

# Practice Exam Questions for Nokia Multicast Protocols (exam number: 4A0-108)

The following questions will test your knowledge and help prepare you for the Nokia Multicast Protocols written exam. Compare your responses with the Answer Key at the end of the document.

1. Which of the following is NOT a characteristic of multicast?
  - a. A router may replicate and place multiple copies of a multicast data packet on the same interface, based upon the number of receivers on that interface.
  - b. Routers must be explicitly configured to forward multicast data packets, otherwise they will discard such packets.
  - c. Uninterested receivers can discard packets at the layer-2 level or possibly never receive the packets at all.
  - d. The data flow may be bidirectional or unidirectional, based on the requirement of the application generating the traffic.
2. Which of the following statements about MAC addressing for IPv4 multicast is FALSE?
  - a. The OUI allocated for IPv4 multicast is 01-00-5e.
  - b. The 25th bit in any multicast MAC address is fixed to 1.
  - c. The last 23 bits of the IPv4 multicast address are mapped to the last 23 bits of the MAC address.
  - d. There are 5 bits in the IPv4 multicast address that are not identified by the MAC address.
3. Which of the following statements about an IGMPv3 report message is FALSE?
  - a. The report message can include multiple records.
  - b. The record type can be either include or exclude.
  - c. A record of type include with an empty source list is used to implement PIM ASM.
  - d. A record of type exclude with a list of sources identifies the sources that the receiver does not wish to get data from.
4. Which of the following PIM messages is sent using a unicast destination address?
  - a. Join/Prune
  - b. Register-Stop
  - c. Bootstrap
  - d. Assert

5. In a PIM ASM network, which of the following is a function of the PIM DR when there are multiple routers connected to a multi-access segment?
  - a. Generate a query message toward the receivers.
  - b. Process the reports received from the receivers.
  - c. Register a new source to the RP.
  - d. Generate a query message toward the source.
6. Which of the following actions is NOT performed when electing an assert winner in a PIM multi-access network?
  - a. An (S,G) assert message is preferred over a (\*,G) assert message.
  - b. The router whose route to the source has a better preference becomes the winner.
  - c. The assert winner automatically becomes the PIM-DR for the network.
  - d. The router whose route to the source has a better metric becomes the winner.
7. Consider the exhibit. Which of the following statements is FALSE?

```
(ex) [/configure router "Base" pim]
A:admin@RouterC# /show router pim group detail

=====
PIM Source Group ipv4
=====
Group Address      : 239.1.1.1
Source Address     : 192.168.1.20
RP Address         : 10.10.10.3
Advt Router        : 10.10.10.1
Flags              :
Mode               : sparse
MRIB Next Hop      : 10.1.3.1
MRIB Src Flags     : remote
Keepalive Timer Exp: 0d 00:03:14
Up Time            : 0d 00:01:00
Resolved By        : rtable-u
Up JP State         : Not Joined
Up JP Rpt           : Not Joined StarG
Up JP Rpt Override  : 0d 00:00:00

Register State      : No Info
Reg From Anycast RP: No

Rpf Neighbor        : 10.1.3.1
Incoming Intf        : toRouterA
Outgoing Intf List  :

Curr Fwding Rate    : 0.000 kbps
Forwarded Packets   : 0
Forwarded Octets    : 0
Spt threshold       : 0 kbps
Admin bandwidth     : 1 kbps
Discarded Packets   : 0
RPF Mismatches      : 0
ECMP opt threshold  : 7

Groups : 1
=====
```

- a. There is no shared path tree.
- b. This is the first hop router connected to the source.
- c. No interfaces in the OIL shows that there are no receivers present.
- d. The RPF check is using the unicast routing table.

8. In a PIM ASM network, a source sends multicast data to the first-hop router. Which of the following actions DOES NOT occur?
  - a. The first-hop router registers the source with the RP using a PIM (S,G) Join message.
  - b. If the RP has no receivers for this multicast group, it sends a Register-Stop message back to the first-hop router.
  - c. If the RP has receivers for the multicast group, it sends the data down the shared path tree.
  - d. If the RP has receivers for the multicast group, it sends a PIM (S,G) Join message towards the source.
9. In a PIM ASM network how does a router know that it is a diverging router for the source and shared path trees?
  - a. When it receives a PIM (S,G) Join message and the RPF interface for the source is different from the RPF interface for the RP.
  - b. When it starts receiving copies of the same data on different incoming interfaces.
  - c. When it receives a PIM (S,G) Prune message with the RP bit set on the interface of the shared path tree.
  - d. When it receives a PIM Register-Stop message from the RP telling it to prune the interface from the shared path tree.
10. Which of the following statements about the duties of a RP in a PIM ASM network is FALSE?
  - a. First-hop routers register sources to the RP.
  - b. Last-hop routers forward PIM Join messages of behalf of the receivers to the RP.
  - c. The RP establishes a shared path tree from the source to the receivers.
  - d. The initial multicast flow goes through the RP to the receivers until switchover.
11. Which of the following statements about incongruent routing on the Nokia 7750 SR is TRUE?
  - a. The IGP populates both the multicast and unicast forwarding tables by default.
  - b. The PIM protocol, by default, will first check the multicast FIB to forward its control messages.
  - c. By default, if the destination information is not found in the multicast FIB the PIM protocol will then check the unicast FIB.
  - d. The Nokia 7750 SR maintains separate forwarding tables for unicast and multicast traffic.
12. Which of the following statements about the operation of PIM-SSM is FALSE?
  - a. A receiver must know the source IP address before it can issue a join.
  - b. The receiver can obtain the source address information using a number of different methods.
  - c. IGMPv3 natively supports the inclusion of source IP addresses in the membership report.
  - d. IGMPv2 was modified to allow the specifying of source addresses in the membership report.
13. Which of the following statements about the use of PMSIs in a NG-MVPN is TRUE?
  - a. An S-PMSI spans all the PEs participating in that VPRN.
  - b. An I-PMSI only includes the PEs that have interested receivers.
  - c. Each PMSI becomes an extension of the customer MDT.
  - d. If there is a PE attached to an active source, it is elected as the root of the I-PMSI.
14. The customer network is running PIM SSM. The MVPN is using BGP A-D to distribute customer multicast routes. The transport is mLDp. Which of the following steps in setting up the S-PMSI is FALSE?
  - a. The PE connected to the source sends out a S-PMSI A-D MP-BGP update message to the other PEs.
  - b. The update includes the tunnel type to be used.
  - c. The update includes the FEC that identifies the specific P2MP tunnel.
  - d. PEs with interested receivers will send a Source Tree Join MP-BGP message to the PE router that originated the S-PMSI A-D update.

15. Consider the exhibit. Which of the following statements is TRUE?

```
(ex)[/configure service vprn "100"]
A:admin@R7# /show router bgp routes mvpn-ipv4 originator-ip 10.10.10.5 type
spmsi-ad detail
=====
BGP Router ID:10.10.10.7      AS:65200      Local AS:65200
=====
Legend -
Status codes : u - used, s - suppressed, h - history, d - decayed, * - valid
               1 - leaked, x - stale, > - best, b - backup, p - purge
Origin codes  : i - IGP, e - EGP, ? - incomplete
=====
BGP MVPN-IPv4 Routes
=====
Original Attributes
Route Type      : Spmsi-Ad
Route Dist.     : 65200:100
Originator IP   : 10.10.10.5
Source IP       : 192.168.1.20
Group IP        : 225.100.0.41
-- Snip --
=====
PMSI Tunnel Attributes :
Tunnel-type           : RSVP-TE P2MP LSP
Flags                 : Type: RNVE(0) BM: 0 U: 0 Leaf: required
MPLS Label            : 0
P2MP-ID               : 100
Extended-Tunne*: 10.10.10.5      Tunnel-ID           : 61447
=====
```

- The PE with router-id of 10.10.10.7 is attached to the customer source 192.168.1.20.
  - The transport in use in the provider network are P2MP mLDP tunnels.
  - The fields used to uniquely identify this P2MP LSP consists of values 100, 61447 and 10.10.10.5.
  - This output is for the I-PMSI rooted at 10.10.10.5 for customer group IP 225.100.0.41.
16. Which of the following statements about the use of Global Table Multicast (GTM) on the Nokia 7750 SR is TRUE?
- The attachment routers (AR) exchange MP-BGP updates for multicast signaling with each other.
  - The protocol boundary routers (PBR) use enhanced OSPF/IS-IS control packets to forward the multicast information through the provider core.
  - GTM creates PMSIs using the base routing context to forward multicast traffic across the core network.
  - Currently, the Nokia 7750 SR supports mLDP for transport tunnels through the core network.
17. Which of the following statements about the BIER routers use of the bit string is FALSE?
- The bit string is contained in every multicast data packet.
  - Each router in the network that is potentially an egress point is associated with a bit position in the string.
  - The bit string is used by the BIER routers to identify when to replicate the data packet.
  - The bit string is kept intact until it reaches the tunnel egress routers.

18. Which of the following statements about the way MPLS labels are used to define a P2MP BIER transport tunnel is FALSE?
- The MPLS label is associated with a bit index forwarding table (BIFT).
  - The MPLS labels are selected and advertised by the owner of the (BIFT).
  - The MPLS labels identify the sub-domain and set identifier.
  - The MPLS labels are forwarded in an upstream direction using either RSVP or LDP.
19. A NG-MVPN is configured to use BIER transport tunnels. Which of the following statements about the initiation of the I-PMSI is FALSE?
- The Intra-AS I-PMSI A-D update will indicate that the tunnel type to be used is BIER.
  - The Intra-AS I-PMSI A-D update will include the sub-domain that will be used for the I-PMSI.
  - The BFR-ID and BFR prefix of the sending router will be included in the update.
  - Upon receiving the update, the participating PEs will send back a VPN label to be used by the I-PMSI.
20. A NG-MVPN is configured to use BIER transport tunnels. The customer traffic flowing through the ingress PE has crossed the rate threshold, and the ingress PE has generated an S-PMSI A-D update. Which of the following statements about the information carried by the S-PMSI A-D update is FALSE?
- It includes a VPN label that will be used to identify data packets that belong to the S-PMSI.
  - It includes the BIER sub-domain that the P2MP tunnel belongs to.
  - It includes a flag indicating that the leaf routers are not required to respond.
  - It includes the BFR-ID of the ingress PE router.
21. Consider the exhibit. Which of the following statements about this BIER router is TRUE?

```

TLVs :
  -- Snip --
  TE IP Reach :
    ...
    Default Metric : 0
    Control Info:  8, preflen 32
    Prefix : 10.10.10.5
    Sub TLV :
      Bier::Bier Algo:0, IGP Algo:0, SD id:0, BFR id:5
      MPLS Encap Max SI:16, BS Len:3(256), Label:524271
  
```

- This router is in sub-domain 5.
  - The bit string length is set to 8 bits.
  - This router has not been assigned a bit-forwarding router ID.
  - This router expects to see an MPLS label of 524275 for set identifier 4.
22. Which of the following parameters is not advertised by a BFR to support BIER operations?
- Its own BFR prefix.
  - The area-ID of the BFR.
  - If configured, its own BFR-ID.
  - The maximum number of BFR-ID sets that is supported.

23. In all but one data delivery models, the source sends a single copy of each packet regardless of the number of receivers. Which of the following data delivery models is the exception?
- a. Multicast
  - b. Unicast
  - c. Broadcast
  - d. Anycast
24. What is the purpose of GLOP addressing?
- a. To allocate to each AS a unique range of inter-domain multicast addresses.
  - b. To define an addressing structure for intra-domain multicast addressing.
  - c. To provide a solution for the depletion of IPv4 multicast addresses.
  - d. To eliminate the problem of IPv4 multicast addresses overlapping when converted to multicast MAC addresses.
25. Which MAC address does the IPv4 multicast address 239.231.42.11 translate to?
- a. 01-00-5e-66-3a-6b
  - b. 01-00-5e-75-1a-0b
  - c. 01-00-5e-67-2a-0b
  - d. 01-00-5e-a1-2a-6b
26. IGMP version 3 General Membership Queries (GMQ) are sent to which address?
- a. 224.0.0.1
  - b. 224.0.0.2
  - c. 224.0.0.13
  - d. 224.0.0.22
27. How does IGMP snooping eliminate multicast flooding on the LAN?
- a. The switch populates multicast source addresses into the forwarding table.
  - b. The switch acts as an IGMP proxy for the receiver.
  - c. The switch inspects IGMP messages between receivers and routers and populates the forwarding table with active multicast group addresses.
  - d. The switch inspects all multicast traffic between receivers and routers and populates the forwarding table with active multicast group addresses.
28. What impact does an asymmetric IGP routing topology have on the PIM RPF check?
- a. The PIM RPF check may fail, since traffic from the source may arrive on one interface, while the IP route to the source may point to another interface on the PIM router.
  - b. PIM does not work in an asymmetric topology, therefore there is no RPF check at all.
  - c. There is no impact, since the Shared and Source Path Trees are built from the receiver to the source.
  - d. This can only be used with incongruent routing.

29. What happens when the displayed router receives an IGMPv3 exclude none report for group 232.1.1.1?

```
(ex) [/configure router "Base" igmp]
A:admin@RouterG# info
admin-state enable
ssm-translate {
  group-range start 232.0.0.0 end 232.127.255.255 {
    source 192.168.1.1 { }
  }
  group-range start 232.128.0.0 end 232.255.255.255 {
    source 192.168.1.2 { }
  }
}
interface "toReceiver" {
}
```

- a. The router propagates a (\*, 232.1.1.1) join towards RP if it exists.
  - b. The router sends a PIM (S, G) join toward both sources: 192.168.1.1 and 192.168.1.2.
  - c. The IGMPv3 report is dropped and a misconfiguration message is generated in log 99.
  - d. The router sends a PIM (192.168.1.1, 232.1.1.1) join toward the source.
30. Four routers in a domain are configured as BSR candidates. Router A is configured with a BSR priority of 10; Router B is configured with a BSR priority of 100; Router C and Router D use the default priority value of zero. Router D has the highest IP address. Which router will be selected as the BSR?
- a. Router A
  - b. Router B
  - c. Router C
  - d. Router D
31. Which of the following statements regarding the BSR and RP is FALSE?
- a. A router can be configured as both a candidate-BSR and a candidate-RP.
  - b. A router configured as a candidate-BSR can also be configured as a static RP.
  - c. A router configured as a candidate-RP can also be configured as a static RP.
  - d. A converged multicast network with BSR can have multiple routers elected as BSRs.
32. Which of the following describes a purpose of MP-BGP as used in NG MVPN?
- a. Building GRE tunnels to carry multicast traffic.
  - b. Building MPLS tunnels to carry multicast traffic.
  - c. Allowing a PE to discover the other PE routers in an MVPN.
  - d. Exchanging multicast routing information between CE routers.

33. Which of the following statements about the signaling protocols used in an MVPN service is TRUE when MPLS P2MP tunnels are used?
- a. BGP Auto-Discovery is used for the signaling of the PMSIs, while either mLDP or RSVP-TE P2MP is used for the signaling of customer multicast group membership.
  - b. Either BGP Auto-Discovery or PIM is used for the signaling of the PMSIs, while either mLDP or RSVP-TE P2MP is used for the signaling of customer multicast group membership.
  - c. BGP Auto-Discovery is used for the signaling of the PMSIs, as well as for the signaling of customer multicast group membership.
  - d. BGP Auto-Discovery is used for the signaling of the PMSIs, while either BGP Auto-Discovery or PIM is used for the signaling of customer multicast group membership.
34. Which of the following statements about the Shared Path Tree is TRUE?
- a. The multicast source is the root of the tree.
  - b. It is represented by an (S, G) entry.
  - c. It is the initial forwarding path in ASM mode.
  - d. It is created as a result of switchover.
35. Which of the following is NOT a benefit of anycast RP?
- a. It provides RP redundancy in a PIM SM network.
  - b. It provides load balancing between multiple RPs in the network.
  - c. It supports a different multicast topology than the unicast topology.
  - d. It supports better routing of the Shared Path Tree by allowing redundant RPs to be located throughout the network.
36. Consider the following IPv4 addresses. Which pair of addresses should NOT be used in a multicast network at the same time?
- a. 224.192.12.35 and 238.64.12.35
  - b. 235.182.12.35 and 235.64.12.35
  - c. 226.172.12.35 and 238.42.12.35
  - d. 237.138.12.35 and 238.128.12.35
37. Which one of the following is NOT a characteristic of the many-to-many model of multicast data delivery?
- a. It is well suited for applications such as video on demand.
  - b. All devices are potentially capable of generating multicast data.
  - c. Receivers are generally known by each other, since any receiver may also be a source.
  - d. It is well suited for applications in which the receivers provide feedback to each other and the source.
38. Which feature was introduced in IGMP version 3?
- a. Report suppression is eliminated
  - b. TTL of 1 for IGMP messages
  - c. Leave group message
  - d. IGMP snooping



39. Which of the following statements about the use of RSVP as the signaling protocol for P2MP tunnels in a NG-MVPN is FALSE?
- a. The P2MP LSPs can be either manually configured or be dynamically created using a template.
  - b. Leaf nodes will respond to a PATH message with a RESV message advertising their MPLS labels.
  - c. The MDT root node will generate a PATH message to all participating PE routers or leaf nodes.
  - d. A branching node will forward all received RESV messages to the root but associate them all to a common MPLS label.
40. In the NG-MVPN solution, which of the following statements about the encapsulation of multicast data traffic using BIER transport tunnels vs using point-to-multipoint MPLS transport tunnels (mLDP or P2MP RSVP) is TRUE?
- a. When point-to-multipoint MPLS encapsulation is configured, a separate transport tunnel is signaled for each PMSI.
  - b. When BIER encapsulation is configured, a single transport tunnel is signaled for each VPRN and reused for all its PMSIs.
  - c. The point-to-multipoint MPLS encapsulation adds two MPLS labels, one defining the transport tunnel and one defining the service tunnel.
  - d. The BIER encapsulation adds a single MPLS label defining the VPRN service that the data packet belongs to.



## Answer Key

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

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Document code: (September) CID213550