IK2215 Advanced Internetworking Exam Part A-2

November 3, 2023

1 True or False

1) BitTorrent uses a hierarchical overlay of group leaders, where a group leader tracks the content of its children. False

2) The reverse proxy is used to enable Internet hosts to communicate with loT devices behind NAT. False

3) RPL is designed to support only unidirectional traffic toward the DODAG root. False

4) In RPL, a network topology is formed as a loop-free directed graph rooted at a single destination, which is a RPL root node. True

5) The DODAG Information Solicitation (DIS) message is used for neighbour discovery. True

6) In diff-serv (Differentiated Services) a PHB (per-hop behavior) defines how individual application flows should be treated by routers inside the diff-serv domain. False

7) One objective with int-serv (Integrated Services) was to provide end-to-end performance guarantees for individual application flows. True

8) You can use DNS to load-balance traffic by redirecting DNS lookups to different servers. True

9) You can configure DNS with (Afferent views for different subnets to enable DNS-based request routing for each subnet. True

10) In IPv6, fragmentation can only occur in the sending host since routers are not allowed to fragment IPv6 datagrams. True

11) In IPv6 there are four times as many IP addresses as in IPv4. False

12) In IPv6 the hop-by-hop checksum from IPv4 has been removed. True

2 Multiple choice

1) What is the purpose of a Distributed Hash Table in a P2P system?
Speed up the search of a file compared to a centralized location directory
Speed up the transmission of a file compared to a Gnutella-like network
Speed up the transmission of a file compared to a centralized system
Speed up the search of a file compared to a Gnutella-like network ✓

2) What is the purpose of a finger table in a distributed hash table?
To reduce the memory requirements compared to a centralized directory ✓
To reduce the memory requirements compared to Chord
To reduce the memory requirements compared to a Gnutella-like system
To reduce the memory requirements compared to Kazaa

3) Choose statement(s) that correctly describes the Real-Time Transport Protocol (RTP).
The protocol enables real-time streaming data to be load-balanced over multiple paths to improve service quality.
The protocol allows out-of-band control of the delivery of data stream.
The protocol has a built-in mechanism for retransmission of real-time data loss.
The protocol does not prevent out-of-order delivery. ✓
The protocol ensures timely delivery of real-time streaming data.

4) Choose statement(s) that correctly describes the Real-Time Streaming Protocol (RTSP).
The protocol ensures timely delivery of real-time streaming data.
The protocol allows out-of-band control of the delivery of data stream. ✓
The protocol has a built-in mechanism to eliminate jitter in real-time streaming.
The protocol enables load balance real-time streaming data over multiple paths to improve service quality.
The protocol provides a method to compress real-time streaming data.

5) Choose the statement(s) below that describes CoAP. ***!!! need to be edited!!!***
It organizes resources in a hierarchical structure ✓
It enables communications with devices behind a NAT
It is a light-weight protocol with low communication overhead ✓
Requires a broker to route published messages to subscribers
Allow constrained devices to scale to thousands of devices.
It is designed to easily interface with HTTP ✓
Has built-in security function to encrypt data
Asynchronous message exchanges ✓
Requires IPv6 at the network layer
Allow constrained devices to scale to thousands of devices ✓
Require a message broker in the communication
Support many-to-many communications
Can be used for applications that requires to report updated data periodically ✓
Use a request/response messaging model ✓
Since no correct answer was found for this question, the judgment of some options was generated by chatGPT4.

6) IPv6 addresses may be abbreviated. How would the IPv6 subnet address FDEC:0000:0000:0000:0000:BBFF:0000:1111/64 be written when abbreviated m much as possible?
FDEC:0:0:0:0:BBFF:0:1111/64
FDEC:0:0:0:0:BBFF::1111/64
FDEC::BBFF:0:1111/64 ✓
FDEC::BBFF::1111/64

7) What was the main purpose with IPv6?
To increase the address space ✓

To remove the header checksum
To simplify the IP header
To increase the routing tables

8) Is the EEE (Energy-Efficient Ethernet) standard based on rate switching (switch to lower transmission rate when possible) or low-power idle (sleep between packets when possible)?
EEE uses low-power idle. ✓
EEE uses rate switching

9) What is the purpose of low-power idle in EEE (Energy-Efficient Ethernet)?
To save energy by sleeping between packets when possible. ✓
To save energy by adapting the transmission rate

10) IETF has devised several strategies for the transition from IPv4 to IPv6. Which one of the following is not such a transition strategy?
Address translation ✓
Tunneling
Dual stack
Header translation

3 short answer

1) Consider the Chord network in the figure below. The ring contains 64 indices, from 0 to 63. Seven peers are connected to the network. Peer 7 decides to leave the network. Which peers will update at least one entry in their finger tables?

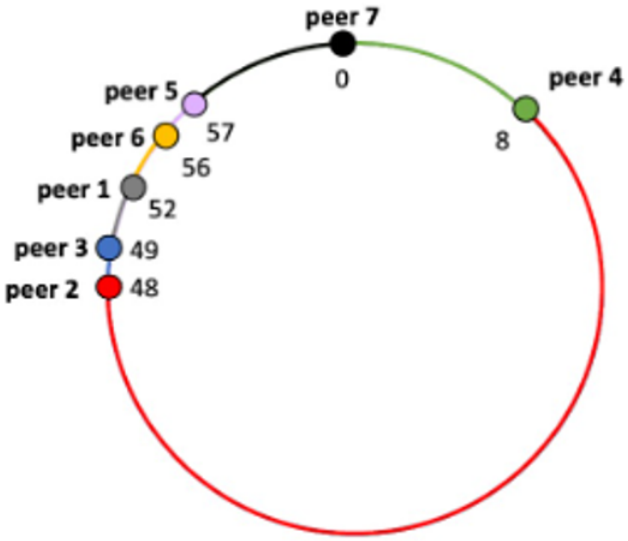

Figure 1: Chord network

Answer:Peer 1, Peer 2, Peer 5, Peer 6

2) Consider the Chord network in the figure below. The ring contains 64 indices, from 0 to 63. Seven peers are connected to the network. Peer 7 decides to leave the network. Which peers will update at least one entry in their finger tables?

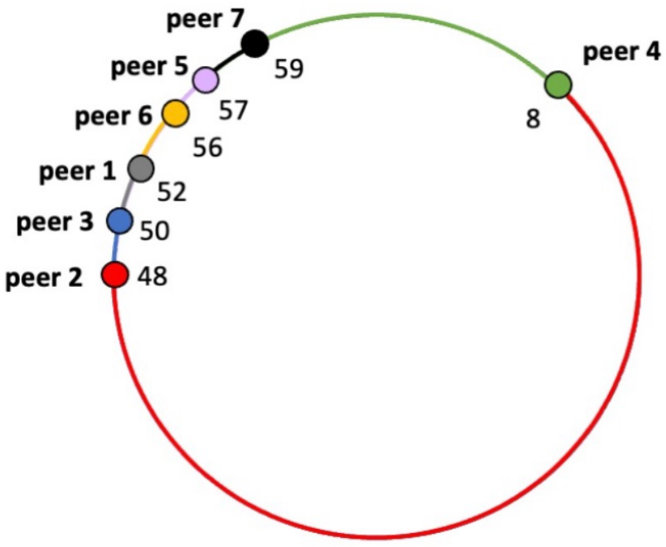

Figure 2: Chord network

Answer:Peer 3, Peer 5, Peer 6

3) What are the advantages with a publish-subscribe model over a traditional client-server model in and IoT scenario with constrained devices?
Answer:With publish-subscribe, the constrained devices can publish data to a broker whenever they wake up and have some data to share. The users will interact with the broker, which can be hosted on a server-like machine capable of serving large amounts of user requests.

4) Briefly explain the trade-off that has to be taken into consideration when setting the playback point in a playback buffer for multimedia traffic
Answer: The trade-off is between delay and packet loss. If the playback point is set low. the delay will be low but the risk of dropping packets will be higher. If the playback point is set high, the delay will be longer but the risk of dropping packets will be smaller.

5) a)A programmer is about to implement an application for streaming of stored multimedia content. She selects TCP as the transport protocol. Explain why that might be a good choice. (1p)
b) Her application includes both a web client and a media player. What is the purpose with each of these parts?(1p)
Answer: a) Firewalls often block UDP traffic. TCP will ensure that the complete file is downloaded without errors and it can then be cached locally at the receiver.
b) The web client is used to request information and the media player is for display and control of the audio/video.

6) A. What is the purpose with the protocol RTSP (RealTime Streaming Protocol). (1p)
B. What is the purpose with a playback buffer? (1p)
Answer: A. It is a protocol for controlling multimedia streams. It is used to exchange playback control information, such as pause, fastforward. rewind, etc.
B. The purpose with the playback buffer is to absorb delay variations (jitter) in the network on the receiver side