BAIT1013 Introduction To Computer Networks

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Tutorial 5: Ethernet

Q1. (a) In a Local Area Network, ARP request is a layer 2 broadcast messages. All the devices in the LAN received the Address Resolution Protocol (ARP) request except the sending device.

(i) What is the purpose of the ARP? (2 marks)

Address Resolution Protocol (ARP) is used to discover ~~link layer~~ physical address where it will resolve IPv4 addresses to MAC addresses. Other than that, it maintains a table of mappings.

(ii) What is the action taken by a node if the node's IP address matched the IP address in the ARP request? (2 marks)

The node responds with an ARP reply that includes its own MAC address.

(iii) What happens if no device on the LAN responds to the ARP request? (2 marks)

The packet will be dropped because a frame cannot be created.

(iv) Name and explain **ONE (1)** reason ARP can cause a problem in a network. (3 marks)

Overhead on the media. This is because ARP request is a broadcast frame where it will be received and processed by every device on the network, therefore when large number of device send ARP requests, reduction of performance occurs in a short period of time.

(v) What is ARP table used for? (4 marks)

ARP Table is used to maintain a correlation between each MAC address and its corresponding IP address. As a node receives frames from the media, the source IP and MAC address is recorded as a mapping in the ARP Table.

(b) Determine the correct sublayer for the following descriptions. (6 marks)

Descriptions	MAC or LLC?
1. Controls the network interface card through software drivers	LLC
2. Works with the upper layers to add application information for delivery of data to higher level protocols	LLC
3. Works with hardware to support bandwidth requirements and checks errors in the bits sent and received	MAC
4. Controls access to the media through signaling and physical media standards requirements	MAC
5. Supports Ethernet technology by using CSMA/CD or CSMA/CA	MAC
6. Remain relatively independent of physical equipment	LLC

Q3. (a) Inspect the following MAC addresses; is this a proper MAC address? If no, why?

(i) 77:EE:33:AA:DD (2 marks)

No. MAC address has 12 hexadecimal characters but it only has 10 hexadecimal characters.

(ii) 01-34-45-7U-8B-P9 (2 marks)

No. Because the character "U" and "B" is are not valid hexadecimal value.

(iii) FI00:5678.910C (2 marks)

No. Because ~~they are not hexadecimal representation of 6 bytes~~ the ~~given~~ character "I" is not hexadecimal value. Besides, the "." should be replaced by ":"

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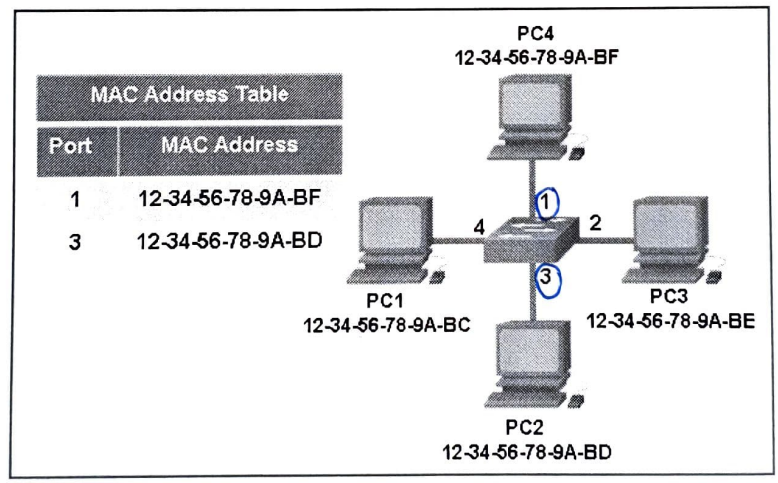
(b) In Ethernet, different MAC addresses are used for unicast, multicast, and broadcast communications. Give relevant example of MAC used in unicast, multicast, and broadcast delivery. (6 marks)

MAC addresses of destination

~~Unicast MAC~~ in Unicast is specific to the destination station because unicast message is only sent to one station on the network. MAC ~~Multicast~~ address of destination in multicast is a special value that begins with 01-00-5E in hexadecimal and its IPv4 addresses range from 224.0.0.0 to 239.255.255.255 because multicast messages are sent to a group stations. MAC ~~broadcast~~ adress of destination in broadcast is always FF-FF-FF-FF-FF-FF and its IPv4 address always end with .255 because broadcast messages are sent to all station on the network.

(c) Refer to the exhibit. The exhibit shows a small switched network and the contents of the MAC address table of the switch. PC1 has sent a frame addressed to PC3. What will the switch do with the frame? (6 marks)



broadcast

The switch will ~~forward~~ the frame to all ports except port 4 which is the incoming port. This is because the MAC address of PC3 is not present in the MAC adress table and the switch does not know where to send the frame.