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### Sections

1. QOS
2. MPLS
3. IOS XR
4. QOS & XR

## Exam A

### QUESTION 1

Which three conditions can occur when metering traffic using a dual token bucket traffic policing QoS mechanism on Cisco routers? (Choose three.)

- A. conform
- B. pass
- C. violate
- D. exceed
- E. burst
- F. matched

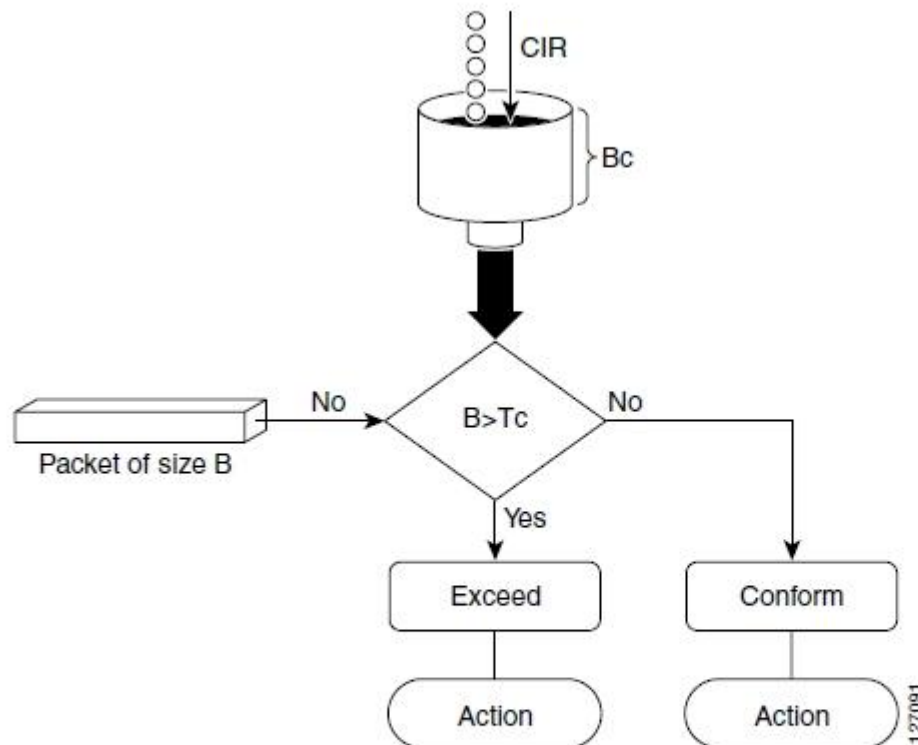
**Correct Answer:** ACD

**Section:** QOS

**Explanation**

**Explanation/Reference:**

**Figure 2**      *How a Traffic Policing Mechanism Regulates Traffic*



The time interval between token updates ( $T_c$ ) to the token bucket is updated at the CIR value each time a packet arrives at the traffic policer. The  $T_c$  token bucket can contain up to the  $B_c$  value. If a packet of size  $B$  is greater than the  $T_c$  token bucket, then the packet exceeds the CIR value and a configured action is performed. If a packet of size  $B$  is less than the  $T_c$  token bucket, then the packet conforms and a different configured action is performed.

**QUESTION 2**

What is the correct formula for determining the CIR?

- A.  $CIR = B_c / T_c$
- B.  $CIR = B_c \times T_c$
- C.  $CIR = T_c / B_c$

- D.  $CIR = Bc + Be$
- E.  $CIR = Tc/(Bc+Be)$
- F.  $CIR = (Bc+Be)/Tc$

**Correct Answer:** A

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

Committed Information Rate (CIR) – the rate the device will send at (on average) over a one second period. The default CIR when traffic-shaping is enabled on the interface is 56K. CIR is also referred to as the “target rate”. Since the device is forced to send at the AR, it does not send all of the time (within one second) in order to send an average amount of data that equals the CIR.

Minimum CIR (mincir) – the rate the service provider guarantees to accept. Theoretically, the provider will set the DE bit for all traffic above this rate.

Mincir is designed to be used in conjunction with adaptive shaping. With adaptive shaping, the router will throttle down in the event of congestion. The router will not throttle down below this value.

Committed Burst (Bc) – the number of committed bits allows to be sent during a given interval. The device sends an average amount of traffic to achieve the CIR. The Bc value defaults to 1/8 of the configured CIR for speeds below 650K. For speeds above that, it is roughly 1/16 of CIR.

Excess Burst (Be) – the number of non-committed bits the router is allowed to send above Bc during the first interval (Tc). The amount of Be “credits” is derived from unused Bc credits in previous intervals. There is no limit to how long Be can “store” unused Bc credits. It is a common misconception that Be can only store credits from the previous interval or the previous second. There is no default Be value.

Committed Rate Measurement Interval (Tc) – the time interval over which Bc or Bc+Be can be transmitted. The max value is 125 ms and the minimum value is 10 ms.

### The Formula

CIR, Tc, and Bc are related mathematically by the following formula:

$$CIR = Bc / (Tc / 1000)$$

Notice the division of Tc by 1000 is used to convert milliseconds into seconds – the common measurement of CIR and Bc.

### QUESTION 3

DS-TE implementations on Cisco routers support which bandwidth pool(s) and class type(s)? (Choose two.)

- A. global pool only
- B. subpool only
- C. global pool and subpool
- D. class-type 0 only
- E. class-type 1 only
- F. class-type 0 and class-type 1

**Correct Answer:** CF

**Section:** MPLS

## **Explanation**

### **Explanation/Reference:**

Explanation:

## **Differential Service Tunnels**

Differential Service Traffic Engineering (TE) is an extension of the regular MPLS Traffic Engineering (MPLS-TE) feature. Regular TE does not provide bandwidth guarantees to different traffic classes. A single bandwidth pool (global pool) is used in regular TE that is shared by all traffic. In order to support various class of service (CoS), the ability to provide multiple bandwidth pools is required. These bandwidth pools then can be treated differently based on the requirement for the traffic class using that pool.

In RSVP global and subpools reservable bandwidths are configured on a per interface basis to accommodate TE tunnels on the node. Available bandwidth from all configured bandwidth pools is advertised using Interior Gateway Protocol (IGP). RSVP is used to signal the TE tunnel with appropriate bandwidth pool requirements.

### **QUESTION 4**

Which field in the MPLS shim header is used to support different QoS markings?

- A. IP precedence
- B. DSCP
- C. EXP
- D. ToS
- E. S
- F. Label

**Correct Answer: C**

**Section: MPLS**

**Explanation**

### **Explanation/Reference:**

Explanation:

MPLS EXP Marking

The three MPLS EXP (experimental) bits in the shim header of an input or output MPLS packet header may be set or changed by a user configured value

### **QUESTION 5**

On a Cisco IOS XR router, which mechanism protects the router resources by filtering and policing the packets flows that are destined to the router that is based on defined flow-type rates?

- A. LLQ
- B. LPTS
- C. Committed Access Rate
- D. Control Plane Policing
- E. Management Plane Protection
- F. NetFlow
- G. ACL

**Correct Answer:** B  
**Section:** QOS & XR  
**Explanation**

**Explanation/Reference:**

**Local Packet Transport Services (LPTS)** maintains tables describing all packet flows destined for the secure domain router (SDR), making sure that packets are delivered to their intended destinations.

The **Low Latency Queueing** feature brings strict priority queueing to Class-Based Weighted Fair Queueing (CBWFQ).

**QUESTION 6**

When configuring LLQ (strict priority queue) on a traffic class using the Cisco IOS XR priority command on a Cisco ASR9K router, which additional QoS command is required for this traffic class?

- A. shape
- B. police
- C. random-detect
- D. bandwidth

**Correct Answer:** B  
**Section:** QOS & XR  
**Explanation**

**Explanation/Reference:**

The **Low Latency Queueing** feature brings strict priority queueing to Class-Based Weighted Fair Queueing (CBWFQ).

**QUESTION 7**

On the Cisco ASR9K router, when using the bandwidth command to specify the minimum guaranteed bandwidth to be allocated for a specific class of traffic, what will be used as the queuing algorithm?

- A. custom queuing
- B. CBWFQ

- C. WFQ
- D. FIFO
- E. priority queuing

**Correct Answer:** B

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

Class based weighted fair queuing (CB-WFQ) was initially released without the support of a priority queuing system, thus it could not guarantee the delay and jitter (delay variation) requirements of real-time, interactive voice and video conversations. Since for CBWFQ, the weight for a packet belonging to a specific class is derived from the bandwidth assigned to the class, which in turn determines the order in which packets are sent. All packets are serviced fairly based on weight and no class of packets may be granted strict priority. This scheme poses problems for voice traffic that is largely intolerant of delay, especially variation in delay

#### **QUESTION 8**

When implementing MPLS DS-TE on Cisco IOS XR routers, all aggregate Cisco MPLS TE traffic is mapped to which class type by default?

- A. class-type 0 (bandwidth global pool)
- B. class-type 1 (bandwidth subpool)
- C. class-type 2 (bandwidth priority)
- D. class type class-default (bandwidth best-effort)

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

### **Differentiated Services Traffic Engineering**

MPLS Differentiated Services (Diff-Serv) Aware Traffic Engineering (DS-TE) is an extension of the regular MPLS-TE feature. Regular traffic engineering does not provide bandwidth guarantees to different traffic classes. A single bandwidth constraint is used in regular TE that is shared by all traffic. To support various classes of service (CoS), users can configure multiple bandwidth constraints. These bandwidth constraints can be treated differently based on the requirement for the traffic class using that constraint.

MPLS diff-serv traffic engineering provides the ability to configure multiple bandwidth constraints on an MPLS-enabled interface. Available bandwidths

from all configured bandwidth constraints are advertised using IGP. TE tunnel is configured with bandwidth value and class-type requirements. Path calculation and admission control take the bandwidth and class-type into consideration. RSVP is used to signal the TE tunnel with bandwidth and class-type requirements.

Diff-Serv TE can be deployed with either Russian Doll Model (RDM) or Maximum Allocation Model (MAM) for bandwidth calculations.

## TE Class Mapping

Each of the eight available bandwidth values advertised in the IGP corresponds to a TE Class. Because the IGP advertises only eight bandwidth values, there can be a maximum of only eight TE classes supported in an IETF DS-TE network.

TE class mapping must be exactly the same on all routers in a DS-TE domain. It is the responsibility of the operator configure these settings properly as there is no way to automatically check or enforce consistency.

The operator must configure TE tunnel class types and priority levels to form a valid TE class. When the TE class map configuration is changed, tunnels already up are brought down. Tunnels in the down state, can be set up if a valid TE class map is found.

[Table 4](#) list the default TE class and attributes.

**Table 4 TE Classes and Priority**

TE Class	Class Type	Priority
0	0	7
1	1	7
2	Unused	
3	Unused	
4	0	0
5	1	0
6	Unused	
7	Unused	



---

ote The default mapping includes four class types.

---

## QUESTION 9

On the Cisco IOS XR, which MQC configuration is different than on the Cisco IOS and IOS XE?

- A. On the Cisco IOS XR, WRED can only be applied in the output direction.
- B. On the Cisco IOS XR, marking can only be applied in the input direction.
- C. On the Cisco IOS XR, LLQ can be applied in the input or output direction.
- D. On the Cisco IOS XR, LLQ can use up to four priority queues: level 1, level 2, level 3, and level 4.

**Correct Answer: C**

**Section: QOS & XR**

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 10**

On Cisco routers, how is hierarchical QoS implemented?

- A. Within the parent policy, reference another child policy using the policy-map command.
- B. Within the child policy, reference another parent policy using the policy-map command.
- C. Use the policy-map command within a service-policy to implement nested policy-maps.
- D. Within the parent policy-map, reference another child policy-map using the service-policy command.

**Correct Answer: D**

**Section: QOS**

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 11**

Refer to the Cisco IOS XR policy-map configuration exhibit.

```
policy-map test
!
class one
priority level 1
!
class two
priority level 2
!
class three
bandwidth percent 60
!
interface GigabitEthernet0/0/0/2
service-policy output test
!
!
```

What is wrong with the policy-map configuration?

- A. missing the priority percent command under class one and class two
- B. missing the police command under class one and class two
- C. missing the police command under class three
- D. missing the priority bandwidth command under class one and class two
- E. missing the bandwidth command under class one and class two

**Correct Answer:** B

**Section:** QOS & XR

**Explanation**

**Explanation/Reference:**

Explanation:

Hierarchical policing is also supported. In such a configuration, both parent and child policies have class-maps containing policing statements, as in the following example:

```
!
policy-map child
  class gold
```

```
    police rate percent 50 conform-action set precedence immediate exceed-action drop
!
!
policy-map parent
    class match_all
        police rate 10000 kbps burst 15000 exceed-action drop
    service-policy child
```

## QUESTION 12

When configuring class-based WRED on Cisco routers, which WRED parameter is not user configurable on a Cisco IOS XR but is user configurable on a Cisco IOS and IOS XE?

- A. the ingress or egress direction where the class-based WRED policy will be applied
- B. the maximum threshold
- C. the minimum threshold
- D. the mark probability denominator

**Correct Answer: D**

**Section: QOS & XR**

**Explanation**

**Explanation/Reference:**

Explanation:

## Comparison of Cisco IOS QoS and Cisco IOS-XR QoS

The Cisco IOS-XR software implementation of QoS is basically the same as the QoS implementation on Cisco IOS software, with the following exceptions:

- On Cisco IOS-XR software, the bandwidth command can be configured only in egress policies.
- The following changes have been made to the class-map command on Cisco IOS-XR software:
  - Supports 4K per logical router.
  - Maximum number of match criteria configurable in one class map is eight.

- When a class is marked as high priority using the priority command on Cisco IOS-XR software, we recommend that you configure a policer to limit the priority traffic. Limiting the priority traffic will ensure that the priority traffic does not starve all of the other traffic on the line card. Use the police command to explicitly configure the policer.
- On Cisco IO-XR software, only one conform-action, exceed-action, or violate-action command can be configured at a time. To configure traffic policing, use the police command.
- On Cisco IOS-XR software, policy modifications cannot be made on existing policies. Use the policy-map command to remove the policy from all attached interfaces, delete the policy map, and redefine a new policy.
- When configuring a policy map on Cisco IOS-XR software, the maximum number of classes configurable in one policy map is 16, which includes both Level 1 and Level 2 classes. To configure a policy map, use the policy-map command.
- When WRED is configured on Cisco IOS-XR software, the mark probability in the random-detect command is not configurable—it is always set to 1.
- When the random-detect exp command is used on Cisco IOS-XR software, the exponential weighting constant is not configurable and will be programmed automatically by Cisco IOS-XR software.
- When access control lists (ACLs) are used in QoS class maps, the underlying deny or permit actions associated with access control entries (ACEs) are ignored. ACEs are used as a classification mechanism in order to provide appropriate QoS behavior as specified in class maps. Use ACLs that include ACEs with permit actions only.

### QUESTION 13

Which of the following three statements are correct regarding IPv6 QoS? (Choose three.)

- A. The traffic class field in the IPv6 header can be used to set specific precedence or DSCP values.
- B. A 20-bit flow label field enables per-flow processing.
- C. DS-TE is not supported by IPv6.
- D. Per-hop behavior in IPv6 networks is based on EXP bits.
- E. IPv6 QoS features are configured using the modular QoS CLI on Cisco routers.

**Correct Answer:** ABE

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

[http://www.cisco.com/en/US/technologies/tk648/tk872/technologies\\_white\\_paper0900aecd8026004d.pdf](http://www.cisco.com/en/US/technologies/tk648/tk872/technologies_white_paper0900aecd8026004d.pdf)



## IPv6 QoS AT-A-GLANCE

### RFC 2460/3697

Currently IPv6 provides support for QoS marking via a field in the IPv6 header.

Similar to the type of service (ToS) field in the IPv4 header, the traffic class field (8 bits) is available for use by originating nodes and/or forwarding routers to identify and distinguish between different classes or priorities of IPv6 packets.

Figure 1

The traffic class field may be used to set specific precedence or differentiated services code point (DSCP) values. These values are used in the exact same way as in IPv4.

The key advantage with the flow label is that the transit routers do not have to open the inner packet to identify the flow, which aids with identification of the flow when using encryption and other scenarios.

Version	Traffic Class	Flow Label
Payload Length	Next Header	Hop Limit
Source Address		
Destination Address		

Current Cisco IOS® Software support for IPv6 QoS includes:

- Packet classification
- Queuing (includes LLQ; excludes legacy PQ/CQ)
- Traffic shaping
- WRED

IPv6 also has a 20-bit field known as the flow label field (RFC 3697). The flow label enables per-flow processing for differentiation at the IP layer.

It can be used for special sender requests and is set by the source node.

The flow label must not be modified by an intermediate node.

Planned Cisco IOS Software support for IPv6 QoS includes:

- Compressed Real-Time Protocol (cRTP)
- Network-based application recognition (NBAR)
- Committed access rate (CAR)

**QUESTION 14**

With unmanaged CE routers, at which point in the service provider network is the QoS trust boundary, and what is required at the trust boundary?

- A. between the CE and PE router and mapping of the customer traffic classes into the service provider traffic classes at the PE router ingress
- B. between the CE and PE router and trusting the QoS markings from the CE router and applying the required QoS mechanisms based on the customer QoS markings
- C. between the PE and the P router and mapping of the customer traffic classes into the service provider traffic classes at the P router ingress
- D. between the PE and P router and trusting the QoS markings from the CE router and applying the required QoS mechanisms based on the customer QoS markings
- E. between the customer network and the CE router ingress and applying the required egress QoS policy on the CE router

**Correct Answer:** A

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 15**

On the Cisco IOS XR, when using the match protocol command within a class-map to classify traffic, you noticed that the match protocol option on the Cisco IOS XR shows much fewer protocol options than on the Cisco IOS or IOS XE, like there is no option such as the match protocol yahoo-messenger command on the Cisco IOS XR. Why is this?

- A. because the Cisco IOS XR router does not have the correct software packages installed
- B. because when defining the class-map, the class-map type should be set to type inspect: class- map type inspect class-map-name command
- C. because NBAR is not supported on the Cisco IOS XR
- D. because flexible packet matching has not been enabled on the Cisco IOS XR router

**Correct Answer:** C

**Section:** QOS & XR

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 16**

Within the service provider core network, which two QoS mechanisms are typically deployed on the P routers? (Choose two.)

- A. LLQ

- B. traffic policing and remarking
- C. WRED
- D. traffic shaping
- E. traffic classification and markings
- F. link fragmentation and interleaving

**Correct Answer:** AC

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 17

Which three steps are required to configure QPPB on Cisco IOS XR routers? (Choose three.)

- A. Apply a QPPB route policy to the BGP process using the table-policy command
- B. Apply a QPPB route policy to the BGP neighbor using the route-policy command
- C. Define a QPPB route policy to match the customer routes, then set the IP precedence or qos- group
- D. Define a QPPB route policy to match the customer IP precedence or qos-group markings, then set the BGP community
- E. Enable QPPB on an interface using the ipv4 bgp policy propagation input ip-precedence|qos- group destination|source command
- F. Enable QPPB on an interface using the ipv4 bgp policy propagation output ip-precedence|qos- group destination|source command

**Correct Answer:** ACE

**Section:** QOS & XR

**Explanation**

**Explanation/Reference:**

QoS Policy Propagation via BGP (**QPPB**), is a mechanism that allows propagation of quality of service (QoS) policy and classification by the sending party based on access lists, community lists and autonomous system paths in the Border Gateway Protocol (BGP), thus helping to classify based on destination instead of source address.

## QUESTION 18

The Cisco IOS and IOS XE qos pre-classify command allows which kind of packet classification on IP packets that are encapsulated with GRE and IPsec?

- A. allows for packets to be classified based on the ToS byte values before packet encryption
- B. allows for packets to be classified based on the ToS byte values after packet encryption
- C. allows for packets to be classified based on the packet payload before packet encryption

- D. allows for packets to be classified based on the packet payload after packet encryption
- E. allows for packets to be classified based on the packet header parameters other than the ToS byte values after packet encryption

**Correct Answer:** E

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 19**

Which are typical class-based marking policies that are implemented on service provider IP NGN PE routers?

- A. On the PE ingress, classify the customer traffic and then mark with qos-group. On the PE egress, classify based on the qos-group and then mark with mpls exp.
- B. On the PE ingress, classify the customer traffic and then mark with mpls exp. On the PE egress, classify based on the mpls exp and then mark with qos-group.
- C. On the PE ingress, trust the customer QoS markings. On the PE egress, classify based on the customer QoS markings and then mark with qos-group.
- D. On the PE ingress, trust the customer QoS markings. On the PE egress, classify based on the customer QoS markings and then mark with mpls exp.

**Correct Answer:** A

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 20**

Which item is not available to be used for QoS classification in Cisco IOS XR?

- A. MAC SA
- B. protocol
- C. inner EXP
- D. discard-class
- E. QoS-group
- F. VLAN

**Correct Answer:** C

**Section: QOS & XR****Explanation****Explanation/Reference:**

Explanation:

**QUESTION 21**

Which statement is correct regarding the default MPLS TTL behavior?

- A. When an ingress edge LSR receives an IP packet, it will decrement the IP TTL field by 1; then it will set the MPLS Label TTL field to 255.
- B. When an ingress edge LSR receives an IP packet, it will decrement the IP TTL field by 1; then it will copy the decremented IP TTL field into the MPLS Label TTL field.
- C. When an ingress edge LSR receives an IP packet, it will just copy the IP TTL field into the MPLS Label TTL field.
- D. When an ingress edge LSR receives an IP packet, it will copy the IP TTL field into the MPLS Label TTL field first; then it will only decrement the MPLS Label TTL field by 1.
- E. When an ingress edge LSR receives an IP packet, it will copy the IP TTL field into the MPLS Label TTL field first; then it will only decrement the IP TTL field by 1.

**Correct Answer:** B

**Section: MPLS****Explanation****Explanation/Reference:**

Explanation:

**QUESTION 22**

Which three statements are correct regarding ping mpls command operations? (Choose three.)

- A. MPLS OAM has to be enabled on the router using the mpls oam command.
- B. They use a 127/8 address as the destination address in the MPLS echo request packet.
- C. They use ICMP echo request and ICMP echo reply packets.
- D. They are used to test for a broken LSP.
- E. If there is a broken LSP, instead of using label switching, the packet can still be forwarded based on the destination IP address in the mpls ping echo request packet.

**Correct Answer:** ABD

**Section: MPLS****Explanation****Explanation/Reference:**

How MPLS Ping works?

MPLS Ping doesn't rely on ICMP echo messages. Instead it uses UDP protocol with both source and destination port as 3503 and relies on MPLS Echo request and MPLS Echo reply.

When MPLS ping is triggered from any MPLS router, it will generate UDP segment with source/destination port as 3503. The source address will be selected as usual while the destination address will be 127.0.0.1. The IP TTL will be set to 1.

Below is a sample IP format when MPLS Ping is originated from R5 to 150.1.6.6/32,

```

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Version|  IHL  |Type of Service|          Total Length        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Identification            |Flags|      Fragment Offset  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  TTL=1   |   Protocol=UDP   |          Header Checksum       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                  150.1.5.5                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                  127.0.0.1                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Options                    |      Padding            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

```

Now the originating LSR will look into the LFIB and populate the label header with respective labels to reach the FEC, in our case 150.1.6.6/32.

R4 on receiving the MPLS packet will be able to send to the actual destination only if the LSP is end to end. If the LSP is broken between R4 and R6, R4 will look into the destination IP address which will be 127.0.0.1 and won't be able to perform IP forwarding. As per RFC 1812, a router should not forward any packet that has destination address of 127.0.0.0/8

## QUESTION 23

What are the four fields inside the MPLS shim header? (Choose four.)

- A. EXP
- B. TTL

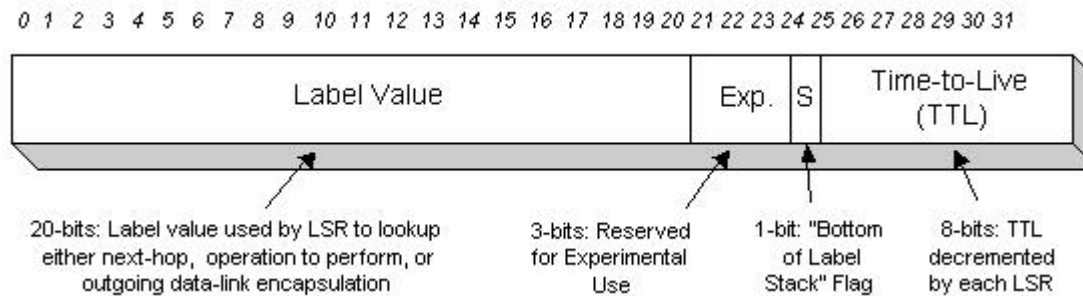
- C. Version
- D. S
- E. Length
- F. Label
- G. Type
- H. FCS

**Correct Answer:** ABDF

**Section:** MPLS

**Explanation**

**Explanation/Reference:**



#### QUESTION 24

Which two of the following statements are correct regarding LSPs? (Choose two.)

- A. An LSP is created for every routing protocol entry.
- B. Each LSP is bidirectional, that is, packets traveling in the opposite direction use the same LSP.
- C. An IGP is used to populate routing tables in all routers in an MPLS domain.
- D. LDP is used to propagate labels and build LSPs.
- E. The FIB is used to forward MPLS-labeled packets down an LSP.

**Correct Answer:** CD

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

### QUESTION 25

Which four pieces of information are stored for each prefix in the LFIB? (Choose four.)

- A. local label
- B. outgoing label
- C. next-hop IP address
- D. outgoing interface
- E. incoming interface
- F. Layer 2 header rewrite information

**Correct Answer:** ABCD

**Section:** MPLS

**Explanation**

#### **Explanation/Reference:**

Forwarding Labeled Packets

LSR forwards the packet based on:

Top Label value of the received packet

Corresponding entry in LFIB (LABEL <=> INTERFACE)

#show mpls forwarding-table - will show:

local label

outgoing label

prefix (network)

outgoing interface

next-hop

Pomerol#show mpls forwarding-table

Local tag	Outgoing tag or VC	Prefix or Tunnel Id	Bytes tag switched	Outgoing interface	Next Hop
16	Pop tag	10.1.1.12/30	636	Se3/0	point2point
17	Pop tag	10.10.10.1/32	0	Se3/0	point2point
18	21	10.10.10.4/32	0	Se3/0	point2point
19	Pop tag	10.1.1.0/30	0	Se4/0	point2point
	Pop tag	10.1.1.0/30	0	Se3/0	point2point
20	Pop tag	10.10.10.6/32	612	Se2/0	point2point
21	Pop tag	10.1.1.16/30	0	Se3/0	point2point
22	16	10.10.10.5/32	0	Se3/0	point2point
23	Pop tag	10.10.10.2/32	0	Se4/0	point2point

LSR expects packet to come with "top" label being "Local" (from show mpls forwarding-table).

If Outgoing label is "Aggregate", then that means that this is a summary route and more specific lookup is performed.

If LSR cannot find label/interface mapping in LFIB, then it drops the packet.

There are several "RESERVED" labels numbered from 0 to 15:

- 0 - explicit NULL - is used to preserve QoS info through EXP bits. It copies 'ip prec' or DiffServ.
- 1 - router alert label - forces LSR to software switch the packet.
- 3 - implicit NULL - this label is used for "connected" or "summary" routes. This way LSR signals its neighbors to execute "POP label" operation on "connected" routes. It is called PHP, Penultimate Hop Popping, and is used to make sure that LSR does not perform 2 lookups (label + ip).
- 14 - OEM alert label - is used for monitoring purpose.

In Cisco IOS, the default range is 16 through 100,000, but can be expanded by using "mpls label range" command.

## QUESTION 26

Which three network services can be implemented using MPLS within the service provider IP NGN core? (Choose three.)

- A. Layer 2 VPNs
- B. Layer 3 VPNs
- C. traffic engineering
- D. IntServ traffic engineering tunnels
- E. encrypted LSPs

**Correct Answer:** ABC

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 27

LDP session protection uses which one to maintain the LDP session between LDP neighbors?

- A. LDP NSF
- B. LDP NSR
- C. backup-targeted LDP hellos
- D. BFD
- E. LDP-IGP synchronization

**Correct Answer:** C

**Section:** MPLS

### **Explanation**

#### **Explanation/Reference:**

Explanation:

#### **QUESTION 28**

You are tasked to enable LDP on many of the interfaces on the Cisco CRS-3 router, and because there are many interfaces that need to have LDP enabled, you mistakenly did not enable LDP on all the required interfaces. To prevent this issue from happening again in the future, what could you do the next time you need to enable LDP on many interfaces?

- A. use the mpls ldp auto-config command under the IGP routing process
- B. use the mpls ldp sync command under the IGP routing process
- C. use the interface all command under the MPLS LDP process
- D. use the discovery command under the MPLS LDP process

**Correct Answer:** A

**Section:** MPLS

### **Explanation**

#### **Explanation/Reference:**

Explanation:

#### **QUESTION 29**

Which two statements are correct in describing ISP environments that are running IP/MPLS in the core network? (Choose two.)

- A. On the PE routers, each BGP route must use a unique label to reach the BGP next hop.
- B. The BGP next hops point to the PE routers, and only the PE routers are required to run BGP.
- C. A full mesh of IBGP sessions are required between all of the PE and P routers to ensure proper packets forwarding.
- D. The PE and P routers run LDP to learn the labels for reaching the BGP next-hop addresses.

**Correct Answer:** BD

**Section:** MPLS

### **Explanation**

#### **Explanation/Reference:**

Explanation:

#### **QUESTION 30**

When troubleshooting LDP operations on the Cisco IOS and IOS XE routers, what is one of the first things that should be verified?

- A. if running OSPF as the IGP, ensure that OSPFv3 has been enabled

- B. check if the ip cef command has been enabled
- C. verify in the running configurations that all of the required LDP interfaces are defined under the mpls ldp command configuration mode
- D. verify if there are any access lists that are denying TCP and UDP port 464 packets

**Correct Answer:** B

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 31**

Referring to the Cisco IOS XR configuration exhibit,

```
mpls ldp
label
advertise
disable
for test1 to test2
!
ipv4 access-list test2
10 permit ipv4 any any
ipv4 access-list test1
10 permit ipv4 host 10.1.1.1 any
```

which labels will be advertised by the router with this configuration?

- A. Only the label for 10.1.1.1/32 will be advertised to all the LDP peers.
- B. Labels for all prefixes will be advertised to the 10.1.1.1 LDP peer.
- C. Labels for all prefixes will be advertised to all the LDP peers.
- D. No labels will be advertised to any LDP peers.

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 32**

What is the term that is used for the label that an LSR assigns and distributes to other LSRs in MPLS?

- A. Local
- B. Remote
- C. Explicit
- D. Explicit Null
- E. Aggregate

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 33**

Which Cisco IOS XR high-availability feature is used to prevent routes from being used before LDP converges?

- A. LDP session protection
- B. LDP-IGP synchronization
- C. BFD
- D. IGP session protection

**Correct Answer:** B

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 34**

Which Cisco IOS XR command should be used in order to enable LDP-IGP synchronization for the ISIS IGP protocol?

- A. RP/0/RSP0/CPU0:R1(config-isis-if-af)#mpls ldp sync
- B. RP/0/RSP0/CPU0:R1(config-isis)#mpls ldp sync
- C. RP/0/RSP0/CPU0:R1(config-ldp)#isis ldp sync
- D. LDP-IGP synchronization is not supported for the ISIS IGP protocol on Cisco IOS XR platforms

**Correct Answer:** A

**Section: MPLS****Explanation****Explanation/Reference:**

Explanation:

**QUESTION 35**

Referring to the Cisco IOS XR show command output exhibit,

```
RP/0/RSP1/CPU0:ASR9006#sh mpls ldp igp sync
Bundle-Ether9000:
  Sync status: Ready
  Peers:
    192.168.1.25:0 (GR)
GigabitEthernet0/1/0/10:
  Sync status: Not ready
```

what are three possible reasons that the GigabitEthernet0/1/0/10 LDP IGP sync status is not ready? (Choose three.)

- A. GigabitEthernet0/1/0/10 is not configured to run LDP.
- B. Graceful restart is not configured on the peer.
- C. The LDP neighbor on GigabitEthernet0/1/0/10 is not up.
- D. The OSPF neighbor on GigabitEthernet0/1/0/10 is not up.
- E. LDP is up on GigabitEthernet0/1/0/10, but no label bindings have been received from the peer.
- F. GigabitEthernet0/1/0/10 is a member link of Bundle-Ether9000.

**Correct Answer:** CDE

**Section: MPLS****Explanation****Explanation/Reference:**

Explanation:

**QUESTION 36**

In which two Cisco IOS XR configuration modes can mpls ldp igp sync be configured? (Choose two.)

- A. config-ldp
- B. config-if
- C. config-ospf-ar

- D. config-ospf
- E. config-isis

**Correct Answer:** CD

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 37

On Cisco routers, which three methods can be used to map traffic into the MPLS traffic engineering tunnel? (Choose three.)

- A. on-demand routing
- B. static routing
- C. optimized edge routing
- D. policy-based routing
- E. autoroute

**Correct Answer:** BDE

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 38

Which three statements are correct regarding a Cisco MPLS TE? (Choose three.)

- A. A Cisco MPLS TE tunnel maps onto an LSP path.
- B. Tunnels are bidirectional by default.
- C. Packets that are mapped into a Cisco MPLS TE tunnel will have two labels, with the top label indicating what the tail-end router should do with the packet.
- D. A tunnel that is created with a priority of 0 can pre-empt an existing tunnel with a priority of 7.
- E. CBR takes into account link resource and traffic tunnel attributes.
- F. RSVP is used between customer routers.

**Correct Answer:** ADE

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 39**

On a Cisco router, when will the router actually reserve the bandwidth for the MPLS traffic engineering tunnel?

- A. during the autoroute process
- B. during constraint-based routing calculations
- C. on the receipt of the RSVP Path message
- D. on the receipt of the RSVP Resv message

**Correct Answer:** D

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 40**

Cisco MPLS TE path setup can be affected by which three tunnel attributes? (Choose three.)

- A. bandwidth
- B. delay
- C. MTU
- D. priority
- E. affinity

**Correct Answer:** ADE

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 41**

When using the `tunnel mpls traffic-eng path-option 1 explicit name test` command in Cisco MPLS TE tunnel configurations, the test explicit-path configuration will consist of a list of which values?

- A. tunnel endpoint

- B. resource class affinity
- C. MPLS label
- D. IP address

**Correct Answer:** D

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

tunnel mpls traffic-eng path-option

To configure a path option for a Multiprotocol Label Switching (MPLS) traffic engineering tunnel, use the tunnel mpls traffic-eng path-option command in interface configuration mode. To disable the specified path option, use the no form of this command.

```
tunnel mpls traffic-eng path-option number {dynamic | explicit {name path-name | path-number}} [lockdown]
```

```
no tunnel mpls traffic-eng path-option number {dynamic | explicit {name path-name | path-number}} [lockdown]
```

Syntax Description

number = When multiple path options are configured, lower numbered options are preferred.

dynamic = Path of the LSP is dynamically calculated.

explicit = Path of the LSP is an IP explicit path.

name path-name = Path name of the IP explicit path that the tunnel uses with this option.

path-number = Path number of the IP explicit path that the tunnel uses with this option.

lockdown = (Optional) The LSP cannot be reoptimized.

Usage Guidelines

You can configure multiple path options for a single tunnel. For example, there can be several explicit path options and a dynamic option for one tunnel. Path setup preference is for lower (not higher) numbers, so option 1 is preferred.

Examples

The following example shows how to configure the tunnel to use a named IP explicit path:

```
Router(config-if)# tunnel mpls traffic-eng path-option 1 explicit name test
```

**QUESTION 42**

Cisco MPLS TE resource attributes that are configured locally for each link are distributed to the headend router of the traffic engineering tunnel using which protocol?

- A. BGP
- B. MP-BGP
- C. LDP
- D. RSVP
- E. OSPF or IS-IS with TE extension

**Correct Answer:** E

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 43**

When implementing Cisco MPLS TE, the constrained-based path calculations will use which value as the TE cost of each link within the MPLS domain?

- A. By default, it will use the IGP metric, or each link can be assigned a specific value using the `admin-weight` command.
- B. It can only use the IGP metric as the TE cost.
- C. It will use the interface bandwidth as the TE cost.
- D. Each link must be assigned a TE cost using the `metric` command.

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 44**

Which affinity and mask value will match the link affinity that has 0x0F in the first 8 bits and 0x01 in the last 8 bits, and the middle 16 bits can be any value?

- A. affinity 0x0F000001 mask 0x0F000001
- B. affinity 0x0F000001 mask 0x00000000
- C. affinity 0x0F000001 mask 0x11111111
- D. affinity 0x0F000001 mask 0x11000011

- E. affinity 0x0F000001 mask 0xFF0000FF
- F. affinity 0x0F000001 mask 0x00FFFF00

**Correct Answer:** E

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 45**

Which two features are used to provide Cisco MPLS TE node and link protection? (Choose two.)

- A. autoroute
- B. fast reroute
- C. backup tunnels
- D. BFD

**Correct Answer:** BC

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 46**

In Cisco MPLS TE implementations, what can cause the tunnel bandwidth to adjust automatically based on the traffic load in the tunnel?

- A. fast reroute
- B. admin weight
- C. autobandwidth
- D. bandwidth subpool

**Correct Answer:** C

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 47**

Which affinity value will be matched by the affinity bit mask of the affinity 0xFF00000A mask 0xFFFF000F command?

- A. 0xFFFF000A
- B. 0xFF00EEEE
- C. 0xFF000000
- D. 0x00000000
- E. 0x11110001

**Correct Answer:** B

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

0xFF00000A 11111111000000000000000000001010

0xFFFF000F 11111111111111110000000000001111

0xFF00EEEE 11111111000000001110111011101010

**QUESTION 48**

Refer to the Cisco IOS XR configuration exhibit.

```
interface Tunnel-te 10
ipv4 unnumbered Loopback0
destination 10.5.5.5
signalled-bandwidth 1000
priority 7 7
path-option 1 explicit name testpath
!
explicit-path name testpath
index 1 next-address ipv4 unicast 10.3.3.3
index 2 next-address ipv4 unicast 10.4.4.4
!
mpls traffic-eng
interface GigabitEthernet 0/0/0/10
backup-path tunnel-te 10
```

Which statement is correct?

- A. The backup tunnel-te 10 tunnel is using the highest setup and hold priority settings of 7.
- B. The backup tunnel path is learned dynamically.
- C. The fast-reroute command is missing under the (config-mpls-te-if)# configuration mode.
- D. Interface gi0/0/0/10 is the protected link.

**Correct Answer:** D

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 49**

When defining an explicit MPLS TE tunnel path, which two command options are available under the explicit-path configuration mode? (Choose two.)

- A. exclude-address
- B. include-address
- C. next-address
- D. dynamic-address

**Correct Answer:** AC

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 50**

Which three mechanisms are used to implement MPLS TE? (Choose three.)

- A. tunnel interface
- B. CSPF
- C. RSVP
- D. LDP
- E. MP-BGP

**Correct Answer:** ABC

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

Constrained-Based Shortest Path First (**CSPF**).

**Resource Reservation Protocol - Traffic Engineering** is an extension of the resource reservation protocol (RSVP) for traffic engineering.

**QUESTION 51**

Implementing IPoDWDM interfaces on Cisco CRS routers eliminates the need for which network component?

- A. ROADM
- B. external transponders
- C. electrical-optical-electrical converters
- D. electrical cross-connect

**Correct Answer: B**

**Section: IOS XR**

**Explanation**

**Explanation/Reference:**

IP over DWDM (**IPoDWDM**) is a technology used in telecommunications networks to integrate IP Routers and Switches in the OTN (Optical Transport Network).

**QUESTION 52**

Layer 2 VPN services that are offered by traditional service providers using a SONET/SDH backbone can be implemented by service providers using an IP/MPLS backbone with which MPLS feature?

- A. LSP stitching
- B. AToM
- C. virtual private WAN services
- D. cell-mode MPLS

**Correct Answer: B**

**Section: MPLS**

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 53**

On Cisco routers, which QoS marker is only locally significant?

- A. DSCP
- B. MPLS EXP
- C. IP precedence
- D. QoS group
- E. discard eligible (DE)

**Correct Answer:** D

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 54

Which QoS mechanism is used for congestion avoidance?

- A. LLQ
- B. CBWFQ
- C. WRED
- D. LFI
- E. traffic policing

**Correct Answer:** C

**Section:** QOS

**Explanation**

**Explanation/Reference:**

Explanation:

## QUESTION 55

Only based on the Cisco IOS XR policy-map configuration exhibit,

```
policy-map policy_A
class test
  bandwidth 1000000
  random-detect dscp AF11 10000 20000
  random-detect dscp AF41 12000 24000
```

which statement is correct?

- A. All DSCP AF41 marked packets will be dropped when the average queue length reaches 12,000 packets.
- B. DSCP AF11 marked packets will be randomly dropped when the average queue length reaches 10,000 packets.
- C. DSCP AF11 and AF41 marked packets are guaranteed a minimum bandwidth of 1 Mb/s.
- D. DSCP AF11 and AF41 marked packets are guaranteed a maximum bandwidth of 1 Mb/s.

**Correct Answer:** B

**Section:** QOS & XR

**Explanation**

**Explanation/Reference:**

Explanation:

Random-Detect ---- randomly dropped

**QUESTION 56**

Referring to the show output exhibit,

```
RP/0/RSP0/CPU0:P1# show mpls ldp bindings

10.7.1.1/32, rev 61
Local binding: label: 16008
Remote bindings: (2 peers)
Peer          Label
-----
10.0.2.1:0    16013
10.7.1.1:0    IMP-NULL

10.7.10.1/32, rev 85
Local binding: label: 16009
Remote bindings: (1 peer)
Peer          Label
-----
10.0.2.1:0    16022
```

which statement is correct?

- A. The P1 router is receiving label information for the 10.0.2.1/32 prefix from two LDP peers.
- B. The P1 router is receiving label information for the 10.7.1.1/32 prefix from two LDP peers.

- C. The P1 router is using the IMP-NULL local label for the 10.7.1.1/32 prefix because 10.7.1.1/32 is the loopback interface IP address on the P1 router.
- D. The P1 router will perform PHP for the 10.7.1.1/32 and 10.7.10.1./32 prefixes.

**Correct Answer:** B

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### QUESTION 57

Referring to the traceroute output exhibit that is shown,

```
pe1#traceroute 14.14.14.14
Type escape sequence to abort.
Tracing the route to 14.14.14.14
 0 37.37.37.1 [MPLS: Label 66 Exp 0] 40 msec 24 msec 28 msec
 1 78.78.78.2 [MPLS: Label 99 Exp 0] 28 msec 32 msec 28 msec
 2 181.181.181.1 [MPLS: Label 99 Exp 0] 36 msec 24 msec 24 msec
 3 110.110.110.1 28 msec 28 msec 28 msec
 4 103.103.103.2 [MPLS: Label 66 Exp 0] 28 msec 28 msec 24 msec
 5 135.135.135.2 28 msec 28 msec *
```

which statement is correct?

- A. There is no problem with the end-to-end LSP as indicated by the successful trace.
- B. Normal PHP operation is performed by the hop 4 router.
- C. The end-to-end LSP is broken at hop 4.
- D. At each hop, each LSR is able to perform label swapping.

**Correct Answer:** C

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### QUESTION 58

What is an important requirement with MPLS applications like Layer 3 MPLS VPNs?

- A. All the PE routers loopback addresses should be summarized to reduce the number of routing table entries in the core routers.
- B. Targeted hellos are required between all the PE routers.
- C. An end-to-end LSP is required between the PE routers.
- D. The LSPs that are built between the PE routers must be symmetrical (bidirectional).

**Correct Answer:** C

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 59**

When implementing MPLS TE tunnels on Cisco IOS XR routers, what is the tunnel setup and hold priority value range, and which value has the highest priority?

- A. 0-63, where 0 is the highest priority
- B. 0-63, where 63 is the highest priority
- C. 0-7, where 0 is the highest priority
- D. 0-7, where 7 is the highest priority

**Correct Answer:** C

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 60**

Which Cisco IOS XR command should be used in order to enable LDP on all interfaces for which the IGP protocol is enabled?

- A. RP/0/0/CPU0:R1(config-ospf)#mpls ldp auto-config
- B. RP/0/0/CPU0:R1(config-ospf)#mpls ldp interface all enable
- C. RP/0/0/CPU0:R1(config-ospf)#enable all
- D. RP/0/0/CPU0:R1(config-ldp)#enable all

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

**QUESTION 61**

Refer to the partial Cisco IOS XR configurations exhibit for Router 1 and Router 2.

```
RP/0/RP0/CPU0:Router1#show running-config mpls ldp
```

```
mpls ldp
router-id 33.33.33.33
log
 adjacency
!
interface GigabitEthernet0/2/0/6
!
```

```
RP/0/RP1/CPU0:Router2#show running-config mpls ldp
```

```
mpls ldp
router-id 10.12.0.3
log
 neighbor
!
interface GigabitEthernet0/0/2/2
!
```

```
RP/0/RP0/CPU0:Router1#show running-config router ospf
```

```
router ospf test
area 0
 interface Loopback7
  passive enable
!
```

```
RP/0/RP1/CPU0:Router2#show running-config router ospf
```

```
router ospf test
area 0
 interface Loopback0
  passive enable
!
 interface GigabitEthernet0/0/2/2
!
```

There are two routers that are connected back to back over the Gigabit Ethernet link. If the "show mpls ldp neighbor" command output on Router 1 does

not show LDP peering with Router 2, what could be the possible root cause of the LDP peering problem?

- A. missing interface under OSPF IGP configuration
- B. hello timers mismatch on Router 1 and Router 2
- C. password for LDP session mismatch on Router 1 and Router 2
- D. MPLS LDP session protection is not configured

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

#### **QUESTION 62**

Which Cisco IOS XR command should be used to identify if MPLS TE FRR is enabled?

- A. `show mpls traffic-eng tunnel <tunnel#>`
- B. `show mpls frr`
- C. `show mpls traffic-eng protection`
- D. `show mpls protection`
- E. `show mpls fast-reroute`

**Correct Answer:** A

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

The MPLS Traffic Engineering (TE)—Fast Reroute (FRR) Link and Node Protection feature provides link protection (backup tunnels that bypass only a single link of the label-switched path (LSP)), node protection (backup tunnels that bypass next-hop nodes along LSPs), and the following FRR features:

- Backup tunnel support
- Backup bandwidth protection
- Resource Reservation Protocol (RSVP) Hellos

#### **Prerequisites for MPLS Traffic Engineering (TE)—Fast Reroute (FRR) Link and Node Protection**

Your network must support the following Cisco IOS features:

- IP Cisco Express Forwarding

- Multiprotocol Label Switching (MPLS)

Your network must support at least one of the following protocols:

- Intermediate System-to-Intermediate System (IS-IS)
- Open Shortest Path First (OSPF)

Before configuring FRR link and node protection, it is assumed that you have done the following tasks but you do not have to already have configured MPLS TE tunnels:

- Enabled MPLS TE on all relevant routers and interfaces
- Configured MPLS TE tunnels

### QUESTION 63

When a link flaps, an mpls ldp session will also flap. Which feature minimizes traffic loss and provides faster convergence after the link is re-established?

- A. BFD
- B. MPLS LDP IGP SYNC
- C. graceful restart
- D. LDP session protection
- E. LDP nonstop routing

**Correct Answer:** D

**Section:** MPLS

**Explanation**

**Explanation/Reference:**

Explanation:

### QUESTION 64

A DSCP value of 41 in decimal corresponds to which IP precedence value?

- A. 3 Flash
- B. 4 Flash Override
- C. 5 Critical
- D. 6 Internet Control
- E. 7 Network Control

**Correct Answer:** C

**Section:** QOS

## Explanation

### Explanation/Reference:

= INT(41/8)

The AF behavior group defines four separate AF classes with Class 4 having the highest priority. Within each class, packets are given a drop precedence (high, medium or low). The combination of classes and drop precedence yields twelve separate DSCP encodings from AF11 through AF43 (see table)

Assured Forwarding (AF) Behavior Group				
	Class 1 (lowest)	Class 2	Class 3	Class 4 (highest)
Low Drop	AF11 (DSCP 10)	AF21 (DSCP 18)	AF31 (DSCP 26)	AF41 (DSCP 34)
Med Drop	AF12 (DSCP 12)	AF22 (DSCP 20)	AF32 (DSCP 28)	AF42 (DSCP 36)
High Drop	AF13 (DSCP 14)	AF23 (DSCP 22)	AF33 (DSCP 30)	AF43 (DSCP 38)

### QUESTION 65

Referring to Cisco MPLS TE path setup operations using RSVP, drag the RSVP characteristic on the left to match the correct RSVP message type on the right.

#### Select and Place:

Referring to Cisco MPLS TE path setup operations using RSVP, drag the RSVP characteristic on the left to match the correct RSVP message type on the right.

sent from the tunnel headend to the tunnel tailend

sent from the tunnel tailend to the tunnel headend

carries the MPLS label requests

carries the MPLS labels

RSVP PATH Message

Target

Target

RSVP RESV Message

Target

Target

**Correct Answer:**

Referring to Cisco MPLS TE path setup operations using RSVP, drag the RSVP characteristic on the left to match the correct RSVP message type on the right.

	RSVP PATH Message
	sent from the tunnel headend to the tunnel tailend
	carries the MPLS label requests
	RSVP RESV Message
	sent from the tunnel tailend to the tunnel headend
	carries the MPLS labels

**Section: MPLS**

**Explanation**

**Explanation/Reference:**

RSVP PATH Message --- sent from the tunnel headend to the tunnel tailend ---- carried the MPLS label requests

RSVP RESV Message--Sent from the tunnel tailend to the tunnel headend --- carries the MPLS labels

**QUESTION 66**

Drag each of the QoS mechanisms on the left to match the correct description on the right. (Not all option on the left are used).

**Select and Place:**

Drag each of the QoS mechanisms on the left to match the correct description on the right. (Not all options on the left are used.)

LLQ

LFI

traffic shaping

WRED

CBWFQ

traffic policing

WFQ

Can drop excess traffic beyond the committed rate and remark nonconforming traffic before transmitting it.

Use to avoid the TCP global synchronization problems that occur when tail drop is used as the congestion avoidance mechanism.

Provide a strict priority queue to allow delay-sensitive data such as voice to be dequeued and sent first.

Excess traffic beyond the committed rate will be queued and scheduled for later transmission. Only applied in the output direction.

**Correct Answer:**

Drag each of the QoS mechanisms on the left to match the correct description on the right. (Not all options on the left are used.)

	traffic policing
LFI	WRED
	LLQ
	traffic shaping
CBWFQ	
WFQ	

### Section: QOS

#### Explanation

#### Explanation/Reference:

Can drop express traffic beyond the committed rate and remark non coming traffic before transmitting it--traffic policing

Use to avoid the TCP global synchronization problems that occur when tail drop is used as the congestion avoidance mechanism---WRED

Provide a strict priority queue to allow delay-sensitive data such as voice t be dequeued and sent first--CBWFQ

Express traffic beyond the committed rate will be queue and scheduled for later transmission .Only applied in the output directions.--traffic shaping

#### QUESTION 67

Drag the Cisco MQC configuration task on the left to match the correct description on the right. (Not all option on the left are used).

**Select and Place:**

Drag the Cisco MQC configuration task on the left to match the correct description on the right. (Not all options on the left are required.)

class-map	applies the QoS policy to an interface
tcp-map	defines the PHB QoS action(s) for each of the different traffic classes
route-map	defines the matching parameter(s) for classifying packets into service classes
policy-map	
service-policy	
route-policy	
qos-group	

**Correct Answer:**

Drag the Cisco MQC configuration task on the left to match the correct description on the right. (Not all options on the left are required.)

	service-policy
tcp-map	policy-map
route-map	class-map
route-policy	
qos-group	

### Section: QOS

#### Explanation

#### Explanation/Reference:

Applies the QOS policy to interface--service policy

Defines the PHB qos action for each of the different traffic classes--policy map

Defines the making parameters for classifying packets into service classes--class-map

#### QUESTION 68

Put th MPLS LDP steps on the left into the correct order from top to bottom on the right.

#### Select and Place:

Put the MPLS LDP steps on the left into the correct order from top to bottom on the right.

Build RIB	Target
Build LFIB	Target
Assign Labels	Target
Advertise Labels	Target

## Correct Answer:

Put the MPLS LDP steps on the left into the correct order from top to bottom on the right.

	Build RIB
	Assign Labels
	Advertise Labels
	Build LFIB

## Section: MPLS

### Explanation

### Explanation/Reference:

- 1) Build RIB
- 2) Assign labels
- 3) Advertise Labels
- 4) Build LFIB

## QUESTION 69

Drag the QoS model on the left to match its correct description on the right.

**Select and Place:**

Drag the QoS model on the left to match its correct description on the right.

DiffServ	All network packets are treated exactly the same.
IntServ	It divides traffic into classes and applies a different level of service for each class.
Best Effort	Traffic-handling characteristics are based on signaling events from network-based applications.

**Correct Answer:**

Drag the QoS model on the left to match its correct description on the right.

	Best Effort
	DiffServ
	IntServ

**Section: QOS**

**Explanation**

**Explanation/Reference:**

All network packets are treated exactly the same-- Best Effort

It divides traffic classes and applies a different level of service for each class-- Diffserv

Traffic-handling characteristics are based on signaling events from network-based applications-- intServ

**QUESTION 70**

Drag the MPLS Diff-Serv tunneling mode on the left to match the correct description on the right.

**Select and Place:**

Drag the MPLS Diff-Serv tunneling mode on the left to match the correct description on the right.	
Pipe Mode	If a QoS marking (MPLS EXP) is changed in the MPLS network, it is also changed in the egress IP packet.
Short-Pipe Mode	This provides QoS transparency where the customer QoS marking (for example, DSCP) in the IP packet is preserved. The egress PE uses the original customer QoS marking instead of the service provider QoS marking.
Uniform Mode	QoS is done on the output interface of the PE router that is based on the received MPLS EXP field. The customer QoS marking (for example, DSCP) is not altered when the customer packet travels from the ingress to the egress of the MPLS domain.

**Correct Answer:**

Drag the MPLS Diff-Serv tunneling mode on the left to match the correct description on the right.

	Uniform Mode
	Short-Pipe Mode
	Pipe Mode

## Section: QOS

### Explanation

#### Explanation/Reference:

If a qos making (MPLS EXP) is changed in the MPLS network, it is also changed in the egress IP Packet--> Uniform Mode

This provide QOS transparency where the customer QOS marking (for example,DSCP) in the IP Packet is preserved.The egress PE uses the original customer QOS marking instead of the service provider QOS marking--> short-pipe mode

Qos is done on the output interface of the PE router that is based on the receive--> pipe mode

## QUESTION 71

Scenario:

Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

No console or enable passwords are required.

There are **four** multiple-choice questions with this task. Be sure to answer all **four** questions before selecting the Next button.

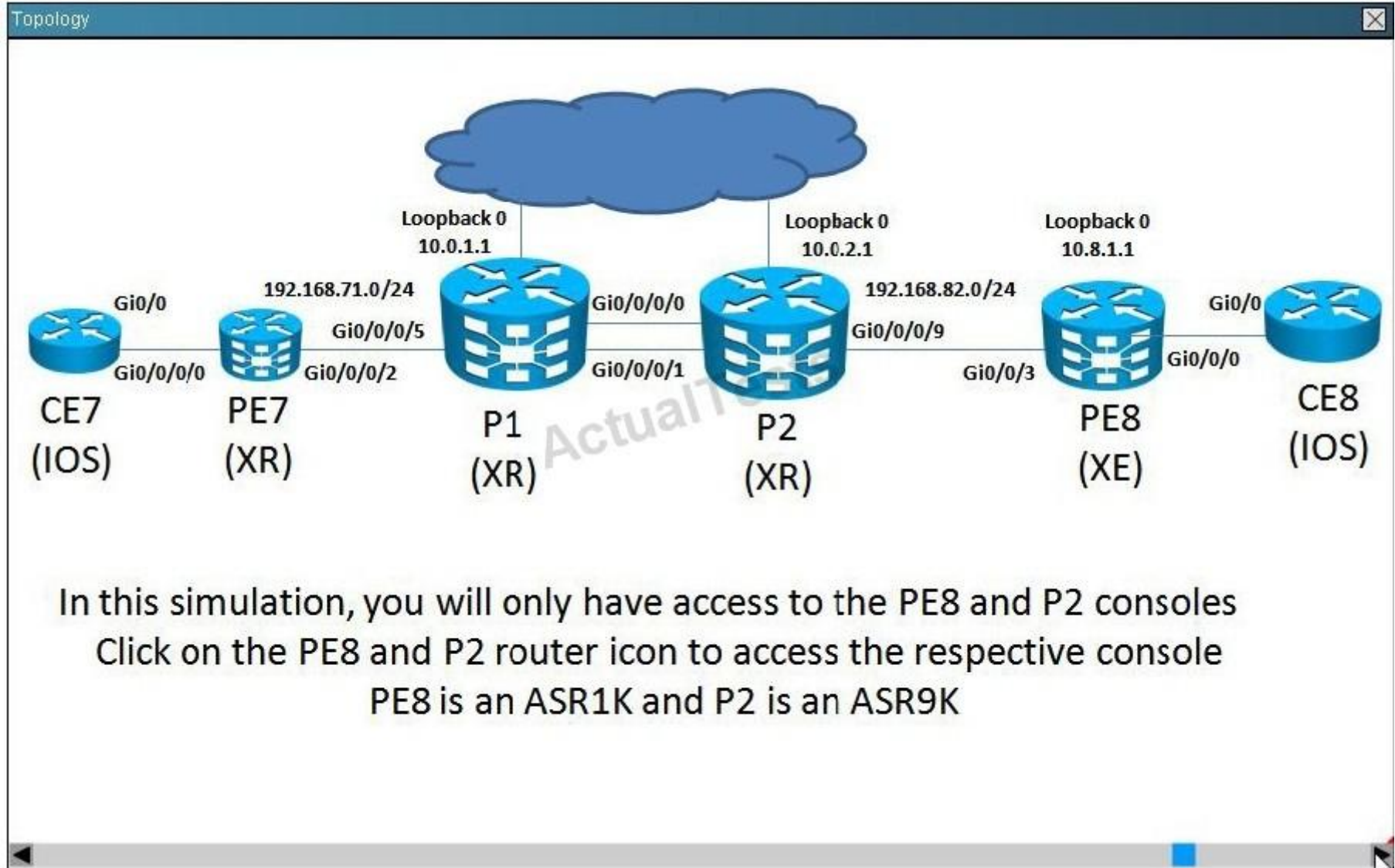
Not all the CLI commands or commands options are supported or required for this simulation.

For example, the show running-config command is **NOT** supported in this simulation.

All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the PE8 and P2 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



On the PE8-router what is the label value used to reach the 10.7.1.1/32 network prefix?

- A. 10.0.2.1:0
- B. imp-null

- C. 16024
- D. 128

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation: Need to run command at PE8 router so that we can get the value .Local tag value is answer for these  
#show mpls forwarding-table 10.7.1.1

## QUESTION 72

Scenario:

Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

No console or enable passwords are required.

There are **four** multiple-choice questions with this task. Be sure to answer all **four** questions before selecting the Next button.

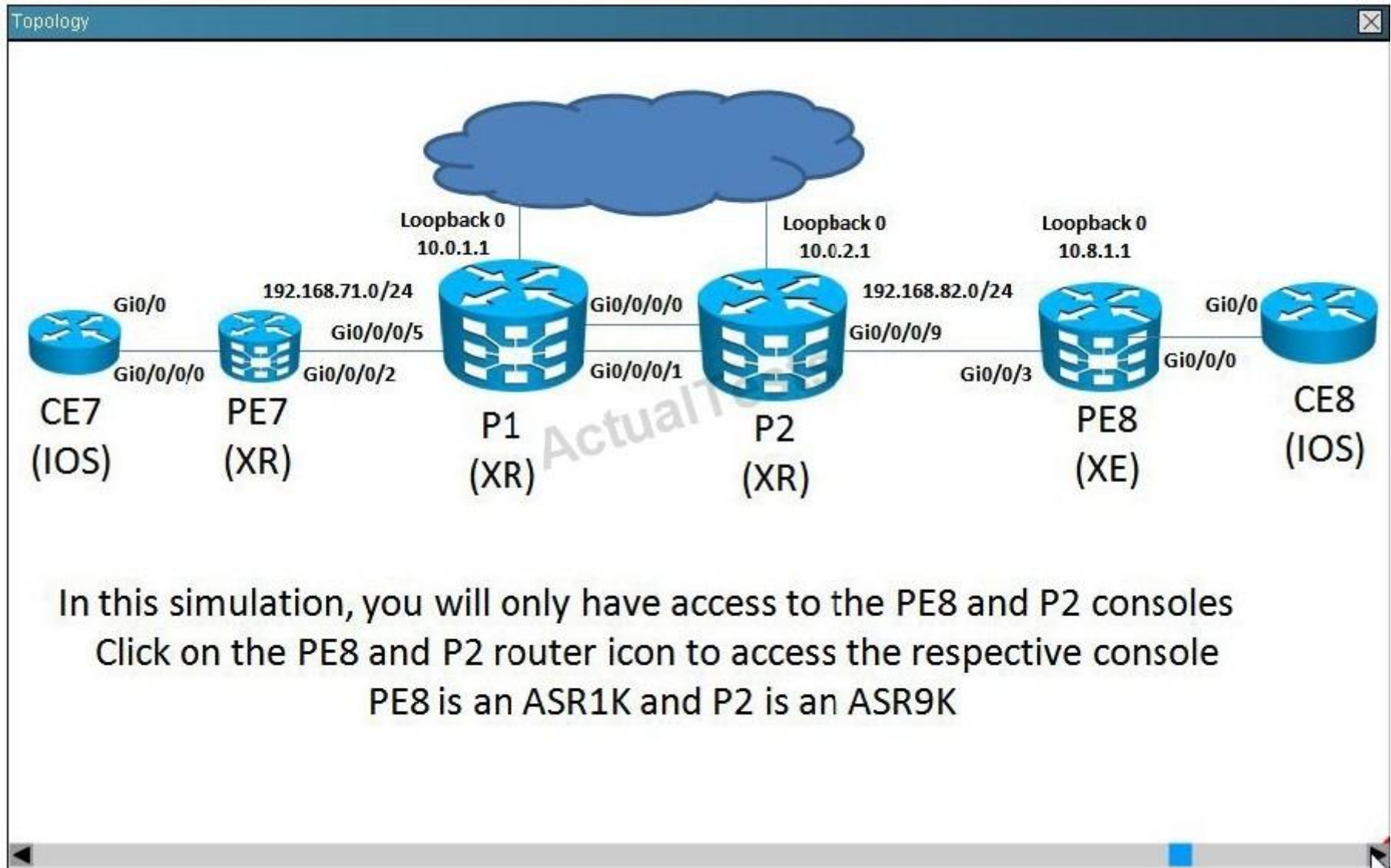
Not all the CLI commands or commands options are supported or required for this simulation.

For example, the show running-config command is **NOT** supported in this simulation.

All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the PE8 and P2 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



On P2 IOS-XR router what is targeted LDP hellos hold time on LDP session with 10.0.1.1:0 LDP ID?

- A. 90 sec
- B. 10 sec

- C. 3 sec
- D. 8.6 sec

**Correct Answer: C**

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation: Need to run command at PE8 router so that we can get the value .

```
RP/0/RSP0/CPU0:P2#show mpls ldp discovery
```

```
Local LDP Identifier: 10.0.2.1:0
```

```
Discovery Sources:
```

```
Interfaces:
```

```
GigabitEthernet0/0/0/0 (0x4000080): xmit/rcv
```

```
Source address: 192.168.1.2; Transport address: 10.0.2.1
```

```
Hello interval: 3 sec (due in 1.3 sec)
```

```
LDP Id: 10.0.1.1:0
```

```
Source address: 192.168.1.1; Transport address: 10.0.1.1
```

```
Hold time: 10 sec (local:10 sec, peer:10 sec)
```

```
(expiring in 7.4 sec)
```

```
GigabitEthernet0/0/0/1 (0x40000c0): xmit/rcv
```

```
Source address: 192.168.2.2; Transport address: 10.0.2.1
```

```
Hello interval: 3 sec (due in 1.6 sec)
```

```
LDP Id: 10.0.1.1:0
```

```
Source address: 192.168.2.1; Transport address: 10.0.1.1
```

```
Hold time: 10 sec (local:10 sec, peer:10 sec)
```

```
(expiring in 9.7 sec)
```

```
.  
.
```

```
RP/0/RP0/CPU0:router# show mpls ldp parameters
```

```
LDP Parameters:
```

```
Protocol Version: 1
```

```
Router ID: 10.0.2.1
```

```
Null Label: Implicit
```

```
Session:
```

```
Hold time: 180 sec
```

```
Keepalive interval: 60 sec
```

```
Backoff: Initial:15 sec, Maximum:120 sec
```

```
Discovery:
```

```
Link Hellos:      Holdtime:15 sec, Interval:5 sec
Targeted Hellos: Holdtime:90 sec, Interval:10 sec
Graceful Restart:
  Enabled (Configured),
  Reconnect Timeout: 120 sec, Forwarding State Hold: 180 sec
Timeouts:
  Binding with unresolved route: 300 sec
  LSD Recovery: 60 sec
  LDP Recovery: 360 sec
```

```
# show mpls ldp neighbor detail----- ?????? Interface...
RP/0/RP0/CPU0:router# show mpls ldp neighbor detail
```

```
Peer LDP Identifier: 2.2.2.2:0
TCP connection: 2.2.2.2:11707 - 1.1.1.1:646
Graceful Restart: No
Session Holdtime: 180 sec
State: Oper; Msgs sent/rcvd: 33/29
Up time: 00:13:37
LDP Discovery Sources:
  POS0/2/0/1
  Targeted Hello (1.1.1.1 ->2.2.2.2, active)
Addresses bound to this peer:
  23.0.0.2 2.0.0.2          123.0.4.2          10.42.37.119
  10.2.2.2
Peer holdtime: 180 sec; KA interval: 60 sec; Peer state: Estab
Clients: Dir Adj Client
Inbound label filtering: accept acl 'pfx_acl2'
Session Protection:
  Enabled, state: Ready
  Duration: 30 seconds
```

### QUESTION 73

Scenario:

Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

No console or enable passwords are required.

There are **four** multiple-choice questions with this task. Be sure to answer all **four** questions before selecting the Next button.

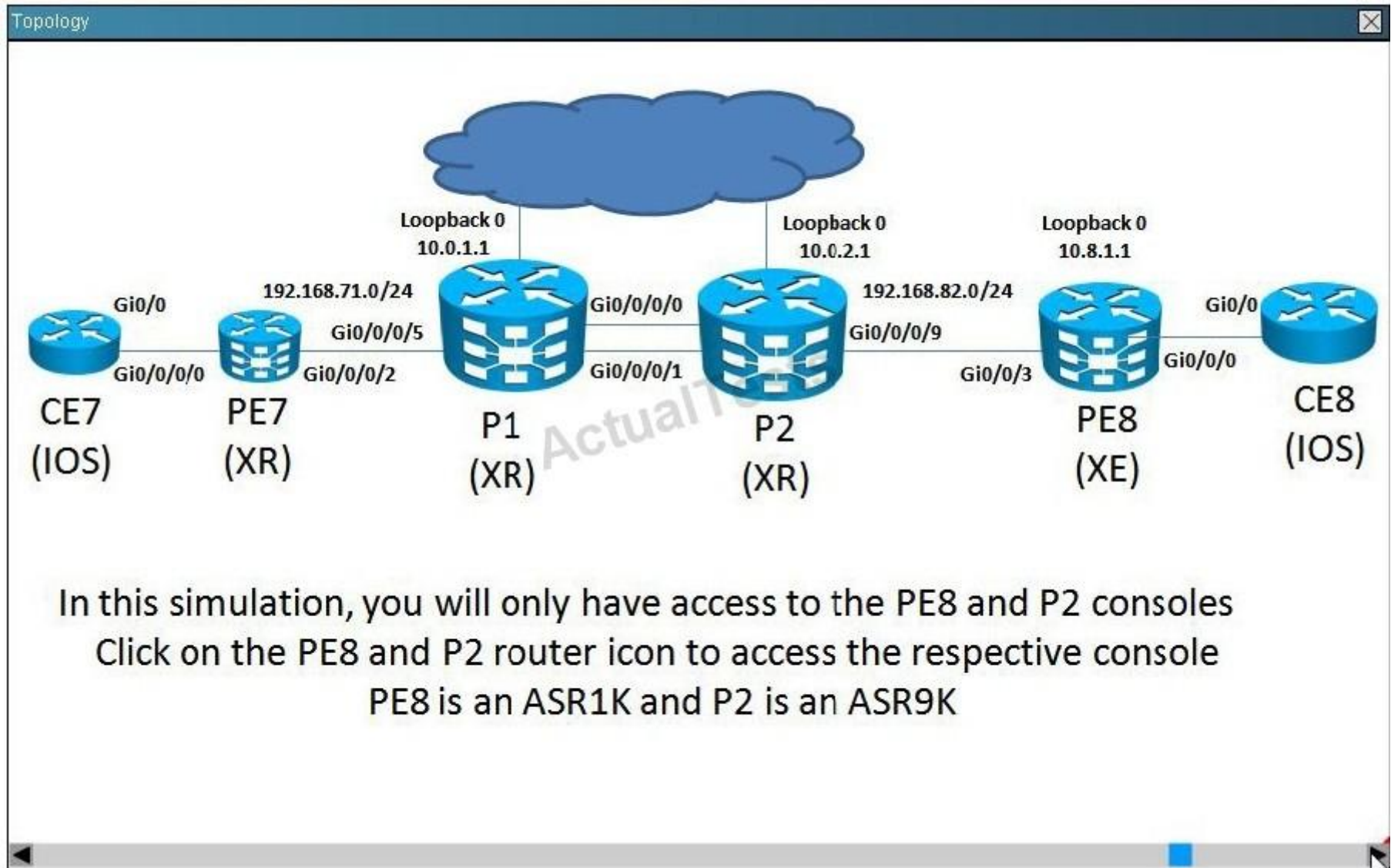
Not all the CLI commands or commands options are supported or required for this simulation.

For example, the show running-config command is **NOT** supported in this simulation.

All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the PE8 and P2 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



From PE8 router, what is the label action used to reach the P2 loopback 0 interface 10.0.2.1/32?

- A. Swap label 35 with label 16004
- B. Push label 16004

- C. Pop label 35
- D. Pop label 16009
- E. Push Label 16009
- F. Swap label 35 with label 16009

**Correct Answer:** D

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

Need to run command at PE8 router so that we can get the value .Local tag value is answer for these  
#show mpls forwarding-table 10.0.2.1

#### QUESTION 74

Scenario:

Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

No console or enable passwords are required.

There are **four** multiple-choice questions with this task. Be sure to answer all **four** questions before selecting the Next button.

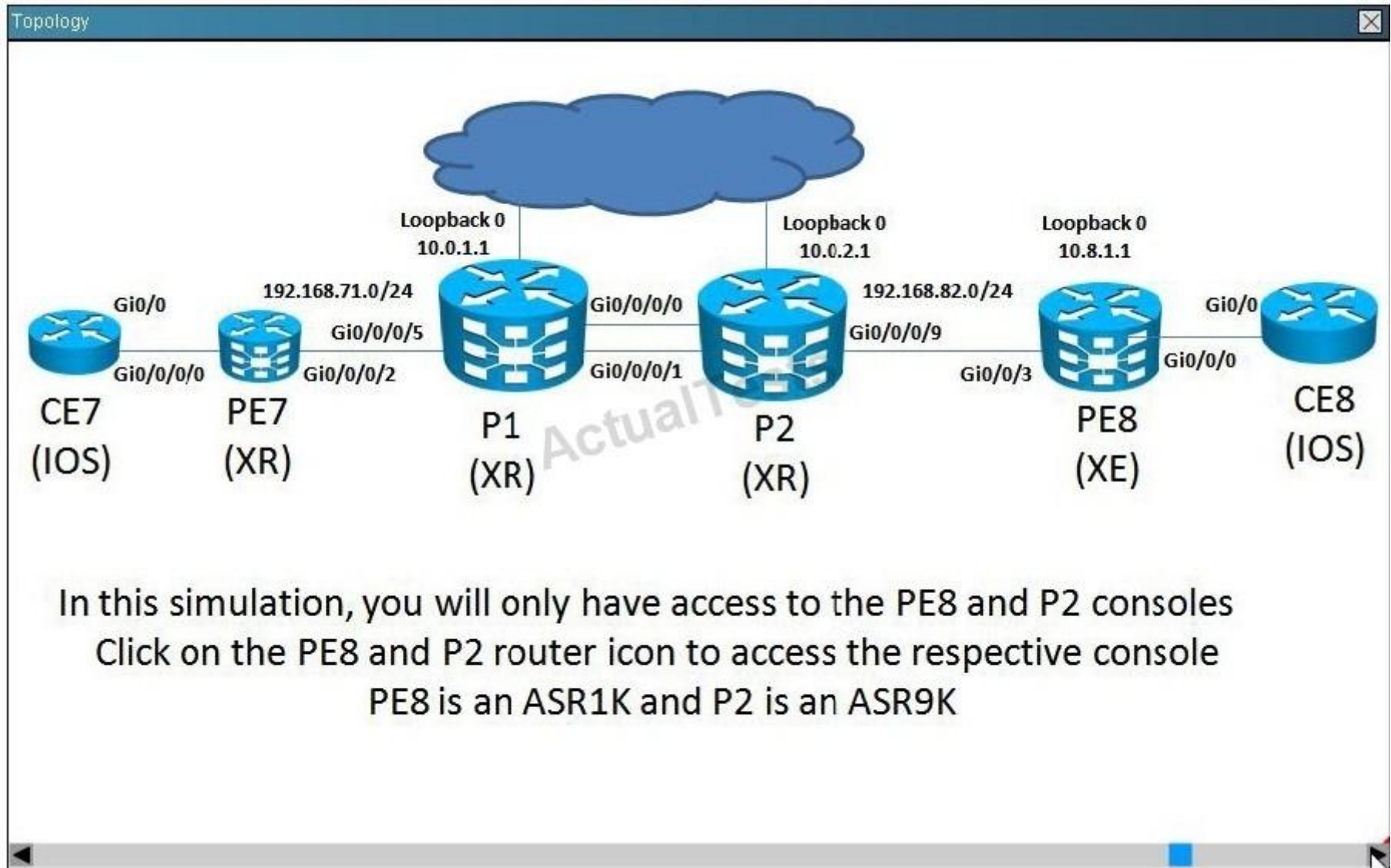
Not all the CLI commands or commands options are supported or required for this simulation.

For example, the show running-config command is **NOT** supported in this simulation.

All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

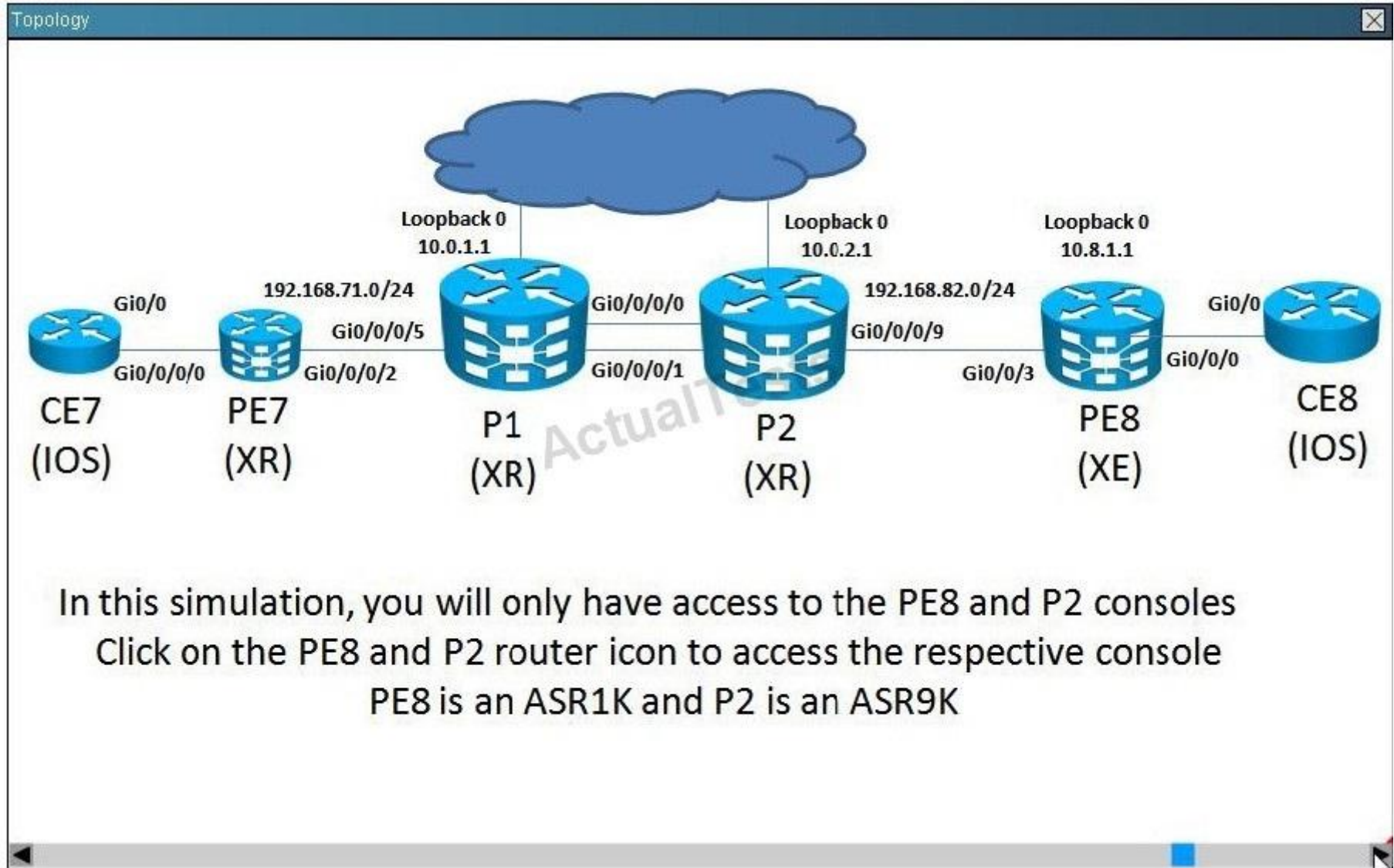
Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the PE8 and P2 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



From the PE8 router, how many total prefixes for have an incoming local label assigned (including the imp-null)?

**Exhibit:**



- A. 45
- B. 21
- C. 66

D. 22

**Correct Answer: D**

**Section: (none)**

**Explanation**

**Explanation/Reference:**

Explanation: Need to run command at PE8 router so that we can get the value .prefix value is answer for these

```
Router# show mpls forwarding-table
```

Local Label	Outgoing Label or VC	Prefix or Tunnel Id	Bytes switched	label interface	Outgoing Next Hop
26	No Label	10.253.0.0/16	0	Et4/0/0	10.27.32.4
28	1/33	10.15.0.0/16	0	AT0/0.1	point2point
29	Pop Label	10.91.0.0/16	0	Hs5/0	point2point
	1/36	10.91.0.0/16	0	AT0/0.1	point2point
30	32	10.250.0.97/32	0	Et4/0/2	10.92.0.7
	32	10.250.0.97/32	0	Hs5/0	point2point
34	26	10.77.0.0/24	0	Et4/0/2	10.92.0.7
	26	10.77.0.0/24	0	Hs5/0	point2point
35	No Label[T]	10.100.100.101/32	0	Tu301	point2point
36	Pop Label	10.1.0.0/16	0	Hs5/0	point2point
	1/37	10.1.0.0/16	0	AT0/0.1	point2point

```
-----  
Router# show mpls ldp bindings
```

```
10.0.0.0/8, rev 9  
  local binding:  label: imp-null  
  remote binding: lsr: 10.10.0.55:0, label: 17  
  remote binding: lsr: 10.66.0.66:0, label: 18  
  remote binding: lsr: 10.0.0.44:0, label: imp-null  
172.16.0.0/8, rev 17  
  local binding:  label: 19  
  remote binding: lsr: 10.0.0.55:0, label: imp-null  
  remote binding: lsr: 10.66.0.66:0, label: 16  
  remote binding: lsr: 10.0.0.44:0, label: imp-null  
192.168.0.66/32, rev 19  
  local binding:  label: 20  
  remote binding: lsr: 10.0.0.55:0, label: 19  
  remote binding: lsr: 10.66.0.66:0, label: imp-null  
  remote binding: lsr: 10.0.0.44:0, label: 18
```

```
.  
. .  
.
```

-----  
Router# show mpls ip binding summary

Total number of prefixes: 53

Generic label bindings

	assigned	learned
prefixes	in labels	out labels
53	53	51

ATM label bindings summary

interface	total	active	local	remote	Bwait	Rwait	IFwait
ATM1/0.8	47	47	40	7	0	0	0

Router#

## QUESTION 75

Scenario:

### Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

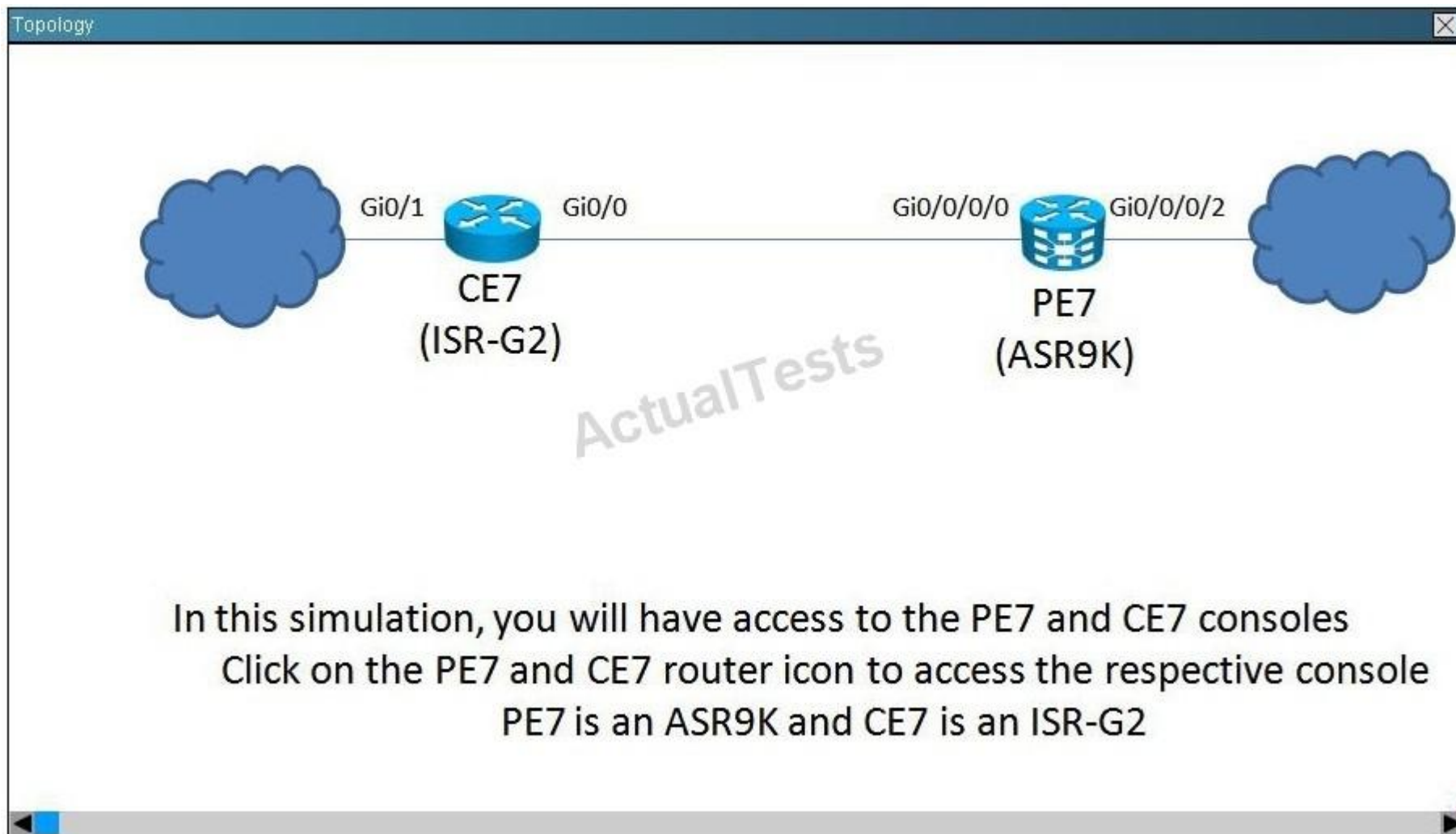
No console or enable passwords are required.

There are four multiple-choice questions with this task. Be sure to answer all four questions before selecting the Next button.

Not all the CLI commands or commands options are supported or required for this simulation.  
All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

### Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the CE7 and PE7 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



On CE 7 router, which statement is correct regarding the "QOS-POLICY policy map configurations?

- A. Traffic matched by the "QOS-HTTP-1" class-map is shaped to an average rate of 2560000 128000bps
- B. Traffic matched by the "QOS1-HTTP-2" class-map will be queued in the low-latency-queue which has a maximum bandwidth guarantee of 64000
- C. Traffic matched by the "QOS-FTP-1" class-map can't use more than 256 Kbps under any condition
- D. The "QOS-POLICY" is applied to the gi0/0 interface in the input direction

**Correct Answer:** C

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

# show policy-map

# show policy-map interface x/y

# show running-config policy-map

### **QUESTION 76**

Scenario:

#### Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

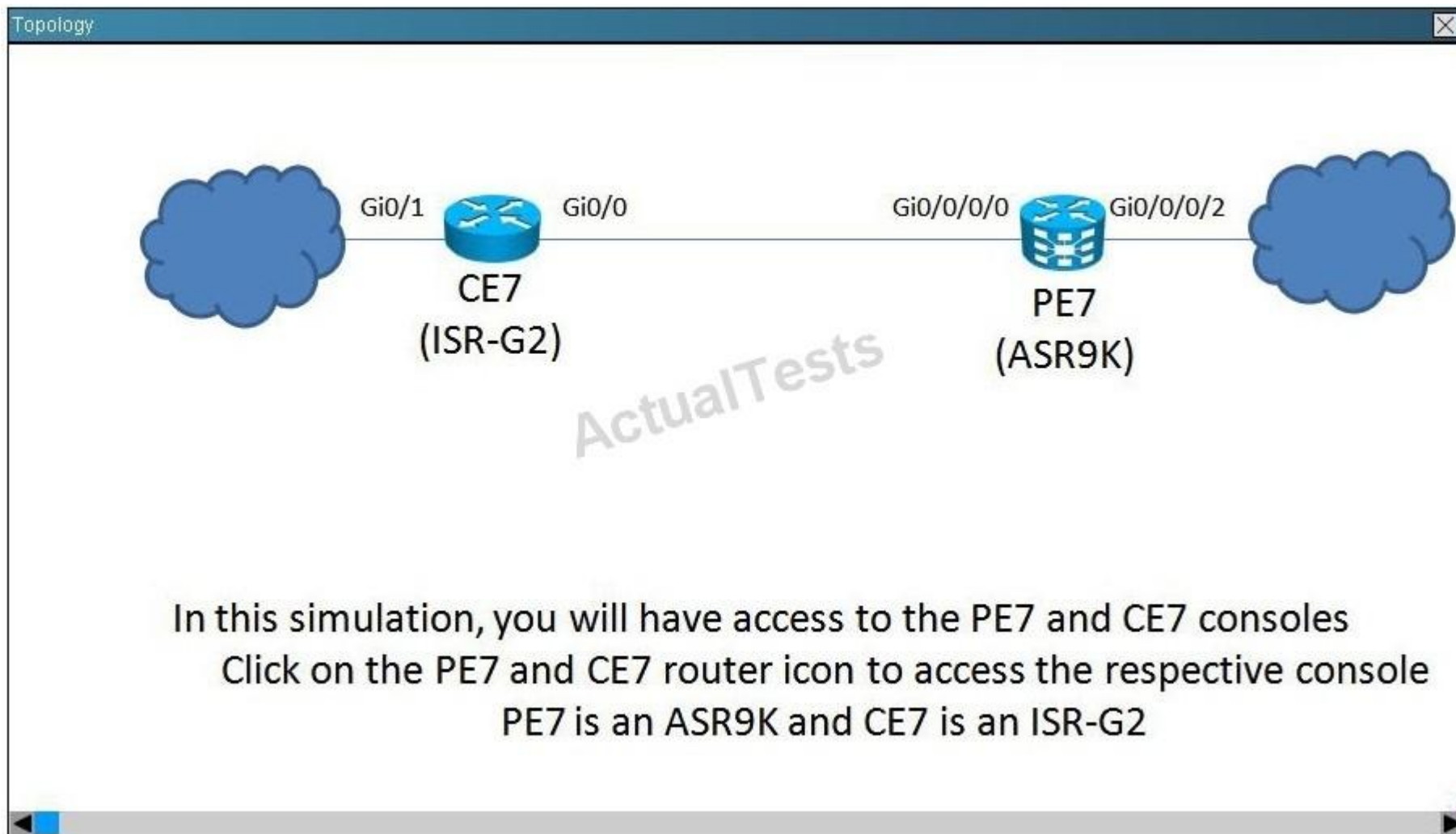
No console or enable passwords are required.

There are four multiple-choice questions with this task. Be sure to answer all four questions before selecting the Next button.

Not all the CLI commands or commands options are supported or required for this simulation.  
All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

#### Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the CE7 and PE7 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



After reviewing present router configuration CE7 .which two statements are correct regarding behavior of the "llq" policy-map? (Choose 2)

- A. Traffic matched by the "cisco1" class-map will be assigned to the priority queue.
- B. The "llq" QoS policy is applied to the gi0/0 interface in the output direction
- C. Traffic matched by the "cisco2" class-map has a maximum bandwidth of 30%
- D. Traffic matched by the "cisco3" class-map has no priority and has a minimum bandwidth guarantee of 20%

E. There are no packets being matched by the "class-default" traffic class in the "llq" policy

**Correct Answer:** AE

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

#show policy-map interface <name>

### QUESTION 77

Scenario:

Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

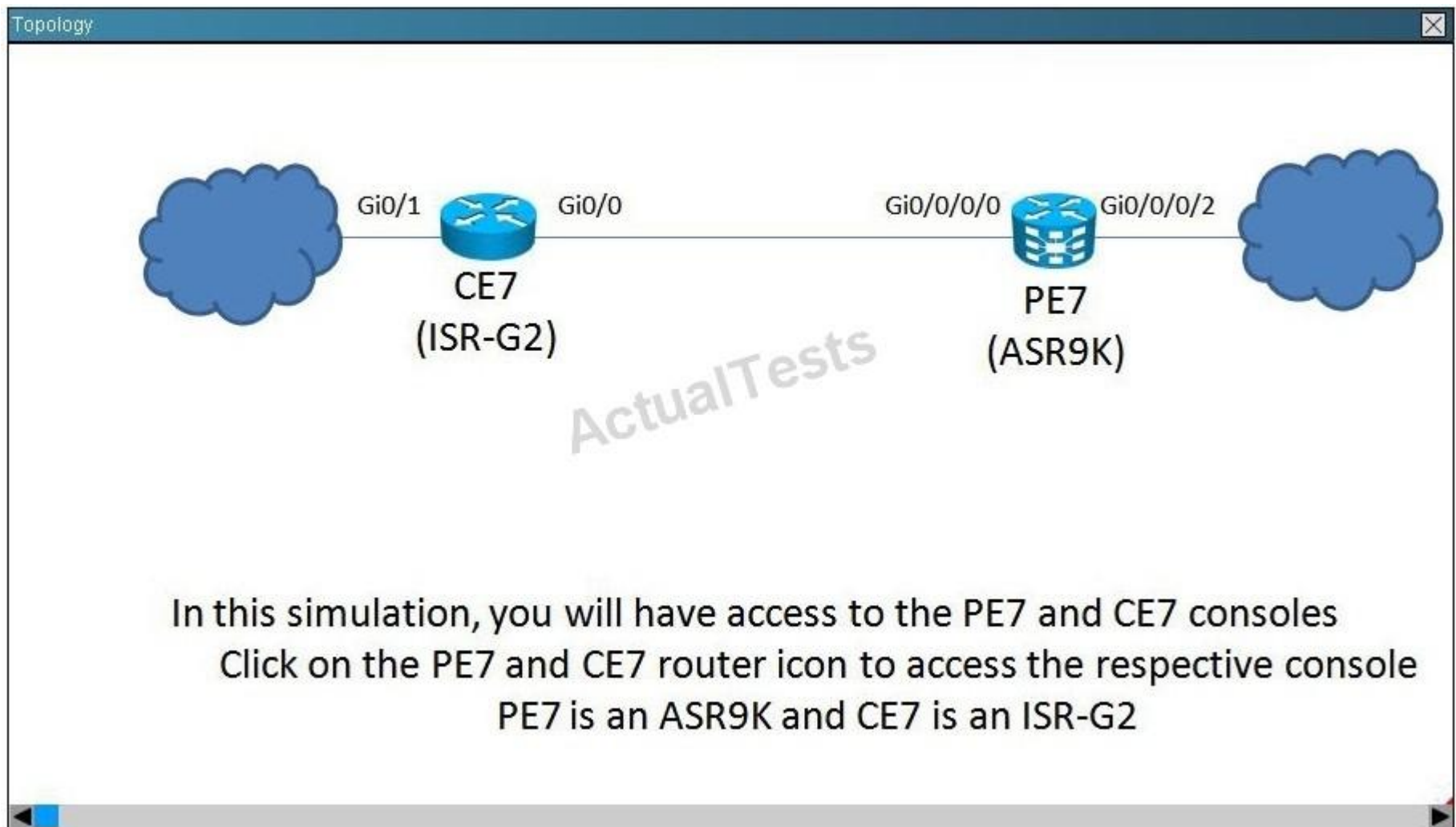
No console or enable passwords are required.

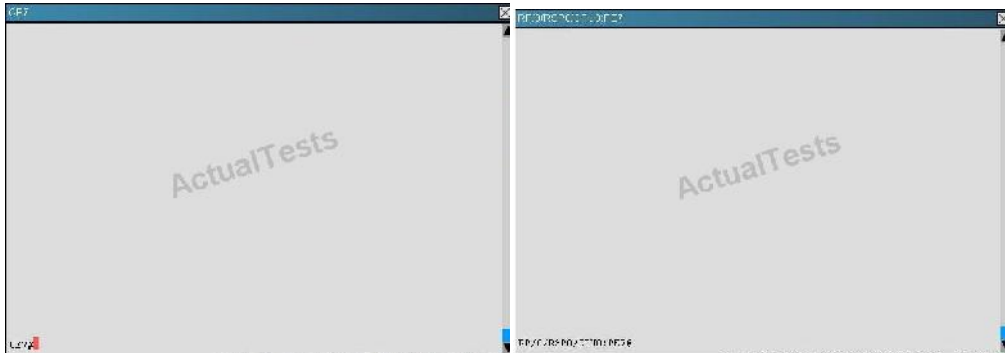
There are four multiple-choice questions with this task. Be sure to answer all four questions before selecting the Next button.

Not all the CLI commands or commands options are supported or required for this simulation. All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the CE7 and PE7 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.





On CE7 which statement is correct regarding Traffic the QoS policy applied to the gi0/0 interface in the input direction?

- A. Traffic matching the "MARKING2" class-map will be marked with qos-group 5
- B. Traffic matching the "MARKING1" class-map will be marked with MPLS EXP 5
- C. All incoming packets not matched by the "MARKING1" class-map will be dropped
- D. All incoming packets with the DSCP EF marking will be marked with MPLS EXP 0

**Correct Answer:** A

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

#show policy-map interface <name> --- check the class-map field

### QUESTION 78

Scenario:

#### Instructions

Enter the proper CLI commands and analysis the outputs on the Cisco routers to answer the multiple-choice questions.

From the network topology diagram, click on the router icon to gain access to the console of the router.

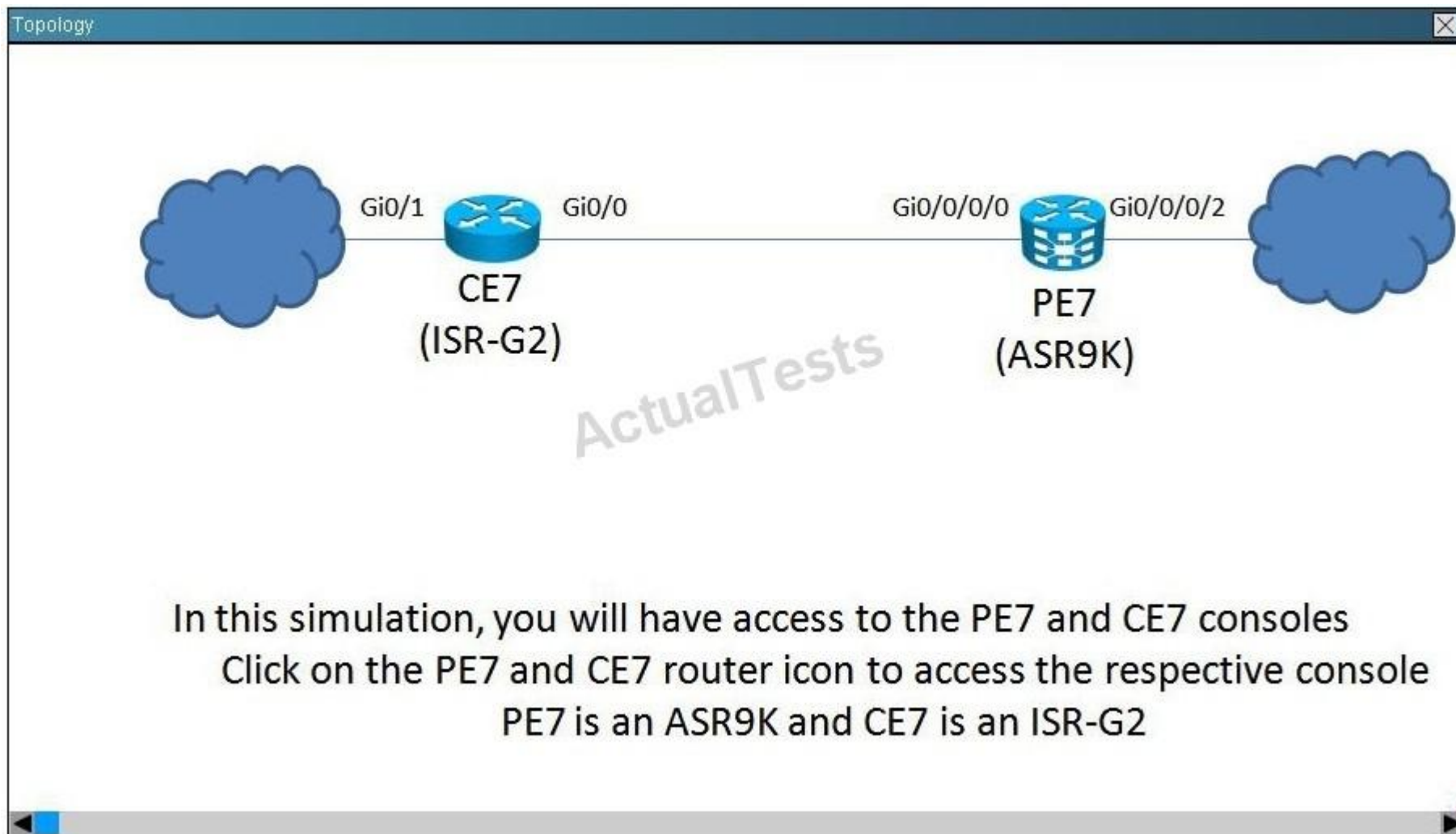
No console or enable passwords are required.

There are four multiple-choice questions with this task. Be sure to answer all four questions before selecting the Next button.

Not all the CLI commands or commands options are supported or required for this simulation. All the devices in this simulation have been pre-configured and you are not required to enter in any configurations.

#### Scenario

Referring to the network topology diagram shown in the exhibit, use the proper CLI commands on the CE7 and PE7 routers and interpret the supported CLI commands outputs to answer the four multiple choice questions.



On PE7 which statement is correct regarding the "traffic-policing" policy-map?

- A. The "traffic-policing" QoS policy is applied to the Gi0/0/0/0 interface in the outbound direction.
- B. The "traffic-policing" QoS policy will police the traffic matched by the "test12" ACL to 3 mbps and will drop all exceeding traffic.
- C. All incoming traffic not matched by the "test12" ACL to the Gi0/0/0/0 interface will be dropped.
- D. The "traffic-policing" QoS policy is using dual rate class-based traffic policing.

**Correct Answer:** B

**Section:** (none)

**Explanation**

**Explanation/Reference:**

Explanation:

#show running-config policy-map

#show policy-map