

Nokia IS-IS Routing Protocol

(exam number: 4A0-112)

The following questions will test your knowledge and prepare you for the Nokia IS-IS Routing Protocol written exam. Compare your responses with the Answer Key at the end of the document.

1. Consider the exhibit. Which of the following statements about the output shown is FALSE?

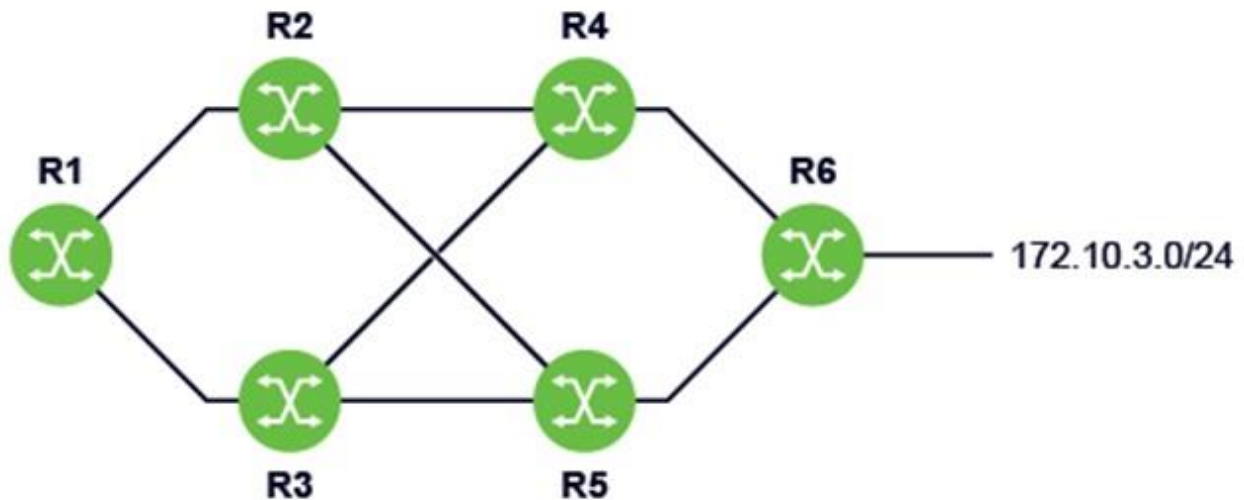
```
(ex)[configure router "Base"]
A:admin@R1# /show router interface
```

Interface Table (Router: Base)					
Interface-Name	Adm	Opr (v4/v6)	Mode	Port/SapId	PfxState
IP-Address					
system	Up	Up/Up	Network	system	
10.10.10.1/32				n/a	
2001:db8:1:100::1/128				PREFERRED	
toR2	Up	Down/Up	Network	1/1/2	
2001:db8:1:101::1/64				PREFERRED	
fe80::5054:ff:fee9:8fb0/64				PREFERRED	
toR3	Up	Up/Up	Network	1/1/3	
10.1.3.1/27				n/a	
fe80::225:baff:fe30:7908/64				PREFERRED	

Interfaces : 3

- A. The system interface is configured with IPv6 address 2001:db8:1:100::1/128.
- B. All interfaces are configured for IPv4 and IPv6.
- C. Interface "toR2" is configured with a global unicast IPv6 address.
- D. Interface "toR3" is not configured with a global unicast IPv6 address.

2. Consider the exhibit. Router R6 advertises the prefix 172.10.3.0/24 using a routing protocol that supports ECMP. All routers are configured with an ECMP value of 4. All links shown in the exhibit have the same cost. How many entries with a destination prefix of 172.10.3.0/24 are in router R1's routing table?



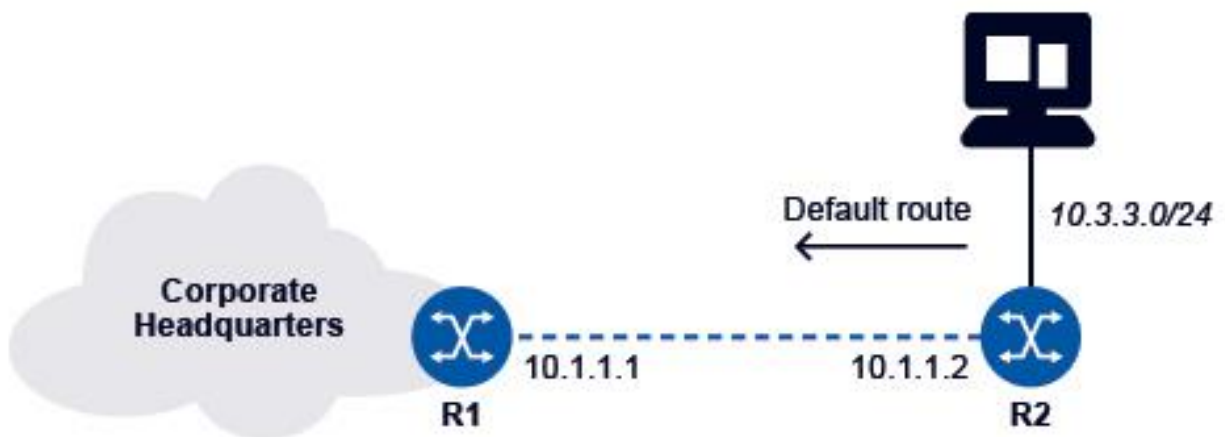
- A. 1
 - B. 2
 - C. 3
 - D. 4
3. Which of the following is NOT a convention used to represent IPv6 addresses?
- A. An IPv6 address is expressed as eight groups of hex digits separated by colons.
 - B. Each group represents 16 bits of the total 128 bits that make up the IPv6 address.
 - C. One or more consecutive groups of zeros can be omitted and replaced by two colons.
 - D. At most, two instances of double colons can exist in the shortened address expression.
 - E. Leading zeroes in each hex group can be omitted.
4. What is the destination address of the Neighbor Discovery message sent by a router to resolve an IPv6 address to a MAC address?
- A. The IPv6 address to resolve
 - B. The solicited-node multicast address
 - C. The link-local multicast address
 - D. The broadcast IPv6 address

5. Which of the following statements about an indirect static route is FALSE?
- A. It requires that the target subnet is directly connected to the router where it is configured.
 - B. It is only valid if the configured in direct address matches a valid entry in the route table.
 - C. Its configured indirect address cannot be resolved through another static route.
 - D. It imposes no overhead on the router's link bandwidth or on its CPU.
6. Consider the exhibit. A static route is configured on router R1 to reach the PC at 139.120.121.2. What needs to be the next-hop IP address of the configured route?



- A. 172.31.1.1
- B. 172.31.1.2
- C. 139.120.121.1
- D. 139.120.121.2

7. Consider the exhibit. Router R2 is a Nokia 7750 SR. What is the correct command to configure a default route on router R2 to reach the corporate headquarters?



SRC_IRP3.1_FE_01_010

- A. Configure router default-route route-type unicast next-hop 10.1.1.1 admin-state enable
 - B. Configure router default-route route-type unicast next-hop 10.1.1.2 admin-state enable
 - C. Configure router static-routes route 0.0.0.0/0 route-type unicast next-hop 10.1.1.1 admin-state enable
 - D. Configure router static-routes route 0.0.0.0/0 route-type unicast next-hop 10.1.1.2 admin-state enable
8. Which database is used by a link-state protocol to perform the SPF calculation that creates the shortest-path tree?
- A. Adjacency database
 - B. Link-state database
 - C. Forwarding database
 - D. Metric database

9. A router receives a copy of a link state advertisement that is already in the local link-state database (LSDB), but the newly received copy has a sequence number higher than the one in the LSDB. Which of the following actions is NOT performed by the router?
- A. The router updates its link state database.
 - B. The router transmits an acknowledgement to the sender.
 - C. The router increases the sequence number of the received link state advertisement.
 - D. The router floods the new link state advertisement to its neighbors.
 - E. The router runs the SPF algorithm against the new link state database.
10. In the process of moving data packets from source to destination, which of the following statements about addressing is FALSE?
- A. Ethernet MAC addresses identify the devices connected to the same local-area network or subnet.
 - B. A public IP address identifies a device worldwide.
 - C. If two hosts are in the same subnet, the sender does not need to use an IP address to identify the intended destination of the data.
 - D. If two hosts are in different subnets of a layer-3 domain, the sender needs to use both a MAC address and an IP address to ensure that the data is properly forwarded.
11. Assume that a router receives an IP packet and finds multiple entries in the routing table that match the destination IP address. Which of the following statements is TRUE?
- A. The packet is forwarded to all the next-hop routers, pointed to by the matching routing table entries.
 - B. The packet is dropped and an ICMP destination unreachable message is sent back to the source.
 - C. The router sends an ICMP echo request message to all the next-hop routers, pointed to by the matching routing table entries to confirm if they can properly forward the packet.
 - D. If multiple routing protocols include the same IP prefix in their forwarding databases, only the one generated by the routing protocol with the best preference will become active.
12. Which of the following statements about IP packet forwarding on a Nokia 7750 SR is FALSE?
- A. Each active routing protocol builds its own forwarding database, but not all entries from all protocols are necessarily active.
 - B. There is an active forwarding database that is built by the routing table manager (RTM) from the contributions of multiple routing protocols.
 - C. If multiple routing protocols include overlapping IP prefixes in their forwarding databases, only the prefix with the longest subnet mask will become active.
 - D. The packet is forwarded to the next-hop router, pointed to by the routing table entry with the longest prefix match.

13. Which of the following statements about route redistribution and route filtering is TRUE?
- A. Route redistribution means redirecting packets to an intermediate point before allowing them to go to their intended destination.
 - B. Route filtering implies controlling which route advertisements received from routing peers are accepted and/or deciding which locally known prefixes are advertised to routing peers.
 - C. Route redistribution is the exchange of information among routers to establish the best paths to forward packets to all the known subnetworks.
 - D. Route filtering means deciding in real time which packets are forwarded, and which ones are dropped.
14. Which of the following is NOT a function of the CPM card in a Nokia 7750 SR?
- A. Running dynamic routing protocols.
 - B. Populating the routing table.
 - C. Re-establishing routing paths in case of failure.
 - D. Performing a route-table lookup on incoming packets to make forwarding decisions.
15. Which of the following is NOT a failure detection option for static routes?
- A. Static route Hello handshake.
 - B. Manual ping and traceroute commands.
 - C. Customer Premises Equipment Check (CPE-Check).
 - D. Bidirectional Forwarding Detection (BFD).
16. Routers in a routing domain are running a link state routing protocol. Which of the following is a type of information that will NOT be exchanged by the routers?
- A. Router IDs.
 - B. The metric of links interconnecting the routers.
 - C. IP prefixes of the subnetworks attached to the routers.
 - D. The optimum next hop for each of the known IP prefixes.
17. A router is running a link state routing protocol. Which of the following is a type of information that is NOT included in its Forwarding database?
- A. List of neighboring routers and the state of each adjacency.
 - B. List of directly attached IP prefixes.
 - C. List of IP prefixes attached to other routers in the routing domain.
 - D. Optimum next hop for each known IP prefix.



18. Which of the following is NOT one of the generic types of messages exchanged by routers running a link state routing protocol?
- A. Hello messages.
 - B. Link state advertisements.
 - C. Messages to exchange advertisements reliably.
 - D. Disconnect messages.
19. Which of the following is NOT an advantage introduced by the link state protocol optimizations?
- A. Electing a designated router on a broadcast interface reduces the number of logical connections among routers, thus decreasing the complexity of the SPF algorithm.
 - B. Electing a designated router on a broadcast interface adds redundancy by offering an alternative path to forward packets.
 - C. Dividing the routing domain into separate areas reduces the amount of time needed to flood new link state information.
 - D. Dividing the routing domain into separate areas can help reduce route table sizes because the IP prefixes advertised between areas can be summarized.
20. Which of the following statements about the system IP address on a Nokia 7750 SR is FALSE?
- A. It has a prefix length of /32 for IPv4 and /128 for IPv6.
 - B. The system interface exists by default.
 - C. It belongs to a physical interface.
 - D. If the router-id is not configured, it inherits the system IPv4 address.
21. Which of the following statements about the data plane in a Nokia 7750 SR router is FALSE?
- A. The data plane utilizes the forwarding tables to forward packets to their destination.
 - B. The data plane must process every incoming packet.
 - C. The data plane exchanges signalling messages with other routers.
 - D. Input/Output cards perform data plane functions.
22. Which of the following types of information are included in an IS-IS Hello packet?
- A. Intermediate system neighbors and authentication information.
 - B. Intermediate system neighbors and list of LSP entries in the link-state database.
 - C. The IP internal reachability information and authentication information.
 - D. The IP external reachability information and intermediate system neighbors.

23. Which of the following statements about the implementation of IS-IS for IPv6 in the Nokia 7750 SR is FALSE?
- A. With native IPv6 routing, a router's IPv4 and IPv6 prefixes are contained in the same LSP for each routing level.
 - B. With multi-topology IS-IS, a router's IPv4 and IPv6 prefixes are contained in two different LSPs for each routing level.
 - C. With native IPv6 routing, IPv4 and IPv6 are considered as a single topology, and a single SPF calculation is performed for all prefixes at each routing level.
 - D. Multi-topology IS-IS considers IPv4 and IPv6 as distinct topologies with separate SPF calculations at each routing level.
24. Which of the following statements about IS-IS is FALSE?
- A. Any change in the immediate vicinity of a router triggers the transmission of a new link state update.
 - B. It supports summarization of the prefixes advertised between areas.
 - C. It uses IP to carry its protocol-specific messages.
 - D. Each router sends Hello messages to multicast addresses during the discovery process.
25. Which of the following statements about the IS-IS complete sequence number PDU (CSNP) is FALSE?
- A. IS-IS routers exchange CSNPs to help achieve link state database consistency.
 - B. Only the designated IS (DIS) sends periodic CSNPs on a broadcast link.
 - C. A router receiving a CSNP that references an older LSP transmits a copy of the LSP from its database to its neighbor.
 - D. A router receiving a CSNP that references a newer LSP sends a CSNP to its neighbor to request the LSP.
26. How does an IS-IS router acknowledge the receipt of an IS-IS LSP message on a broadcast link?
- A. The router sends a PSNP message to the sender.
 - B. The router sends an LSP message to the sender.
 - C. The router sends a CSNP message to the sender.
 - D. The periodic CSNP messages sent by the DIS implicitly acknowledge the LSP message.

27. Which of the following statements about IS-IS adjacencies is FALSE?

- A. Two neighboring routers configured as level-1 and level-2 form two adjacencies if they have a common area ID.
- B. On a point-to-point link, a single Hello message is used for both level-1 and level-2 adjacencies.
- C. An adjacency is only considered UP after the LSDBs of the two routers are synchronized.
- D. Adjacent routers on a broadcast link periodically exchange CSNPs to maintain database consistency.

28. Which of the following statements about the role of L1-only, L2-only, and L1/L2 routers in IS-IS is TRUE?

- A. An L1-only router installs a default route to the nearest L1/L2 router that sets the ATT bit in its L1 LSP.
- B. An L1-only router can form an adjacency with an L2-only neighbor as long as both of them are in the same area.
- C. An L2-only router exchanges link state information only with other L2-only routers.
- D. An L1/L2 router advertises its L2 routes to L1-only routers in its own area by default.

29. Consider the exhibit, which shows IS-IS output from routers R1 and R2. Which of the following is TRUE?

<pre>(ex)[configure router "Base"] A:admin@R1# /show router isis adjacency</pre>						
Rtr Base ISIS Instance 0 Adjacency						
System ID	Usage	State	Hold	Interface	MT-ID	
R2	L2	Up	23	toR2	0	
R3	L1	Up	23	toR3	0	
Adjacencies : 2						

<pre>(ex)[configure router "Base"] A:admin@R2# /show router isis adjacency</pre>						
Rtr Base ISIS Instance 0 Adjacency						
System ID	Usage	State	Hold	Interface	MT-ID	
R1	L2	Up	22	toR1	0	
R4	L2	Up	19	toR4	0	
Adjacencies : 2						

- A. Router R1 is an L1 router.
- B. Router R3 is an L1/L2 router.
- C. Routers R2 and R4 must be in the same area.
- D. Routers R1 and R3 must be in the same area.

30. Consider the exhibit. Routers R1 and R2 are connected through a 1 Gbps link with an assigned prefix 10.1.2.0/27. The two routers have formed a level-1 IS-IS adjacency. Based on the LSP shown in the exhibit, which of the following statements is TRUE?

```
(ex)[configure router "Base" isis 0]
A:admin@R1# /show router isis database R1.00-00 detail

=====
Rtr Base ISIS Instance 0 Database (detail)
=====

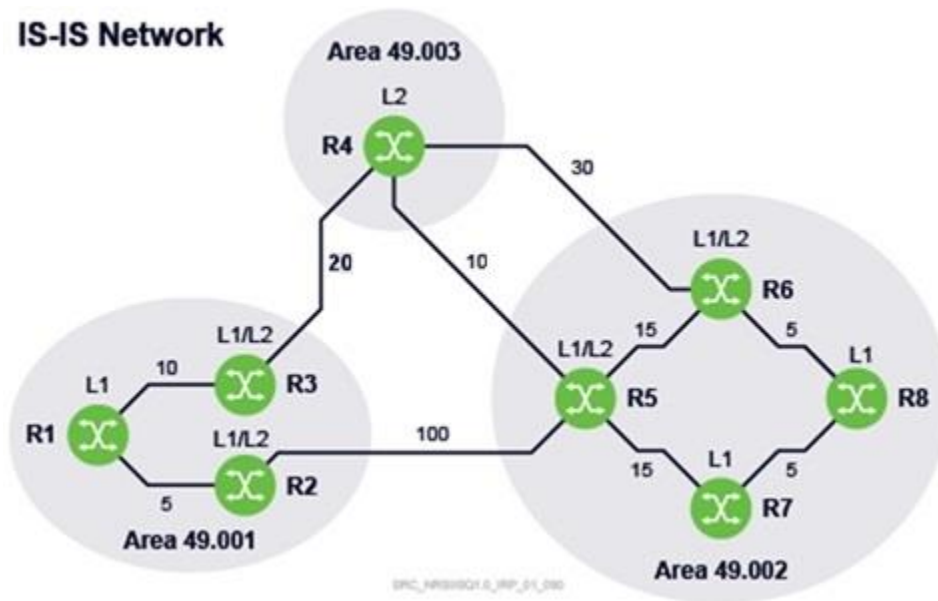
Displaying Level 1 database
-----
LSP ID      : R1.00-00                      Level      : L1
-- Output omitted --

TLVs :

TE IS Nbrs :
  Nbr      : R2.00
  Default Metric : 63
  Sub TLV Len  : 12
  IF Addr    : 10.1.2.1
  Nbr IP     : 10.1.2.2
TE IP Reach :
  Default Metric : 63
  Control Info:  , prefLen 27
  Prefix      : 10.1.2.0
  Default Metric : 0
  Control Info:  , prefLen 32
  Prefix      : 10.10.10.1
...
```

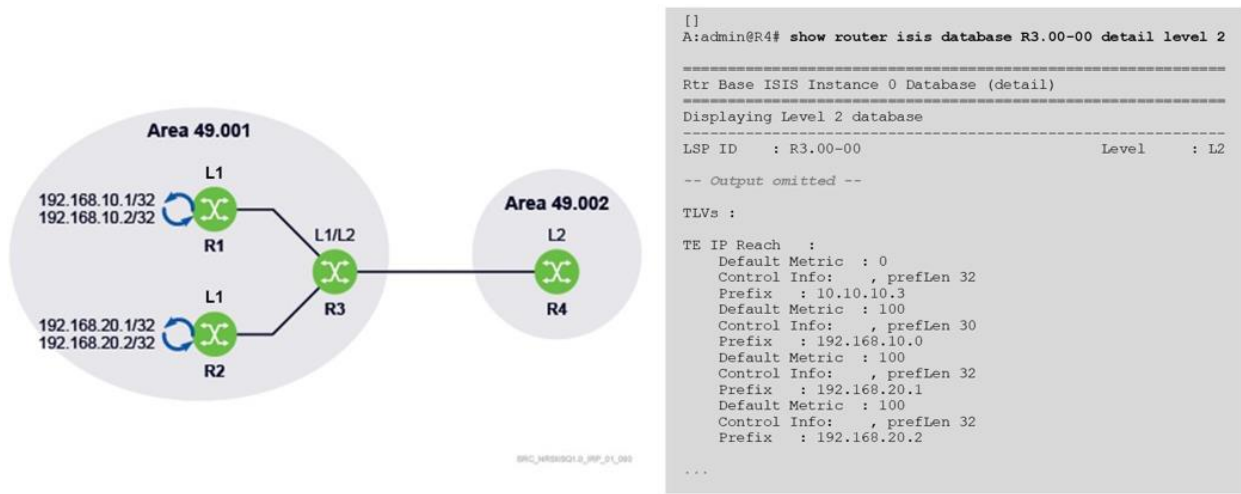
- A. Reference-bandwidth has been set to 100 Gbps and wide-metrics-only has been enabled on router R1.
- B. Reference-bandwidth has been set to 100 Gbps on router R1 but wide-metrics-only has not been enabled.
- C. Wide-metrics-only has been enabled on router R1 but reference-bandwidth has not been configured.
- D. Neither reference-bandwidth nor wide-metrics-only have been configured on router R1.

31. Consider the exhibit, which shows IS-IS link metrics. What path does traffic follow from router R2 to router R7, and from router R7 to router R2?



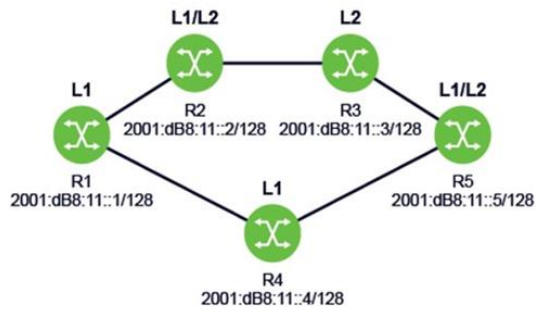
- A. R2 to R7 follows R2-R1-R3-R4-R5-R7; R7 to R2 follows R7-R8-R6-R5-R4-R3-R1-R2.
- B. R2 to R7 follows R2-R1-R3-R4-R5-R7; R7 to R2 follows R7-R8-R6-R4-R3-R1-R2.
- C. R2 to R7 follows R2-R5-R7; R7 to R2 follows R7-R8-R6-R5-R4-R3-R1-R2.
- D. R2 to R7 follows R2-R5-R7; R7 to R2 follows R7-R5-R2.

32. Consider the exhibit. The routers are running IS-IS. Given the content of the L2 LSP originated by router R3, which of the following is TRUE?



- A. Router R3 summarizes the loopback prefixes from router R1 as 192.168.10.0/30 and from router R2 as 192.168.20.0/30.
- B. Router R3 only summarizes the loopback prefixes from router R1 as 192.168.10.0/30.
- C. Router R3 only summarizes the loopback prefixes from router R2 as 192.168.20.0/30.
- D. Router R3 does not summarize any of the loopback prefixes from routers R1 and R2.

33. Consider the exhibit, which shows IS-IS routers and their level capability. Assume that all links have the same cost. Based on the show command output, which of the following statements is TRUE?



```
[ ]
A:admin@R1# show router route-table ipv6
```

Dest Prefix[Flags]	Next Hop[Interface Name]	Type	Proto	Age	Metric	Pref
::/0	FE80::203:FAFF:FE0E:9332-"toR2"	Remote	ISIS	12h31m59s	100	15
2001:DB8::1/128	system	Local	Local	14h21m47s	0	0
2001:DB8::2/128	FE80::203:FAFF:FE0E:9332-"toR2"	Remote	ISIS	12h31m59s	100	15
2001:DB8::3/128	FE80::203:FAFF:FEAC:BB26-"toR4"	Remote	ISIS	12h30m19s	300	15
2001:DB8::4/128	FE80::203:FAFF:FEAC:BB26-"toR4"	Remote	ISIS	12h26m07s	100	15
2001:DB8::5/128	FE80::203:FAFF:FEAC:BB26-"toR4"	Remote	ISIS	12h30m19s	200	15

- A. Route leaking is not configured on any router.
 - B. The system IP address of router R3 is leaked on router R2 but not on router R5.
 - C. The system IP address of router R3 is leaked on router R5 but not on router R2.
 - D. The system IP address of router R3 is leaked on both router R2 and router R5.
34. Which of the following statements about IS-IS authentication is FALSE?
- A. Authentication for IS-IS is disabled by default.
 - B. IS-IS supports IPsec Authentication Header (AH) and Encapsulation Security Payload (ESP) protocols.
 - C. Authentication parameters can be configured that apply to all IS-IS messages.
 - D. Authentication parameters can be configured per interface for Hello messages.
35. Two IS-IS routers sitting in different areas have not been able to establish an adjacency. Which of the following is NOT a likely cause?
- A. One or both routers are L1-only.
 - B. Adjacencies have been limited to L1-only at the interface level on one or both routers.
 - C. Another router in either area is already advertising that it is attached through the ATT bit.
 - D. There is an authentication mismatch between the two routers.
 - E. One interface is configured as broadcast, and the other as point-to-point.

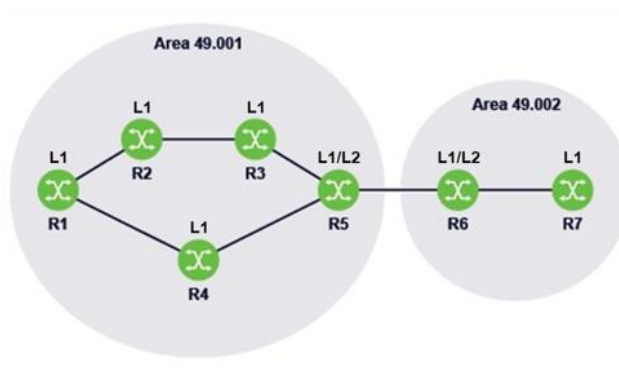
36. Consider the exhibit. In the IS-IS network to which the command output corresponds, why does router R2 generate multiple LSPs?

```
(ex)[configure router "Base"]
A:admin@R1# /show router isis database

Rtr Base ISIS Instance 0 Database
-----
LSP ID                               Sequence  Checksum Lifetime Attributes
-----
Displaying Level 1 database
-----
R1.00-00                             0x1       0xf5ca  1192    L1
R1.05-00                             0x1       0x193   1192    L1
R2.00-00                             0x1       0xf4da  1191    L1
R2.02-00                             0x1       0xba8e  1191    L1
R2.06-00                             0x1       0x6199  1192    L1
R3.00-00                             0x1       0x5b32  1191    L1
Level (1) LSP Count : 6
Displaying Level 2 database
-----
Level (2) LSP Count : 0
```

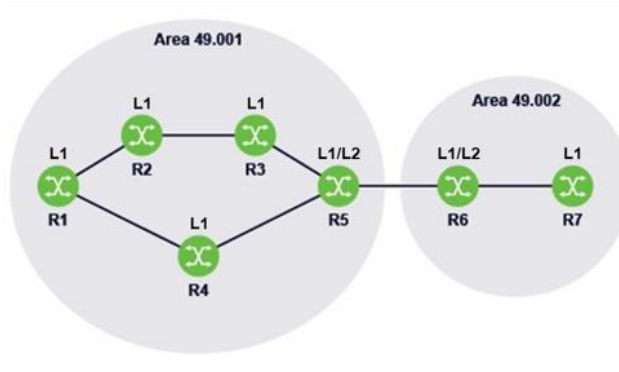
- A. Because it is an L1/L2 router.
- B. Because it has established adjacencies with routers of multiple areas.
- C. Because it has been elected the DIS of some broadcast interfaces.
- D. Because some of its interfaces are configured as point-to-point and others as broadcast.

37. Consider the exhibit. The IS-IS routers have established adjacencies on the interfaces displayed. All the interfaces are configured as broadcast. Considering that router R6 is L1/L2, how many LSPs are there in its link state databases?



- A. Two in its L1 database and two in its L2 database.
- B. Two in its L1 database and six in its L2 database.
- C. Three in its L1 database and three in its L2 database.
- D. Three in its L1 database and twelve in its L2 database.

38. Consider the exhibit. The IS-IS routers have established adjacencies on the interfaces displayed. All the interfaces are configured as point-to-point. Considering that router R5 is an L1/L2 router, it generates one LSP that will be advertised to its L1 peers and one LSP that will be advertised to its L2 peers. Which of the following statements about these LSPs is TRUE?



- A. The L1 LSP includes all subnets directly attached to routers in area 49.001.
 - B. The L1 LSP includes subnets directly attached to itself plus subnets advertised by router R6.
 - C. The L2 LSP only includes subnets directly attached to itself.
 - D. The L2 LSP includes all subnets directly attached to routers in area 49.001.
39. Enabling loopfree-alternate for a link state routing protocol does not change on its own the way a router forwards data packets. However, it makes important calculations that can be used by other features on a Nokia 7750 SR. Which of the following features requires loopfree-alternate as a prerequisite to achieve its goal?
- A. SPF algorithm
 - B. IP fast re-route
 - C. Route summarization
 - D. Route leaking
40. In IS-IS, which of the following statements regarding the default behaviour of an L1/L2 router is TRUE?
- A. An L1/L2 router calculates one SPF tree for both level-1 and level-2 topologies.
 - B. An L1/L2 router advertises its known L2 routes to other L1 routers in the same area.
 - C. An L1/L2 router sets the ATT bit in its L2 LSP to indicate that it knows about routes in other areas.
 - D. An L1/L2 router can have adjacencies with routers in different areas.



Answer Key

1. B	11. D	21. C	31. C
2. B	12. C	22. A	32. B
3. D	13. B	23. B	33. C
4. B	14. D	24. C	34. B
5. A	15. A	25. D	35. C
6. B	16. D	26. D	36. C
7. C	17. A	27. C	37. C
8. B	18. D	28. A	38. D
9. C	19. B	29. D	39. B
10. C	20. C	30. B	40. D

About Nokia

We create the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry's most complete, end-to-end portfolio of products, services and licensing.

From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in digital health, we are shaping the future of technology to transform the human experience. networks.nokia.com

Nokia is a registered trademark of Nokia Corporation. Other product company names mentioned herein may be trademarks or trade names of their respective owners.

© 2025 Nokia

Nokia Oyj
Karaportti 3
FI-02610 Espoo, Finland
Tel. +358 (0) 10 44 88 000
Document code:SR1911039726EN (July) CID 207218