Question: 1

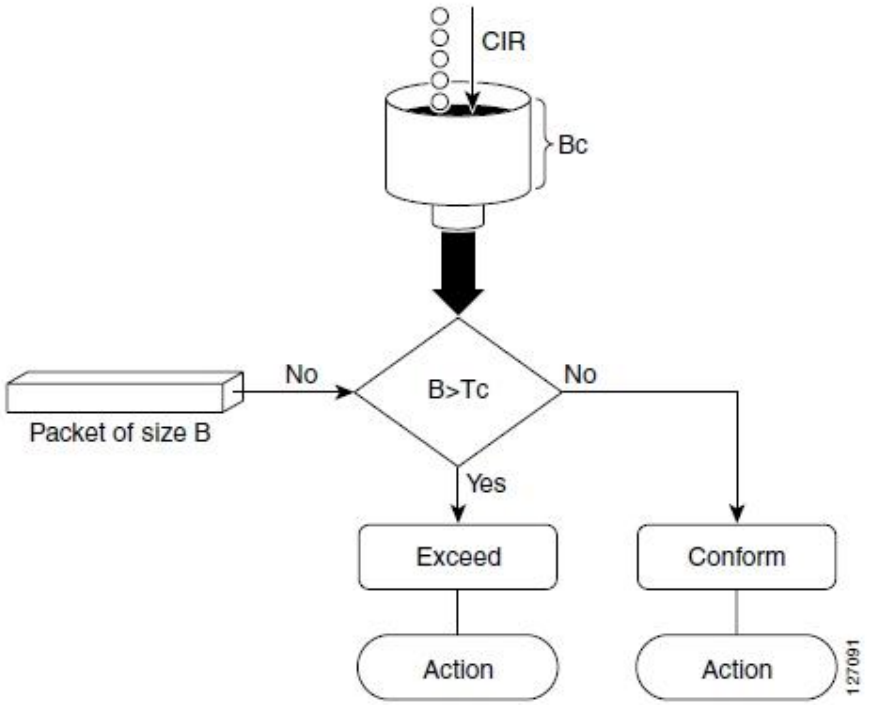
Which three conditions can occur when metering traffic using a dual token bucket traffic policing QoS mechanism on Cisco routers? (Choose three.)

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

Answer: A, C, D

Explanation:

Figure 2 How a Traffic Policing Mechanism Regulates Traffic



The time interval between token updates (Tc) to the token bucket is updated at the CIR value each time a packet arrives at the traffic policer. The Tc token bucket can contain up to the Bc value. If a packet of size B is greater than the Tc 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 Tc 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 = Bc/Tc
B. CIR = Bc x Tc
C. CIR = Tc/Bc
D. CIR = Bc + Be
E. CIR = Tc/(Bc+Be)
F. CIR = (Bc+Be)/Tc

Answer: A

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) Â 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 whic 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

Answer: C, F

Explanation:
Differential Service Tunnels
Differential Service Traffic Engineering (TE) is an extension of the regular MPLS Traffic Engineering (MPLSTE) 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

Answer: C

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

Answer: B

Explanation:
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

Answer: B

Explanation:
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

Answer: B

Explanation:
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)

Answer: A

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 MPLSenabled 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.

Answer: C

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.

Answer: D

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

Answer: B

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

Answer: D

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.

Answer: A, B, E

Explanation:
http://www.cisco.com/en/US/technologies/tk648/tk872/technologies_white_paper0900aecd8026004d.pdf

Cisco Systems

IPv6 QoS
AT-A-GLANCE

RFC 2460/3697

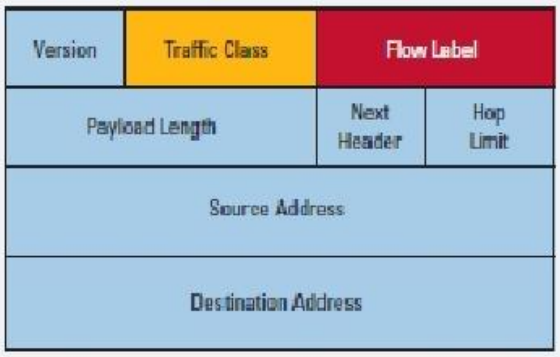
Currently IPv6 provides support for QoS marking via a field in the IPv6 header.

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.



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

Answer: A