not advertised using OSPFv2, a remote network will not be reachable. The output displays a successful neighbor adjacency between router R1 and R2 on the interface So/o of both routers.

**18. Refer to the exhibit. A network administrator has configured OSPFv2 on the two Cisco routers as shown. The routers are unable to form a neighbor adjacency. What should be done to fix the problem?**



- Add the command network 192.168.20.1 0.0.0.0 area 0 on router R1.
- Remove the FastEthernet0/0 passive interface configuration on router R1.
- **Change the IP address on So/0 of router R2 to 192.168.20.2.**
- Add the command network 192.168.30.0 0.0.0.255 area 0 on router R1.

**Explanation:** In order to form OSPFv2 neighbor adjacencies, two connected router interfaces must share the same subnet. Router R2 is shown in the topology with an IP address of 192.168.20.5 and does not exist on the same subnet as the 192.168.20.1 /30 IP address of So/0 on router R1.

**19. Which OSPFv3 LSA type is used by ASBRs to announce routes learned through redistribution from other routing protocols?**

- type 3
- type 4
- **type 5**
- type 7

**Explanation:** OSPFv3 uses type 5, AS external LSAs, to announce default routes and routes learned through redistribution from other routing protocols.

**20. What is a purpose of the OSPFv3 type 8 and type 9 LSAs?**

- advertise default and external routes learned from other protocols
- **eliminate the need for SPF calculations when interface addresses are added or changed**
- allow area routers to locate ASBRs in other areas
- advertise NSSA LSAs for redistributed routes in an area

**Explanation:** Two new LSA types are added to OSPFv3, type 8, link-local LSA, and type 9, interarea prefix LSA. These two LSAs advertise unicast prefixes and prevent the need for OSPF calculations when interface addresses are added or changed.

**21. What are two features of OSPFv3? (Choose two.)**

- **IPv6 is used to transport OSPFv3 messages for IPv4 and OSPFv3 messages for IPv6.**
- By default, OSPFv3 enables both IPv4 and IPv6 addressing on an interface.
- **A 32-bit router ID is used when configuring OSPFv3 for IPv4 and IPv6.**
- A 32-bit router ID is used for OSPFv3 for IPv4 and a 128-bit router ID for OSPFv3 for IPv6.
- IPv4 is used to transport OSPFv3 IPv4 messages and IPv6 is used to transport OSPFv3 IPv6 messages.

**Explanation:** OSPFv3 runs directly over IPv6 and inter-router communication for both IPv4 and IPv6 address families is handled by IPv6 link-local addressing. OSPFv3 uses a 32-bit router ID for IPv4 and IPv6 address families routing. IPv6 addressing is not enabled by default on Cisco router interfaces.

**22. A network technician is configuring OSPFv3 with address families on a Cisco router. To verify the configuration the technician issues the show ospfv3 interface brief command. Which three items of information would the technician expect to be displayed? (Choose three.)**

- the state of OSPFv3 neighbor routers
- **the associated process ID**
- **the address family (IPv4 or IPv6)**
- the configured hello timer intervals
- **the OSPFv3 area ID**
- the router IDs of OSPFv3 neighbor routers

**Explanation:** The show ospfv3 interface brief command displays associated process ID, area, address family (IPv4 or IPv6), interface state, and neighbor count. The state of OSPFv3 neighbor routers and the router IDs of OSPFv3 neighbor routers are displayed by the show ospfv3 ipv6 neighbor command. Hello and other timer intervals are displayed by the regular form of the show ospfv3 interface command.

**23. What is described by the interarea prefix LSAs sent by an OSPFv3 ABR?**

- prefixes of link-local routes in the OSPFv3 area
- **routes that belong to other areas in the OSPF domain**
- the segment designated router ID
- autonomous area address family information

**Explanation:** The interarea prefix LSAs sent by an OSPFv3 Area Border Router advertise and describe routes that belong to other areas in the OSPF domain.

**24. Under which configuration mode are OSPFv3 summarization commands issued?**

- interface configuration mode
- global configuration mode
- user configuration mode
- **address-family configuration mode**

**Explanation:** The summarization commands in OSPFv3 reside under the address-family configuration mode.

**25. An administrator attempts to change the router ID on a router that is running OSPFv3 by changing the IPv4 address on the router loopback interface. Once the IPv4 address is changed, the administrator notes that the router ID did not change. What two actions can the administrator take so that the router will use the new IPv4 address as the router ID? (Choose two.)**

- Copy the running configuration to NVRAM.
- **Clear the IPv6 OSPF process.**
- Shut down and re-enable the loopback interface.
- **Reboot the router.**
- Disable and re-enable IPv4 routing.

**Explanation:** There are two methods that can be used to change the router ID of an OSPF router. The router can be rebooted or the OSPF process can be cleared.

**26. Refer to the exhibit. An administrator is trying to configure R1 to run OSPFv3 but the neighbor adjacency is not forming with the router connected to Fa0/0. What is the cause of the problem?**

```

R1# show ip interface brief
Interface      IP-Address      OK? Method Status      Protocol
FastEthernet0/0 unassigned      YES unset  up          up
FastEthernet0/1 unassigned      YES unset  administratively down down
Serial0/0/0    unassigned      YES unset  administratively down down
Serial0/0/1    unassigned      YES unset  administratively down down

```

```

R1# show running-config
<output omitted>
interface FastEthernet0/0
  no ip address
  duplex auto
  speed auto
  ipv6 address 2001:DB8:C5C0:1::1/64
  ipv6 ospf 1 area 0
<output omitted>
ipv6 router ospf 1
  log-adjacency-changes
  default-information originate
<output omitted>

```

```

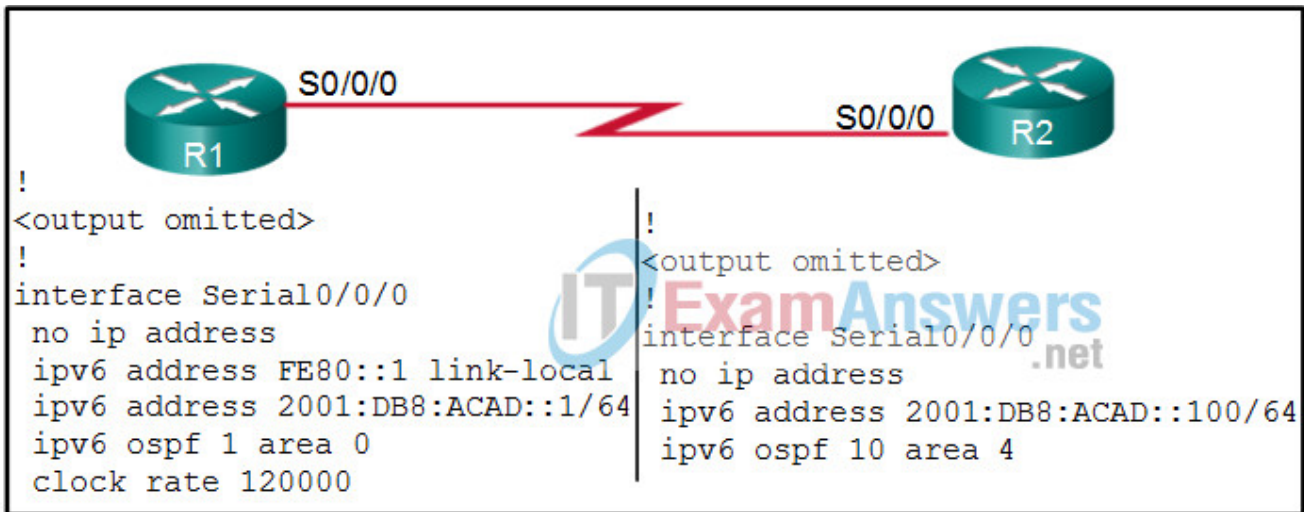
R1# show ipv6 ospf interface fa0/0
%OSPFv3: OSPF not enabled on
FastEthernet0/0

```

- A link-local address has not been configured on interface FastEthernet0/0.
- The OSPF process ID and area values are backwards in the interface configuration.
- FastEthernet0/0 has been configured as a passive interface.
- **No router ID has been configured.**

**Explanation:** The output of show ipv6 ospf interface fa0/0 shows that OSPFv3 is not enabled on the interface even though the command is in the running configuration. This is because no router ID has been configured on this router. The router ID in OSPFv3 is a 32 bit number, similar to the ID in OSPFv2. If the router ID is not manually specified then an IPv4 address from one of the interfaces is used instead. This router has no IPv4 addresses configured on it so a router ID cannot be automatically chosen. The router-id command must be configured under ipv6 router ospf 1 in order to fix this problem.

**27. Refer to the exhibit. A network administrator is configuring OSPF for R1 and R2, but the adjacency cannot be established. What is the cause of the issue?**



- **The area ID is misconfigured.**
- The IP address on router R2 is misconfigured.
- The process ID is misconfigured.
- The interface so/o/o on router R2 is missing a link-local address.

**Explanation:** To form a neighbor relationship between OSPF speaking routers, the routers should reside on the same network and have the same Hello and dead intervals. Others criteria that must match are area ID and network type. In the topology displayed, the two routers are in two different areas, thus causing an area mismatch error.

**28. Refer to the exhibit. Directly connected networks configured on router R1 are not being shared with neighboring routers through OSPFv3. What is the cause of the issue?**

```

R1# show running-config
<output omitted>

ipv6 unicast-routing
!
interface GigabitEthernet0/0
  no ip address
  ipv6 address 2001:DB8:CAFE:A001::1/64
!
interface GigabitEthernet0/1
  no ip address
  ipv6 address 2001:DB8:CAFE:1::1/64
!
ipv6 router ospf 1
  router-id 1.1.1.1
  log-adjacency-changes
!

```

- There are no IPv4 addresses configured on the interfaces.
- IPv6 OSPF routing is not enabled.
- **The routes are not enabled in the OSPF advertisement.**
- There are no network statements for the routes in the OSPF configuration.

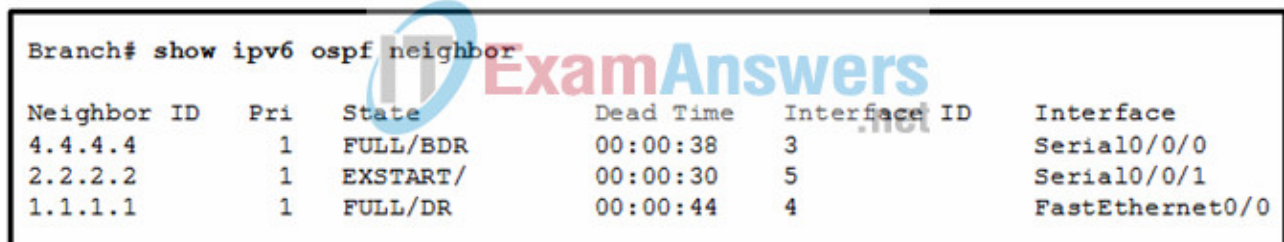
**Explanation:** Unlike OSPFv2, OSPFv3 does not use the network command to advertise directly attached networks. OSPFv3 is enabled directly on the interface. Once the command `ipv6 ospf process_id area area_id` is entered on the interface, that particular network will be included in OSPFv3 advertisements.

## 29. Which command is used to enable OSPFv3 and address families on an interface?

- R1(config-router)# network [ wildcard\_mask | prefix-length ] area area-id
- **R1(config-if)# ospfv3 pid { ipv4 | ipv6 } area area-id**
- R1(config-if)# { ipv4 | ipv6 } ospfv3 area area-id
- R1(config-if)# address-family { ipv6 | ipv4 } unicast

**Explanation:** The OSPFv3 process is enabled on an interface-by-interface basis in interface configuration mode with the `ospfv3 pid { ipv4 | ipv6 } area area-id` command.

## 30. Refer to the exhibit. A network technician is troubleshooting missing OSPFv3 routes on a router. What is the cause of the problem based on the command output?



Neighbor ID	Pri	State	Dead Time	Interface ID	Interface
4.4.4.4	1	FULL/BDR	00:00:38	3	Serial0/0/0
2.2.2.2	1	EXSTART/	00:00:30	5	Serial0/0/1
1.1.1.1	1	FULL/DR	00:00:44	4	FastEthernet0/0

- The dead time must be higher than 30 for all routers to form neighbor adjacencies.
- The neighbor IDs are incorrect. The interfaces must use only IPv6 addresses to ensure fully synchronized routing databases.
- The local router has formed complete neighbor adjacencies, but must be in a 2WAY state for the router databases to be fully synchronized.
- **There is a problem with the OSPFv3 adjacency between the local router and the router that is using the neighbor ID 2.2.2.2.**

**Explanation:** If the output of the `show ipv6 ospf neighbor` command does not show a state of FULL or 2WAY, the two routers have not formed an OSPFv3 adjacency. If two routers do not establish an adjacency, the link-state information will not be exchanged, and routes to destination networks may not exist.



**31. The OSPF hello timer has been set to 15 seconds on a router in a point-to-point network. By default, what is the dead interval on this router?**

- 15 seconds
- **60 seconds**
- 30 seconds
- 45 seconds

**Explanation:** By default, the dead interval is calculated as 4 times the hello interval.

**32. Refer to the exhibit of the routing table from a router that is a backbone router and the ABR router for area 1. How will this routing table change, if any, if area 1 is configured as a stub area?**

```
Gateway of last resort is 10.0.0.5 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
O   10.0.0.0/30 [110/2] via 10.0.0.5, 00:10:51, GigabitEthernet0/1
C   10.0.0.4/30 is directly connected, GigabitEthernet0/1
L   10.0.0.6/32 is directly connected, GigabitEthernet0/1
C   10.0.0.8/30 is directly connected, Serial0/0/0
L   10.0.0.9/32 is directly connected, Serial0/0/0
C   10.1.0.0/24 is directly connected, GigabitEthernet0/0
L   10.1.0.1/32 is directly connected, GigabitEthernet0/0
O   10.1.1.0/24 [110/2] via 10.1.0.2, 00:10:56, GigabitEthernet0/0
O IA 10.2.0.0/25 [110/3] via 10.0.0.5, 00:10:51, GigabitEthernet0/1
O IA 10.2.0.128/25 [110/4] via 10.0.0.5, 00:10:51, GigabitEthernet0/1
    192.168.0.0/30 is subnetted, 1 subnets
O E2 192.168.0.0/30 [110/20] via 10.0.0.5, 00:10:51, GigabitEthernet0/1
O E2 192.168.0.64/26 [110/20] via 10.0.0.5, 00:00:45, GigabitEthernet0/1
O*E2 0.0.0.0/0 [110/1] via 10.0.0.5, 00:10:51, GigabitEthernet0/1
```

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- Only the O E2 routes will be removed from the routing table.
- All of the O IA and O E2 routes will be removed from the routing table.
- Only the O IA routes and the two O E2 subnet routes to the 192.168.0.0 networks will be removed.
- **None of the routes will be removed as a result of Area 1 and this ABR being configured as a stub area.**

**Explanation:** The ABR for the Area 1 routing table will not change. The ABR connects to the backbone area as well as Area 1. The ABR router continues to receive external routes and intra-area routes through the interface that connects to the backbone area.

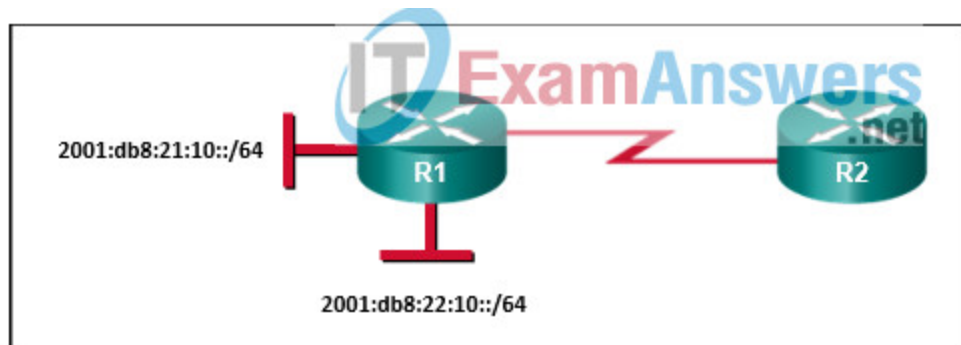


**33. Which command is used to verify that OSPF is enabled and also provides a list of the networks that are being advertised by the network?**

- **show ip protocols**
- show ip ospf interface
- show ip interface brief
- show ip route ospf

**Explanation:** The command show ip ospf interface verifies the active OSPF interfaces. The command show ip interface brief is used to check that the interfaces are operational. The command show ip route ospf displays the entries that are learned via OSPF in the routing table. The command show ip protocol s checks that OSPF is enabled and lists the networks that are advertised.

**34. Refer to the exhibit. Which configuration on R1 would advertise a summary route of the two LANs to R2?**



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- **area 0 range 2001:db8:20::/44**
- area 0 range 2001:db8:11::/48
- area 0 range 2001:db8:10::/44
- area 0 range 2001:db8:21::/48

**Explanation:** The network prefix 2001:db8:20::/44 will summarize the 2001:db8:21:10::/64 and 2001:db8:22:10::/64 networks.