Cisco Certified Network Professional (CCNP)

Exam 300-101
Implementing Cisco IP Routing (ROUTE)

Multiple Choice Questions

QUESTION 1
Which three problems result from application mixing of UDP and TCP streams within a network with no QoS? (Choose three.)

A. starvation
B. jitter
C. latency
D. windowing
E. lower throughput

Correct Answer: ACE
Section: part 1
Explanation

Explanation/Reference:
It is a general best practice not to mix TCP-based traffic with UDP-based traffic (especially streaming video)
within a single service provider class due to the behaviors of these protocols during periods of congestion.
Specifically, TCP transmitters will throttle-back flows when drops have been detected. Although some UDP applications have application-level windowing, flow control, and retransmission capabilities, most UDP transmitters are completely oblivious to drops and thus never lower transmission rates due to dropping.
When TCP flows are combined with UDP flows in a single service provider class and the class experiences
congestion, then TCP flows will continually lower their rates, potentially giving up their bandwidth to dropoblivious
UDP flows. This effect is called *TCP-starvation/UDP-dominance*. This can increase latency and
lower the overall throughput.
TCP-starvation/UDP-dominance likely occurs if (TCP-based) mission-critical data is assigned to the same service provider class as (UDP-based) streaming video and the class experiences sustained congestion.
Even if WRED is enabled on the service provider class, the same behavior would be observed, as WRED (for the most part) only affects TCP-based flows.
Granted, it is not always possible to separate TCP-based flows from UDP-based flows, but it is beneficial to
be aware of this behavior when making such application-mixing decisions.
Reference: http://www.cisco.com/warp/public/cc/so/neso/vpn/vpnsp/spqsd_wp.htm

QUESTION 2
Which statement about the use of tunneling to migrate to IPv6 is true?

A. Tunneling is less secure than dual stack or translation.
B. Tunneling is more difficult to configure than dual stack or translation.
C. Tunneling does not enable users of the new protocol to communicate with users of the old protocol without dual-stack hosts.
D. Tunneling destinations are manually determined by the IPv4 address in the low-order 32 bits of IPv4-compatible IPv6 addresses.

Correct Answer: C
Section: part 1
Explanation

Explanation/Reference:
Using the tunneling option, organizations build an overlay network that tunnels one protocol over the other by encapsulating IPv6 packets within IPv4 packets and IPv4 packets within IPv6 packets. The advantage of
this approach is that the new protocol can work without disturbing the old protocol, thus providing connectivity between users of the new protocol.
Tunneling has two disadvantages, as discussed in RFC 6144:
Users of the new architecture cannot use the services of the underlying infrastructure.
Tunneling does not enable users of the new protocol to communicate with users of the old

protocol without dual-stack hosts, which negates interoperability.
Reference: http://www.cisco.com/c/en/us/products/collateral/ios-nx-os-software/enterprise-ipv6-solution/white_paper_c11-676278.html

QUESTION 3
Which two actions must you perform to enable and use window scaling on a router?(Choose two.)

A. Execute the command ip tcp window-size 65536.
B. Set window scaling to be used on the remote host.
C. Execute the command ip tcp queuemax.
D. Set TCP options to "enabled" on the remote host
E. Execute the command ip tcp adjust-mss.

Correct Answer: AB
Section: part 1
Explanation

Explanation/Reference:
The TCP Window Scaling feature adds support for the Window Scaling option in RFC 1323, TCP Extensions for High Performance. A larger window size is recommended to improve TCP performance in network paths with large bandwidth-delay product characteristics that are called Long Fat Networks (LFNs).
The TCP Window Scaling enhancement provides that support.
The window scaling extension in Cisco IOS software expands the definition of the TCP window to 32 bits and then uses a scale factor to carry this 32-bit value in the 16-bit window field of the TCP header. The window size can increase to a scale factor of 14. Typical applications use a scale factor of 3 when deployed
in LFNs.
The TCP Window Scaling feature complies with RFC 1323. The larger scalable window size will allow TCP to perform better over LFNs. Use **the ip tcp window-size** command in global configuration mode to configure the TCP window size. In order for this to work, the remote host must also support this feature and
its window size must be increased.
Reference: http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipapp/configuration/12-4t/iap-12-4t-book/iaptcp.
html#GUID-BD998AC6-F128-47DD-B5F7-B226546D4B08

QUESTION 4
A network administrator executes the command clear ip route. Which two tables does this command clear and rebuild? (Choose two.)

A. IP routing
B. FIB
C. ARP cache
D. MAC address table
E. Cisco Express Forwarding table
F. topology table

Correct Answer: AB
Section: part 1
Explanation

Explanation/Reference:
To clear one or more entries in the IP routing table, use the following commands in any mode:

Reference: http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus5000/sw/unicast/5_0_3_N1_1/Cisco_n5k_layer3_ucast_cfg_rel_503_N1_1/l3_manage-routes.html

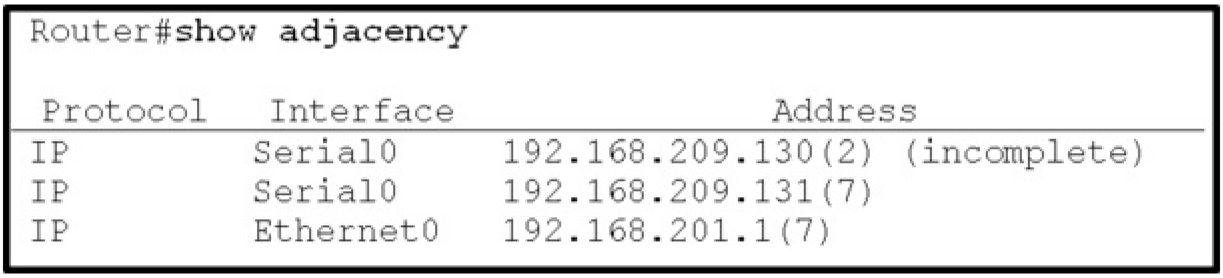
QUESTION 5
Under which condition does UDP dominance occur?

A. when TCP traffic is in the same class as UDP
B. when UDP flows are assigned a lower priority queue
C. when WRED is enabled
D. when ACLs are in place to block TCP traffic

Correct Answer: A
Section: part 1
Explanation

Explanation/Reference:
Mixing TCP with UDP
It is a general best practice to not mix TCP-based traffic with UDP-based traffic (especially Streaming-Video) within a single service-provider class because of the behaviors of these protocols during periods of congestion. Specifically, TCP transmitters throttle back flows when drops are detected. Although some UDP
applications have application-level windowing, flow control, and retransmission capabilities, most UDP transmitters are completely oblivious to drops and, thus, never lower transmission rates because of dropping.
When TCP flows are combined with UDP flows within a single service-provider class and the class experiences congestion, TCP flows continually lower their transmission rates, potentially giving up their bandwidth to UDP flows that are oblivious to drops. This effect is called TCP starvation/UDP dominance.
TCP starvation/UDP dominance likely occurs if (TCP-based) Mission-Critical Data is assigned to the same service-provider class as (UDP-based) Streaming-Video and the class experiences sustained congestion. Even if WRED is enabled on the service-provider class, the same behavior would be observed
because WRED (for the most part) manages congestion only on TCP-based flows.
Reference: http://www.cisco.com/c/en/us/td/docs/solutions/Enterprise/WAN_and_MAN/QoS_SRND/QoSSRND-
Book/VPNQoS.html

QUESTION 6
Refer to the exhibit.



```
Router#show adjacency

 Protocol   Interface              Address
IP         Serial0     192.168.209.130(2) (incomplete)
IP         Serial0     192.168.209.131(7)
IP         Ethernet0   192.168.201.1(7)
```

A network administrator checks this adjacency table on a router. What is a possible cause for the incomplete marking?

A. incomplete ARP information
B. incorrect ACL
C. dynamic routing protocol failure
D. serial link congestion

Correct Answer: A
Section: part 1
Explanation

Explanation/Reference:
To display information about the Cisco Express Forwarding adjacency table or the hardware Layer 3-switching adjacency table, use the show adjacency command.
Reasons for Incomplete Adjacencies
There are two known reasons for an incomplete adjacency:
The router cannot use ARP successfully for the next-hop interface.
After a **clear ip arp** or a **clear adjacency** command, the router marks the adjacency as incomplete.
Then it fails to clear the entry.
In an MPLS environment, IP CEF should be enameled for Label Switching. Interface level command **ip route-cache cef**
No ARP Entry
When CEF cannot locate a valid adjacency for a destination prefix, it punts the packets to the CPU for ARP resolution and, in turn, for completion of the adjacency.
Reference: http://www.cisco.com/c/en/us/support/docs/ip/express-forwarding-cef/17812-cef-incomp.html#t4

QUESTION 7
A network administrator uses IP SLA to measure UDP performance and notices that packets on one router have a higher one-way delay compared to the opposite direction. Which UDP characteristic does this scenario describe?

A. latency
B. starvation
C. connectionless communication
D. nonsequencing unordered packets
E. jitter

Correct Answer: A
Section: part 1
Explanation

Explanation/Reference:
Cisco IOS IP SLAs provides a proactive notification feature with an SNMP trap. Each measurement operation can monitor against a pre-set performance threshold. Cisco IOS IP SLAs generates an SNMP trap to alert management applications if this threshold is crossed. Several SNMP traps are available: round trip time, average jitter, **one-way latency**, jitter, packet loss, MOS, and connectivity tests.
Here is a partial sample output from the IP SLA statistics that can be seen:

```
router#show ip sla statistics 1
Round Trip Time (RTT) for Index 55
Latest RTT: 1 ms
Latest operation start time: *23:43:31.845 UTC Thu Feb 3 2005
Latest operation return code: OK
RTT Values:
Number Of RTT: 10 RTT Min/Avg/Max: 1/1/1 milliseconds
Latency one-way time:
Number of Latency one-way Samples: 0
Source to Destination Latency one way Min/Avg/Max: 0/0/0 milliseconds
Destination to Source Latency one way Min/Avg/Max: 0/0/0 milliseconds
```

Reference: http://www.cisco.com/en/US/technologies/tk648/tk362/tk920/technologies_white_paper09186a00802d5efe.html

QUESTION 8
Which method allows IPv4 and IPv6 to work together without requiring both to be used for a single connection during the migration process?

A. dual-stack method
B. 6to4 tunneling
C. GRE tunneling
D. NAT-PT

Correct Answer: A
Section: part 1
Explanation

Explanation/Reference:
Dual stack means that devices are able to run IPv4 and IPv6 in parallel. It allows hosts to simultaneously reach IPv4 and IPv6 content, so it offers a very flexible coexistence strategy. For sessions that support IPv6, IPv6 is used on a dual stack endpoint. If both endpoints support Ipv4 only, then IPv4 is used.
Benefits:
Native dual stack does not require any tunneling mechanisms on internal networks
Both IPv4 and IPv6 run independent of each other
Dual stack supports gradual migration of endpoints, networks, and applications.
Reference: http://www.cisco.com/web/strategy/docs/gov/IPV6at_a_glance_c45-625859.pdf

QUESTION 9
Which switching method is used when entries are present in the output of the command show ip cache?

A. fast switching
B. process switching
C. Cisco Express Forwarding switching
D. cut-through packet switching

Correct Answer: A
Section: part 1
Explanation

Explanation/Reference:
Fast switching allows higher throughput by switching a packet using a cache created by the initial packet sent to a particular destination. Destination addresses are stored in the high-speed cache to expedite forwarding. Routers offer better packet-transfer performance when fast switching is enabled. Fast switching
is enabled by default on all interfaces that support fast switching.
To display the routing table cache used to fast switch IP traffic, use the “show ip cache” EXEC command.
Reference: http://www.cisco.com/c/en/us/td/docs/ios/12_2/switch/command/reference/fswtch_r/xrfscmd5.html#wp1038133

QUESTION 11
Which three TCP enhancements can be used with TCP selective acknowledgments?(Choose three.)

A. header compression
B. explicit congestion notification
C. keepalive
D. time stamps
E. TCP path discovery
F. MTU window

Correct Answer: BCD
Section: part 1
Explanation

Explanation/Reference:

TCP Selective Acknowledgment

The TCP Selective Acknowledgment feature improves performance if multiple packets are lost from one TCP window of data.

Prior to this feature, because of limited information available from cumulative acknowledgments, a TCP sender could learn about only one lost packet per-round-trip time. An aggressive sender could choose to resend packets early, but such re-sent segments might have already been successfully received.

The TCP selective acknowledgment mechanism helps improve performance. The receiving TCP host returns selective acknowledgment packets to the sender, informing the sender of data that has been received. In other words, the receiver can acknowledge packets received out of order. The sender can then

resend only missing data segments (instead of everything since the first missing packet).

Prior to selective acknowledgment, if TCP lost packets 4 and 7 out of an 8-packet window, TCP would receive acknowledgment of only packets 1, 2, and 3. Packets 4 through 8 would need to be re-sent. With selective acknowledgment, TCP receives acknowledgment of packets 1, 2, 3, 5, 6, and 8. Only packets 4 and 7 must be re-sent.

TCP selective acknowledgment is used only when multiple packets are dropped within one TCP window. There is no performance impact when the feature is enabled but not used. Use the ip tcp selective-ack command in global configuration mode to enable TCP selective acknowledgment.

Refer to RFC 2018 for more details about TCP selective acknowledgment.

TCP Time Stamp

The TCP time-stamp option provides improved TCP round-trip time measurements. Because the time stamps are always sent and echoed in both directions and the time-stamp value in the header is always changing, TCP header compression will not compress the outgoing packet. To allow TCP header compression over a serial link, the TCP time-stamp option is disabled. Use the ip tcp timestamp command to enable the TCP time-stamp option.

TCP Explicit Congestion Notification

The TCP Explicit Congestion Notification (ECN) feature allows an intermediate router to notify end hosts of impending network congestion. It also provides enhanced support for TCP sessions associated with applications, such as Telnet, web browsing, and transfer of audio and video data that are sensitive to delay or packet loss. The benefit of this feature is the reduction of delay and packet loss in data transmissions. Use the ip tcp ecn command in global configuration mode to enable TCP ECN.

TCP Keepalive Timer

The TCP Keepalive Timer feature provides a mechanism to identify dead connections.

When a TCP connection on a routing device is idle for too long, the device sends a TCP keepalive packet to the peer with only the Acknowledgment (ACK) flag turned on. If a response packet (a TCP ACK packet) is not received after the device sends a specific number of probes, the connection is considered dead and the device initiating the probes frees resources used by the TCP connection.

Reference: http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipapp/configuration/xe-3s/asr1000/iap-xe-3sasr1000-
book/iap-tcp.html#GUID-22A82C5F-631F-4390-9838-F2E48FFEEA01

QUESTION 12

A network engineer notices that transmission rates of senders of TCP traffic sharply increase and decrease simultaneously during periods of congestion. Which condition causes this?

A. global synchronization

B. tail drop

C. random early detection

D. queue management algorithm

Correct Answer: A

Section: part 1

Explanation

Explanation/Reference:
TCP global synchronization in computer networks can happen to TCP/IP flows during periods of congestion
because each sender will reduce their transmission rate at the same time when packet loss occurs.
Routers on the Internet normally have packet queues, to allow them to hold packets when the network is busy, rather than discarding them.
Because routers have limited resources, the size of these queues is also limited. The simplest technique to limit queue size is known as tail drop. The queue is allowed to fill to its maximum size, and then any new packets are simply discarded, until there is space in the queue again.
This causes problems when used on TCP/IP routers handling multiple TCP streams, especially when bursty
traffic is present. While the network is stable, the queue is constantly full, and there are no problems except
that the full queue results in high latency. However, the introduction of a sudden burst of traffic may cause large numbers of established, steady streams to lose packets simultaneously.

QUESTION 13
A corporate policy requires PPPoE to be enabled and to maintain a connection with the ISP, even if no interesting traffic exists. Which feature can be used to accomplish this task?

A. TCP Adjust
B. Dialer Persistent
C. PPPoE Groups
D. half-bridging
E. Peer Neighbor Route

Correct Answer: B
Section: part 1
Explanation

Explanation/Reference:
A new interface configuration command, **dialer persistent**, allows a dial-on-demand routing (DDR) dialer profile connection to be brought up without being triggered by *interesting* traffic. When configured, the **dialer persistent** command starts a timer when the dialer interface starts up and starts the connection when the timer expires. If interesting traffic arrives before the timer expires, the connection is still brought up and set as persistent. The command provides a default timer interval, or you can set a custom timer interval.
To configure a dialer interface as persistent, use the following commands beginning in global configuration mode: