DMVA4

Question 1:

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(base) romericodavid@Romericos-Air ~ % netstat -r
Routing tables

Internet:
Destination        Gateway            Flags               Netif Expire
default            fios_quantum_gatew UGScg                 en0
127                localhost          UCS                   lo0
localhost          localhost          UH                    lo0
169.254            link#12            UCS                   en0      !
192.168.1          link#12            UCS                   en0      !
192.168.1.1/32     link#12            UCS                   en0      !
fios_quantum_gatew 18:78:d4:64:62:d9  UHLWIir               en0   1192
family-room.fios-r cc:75:e2:a8:3b:f5  UHLWIi                en0    502
basement.fios-rout 70:4f:b8:84:37:45  UHLWIi                en0    984
50rokuselectseries 64:57:25:64:db:11  UHLWIi                en0    956
iphone.fios-router ce:18:68:bd:ba:39  UHLWI                 en0    706
levoit-purifier.fi 30:c9:22:43:b5:6c  UHLWI                 en0   1178
192.168.1.212      32:4a:a:4c:6e:95   UHLWI                 en0    385
192.168.1.215      22:2c:b6:4a:70:fd  UHLWI                 en0    492
192.168.1.231      4a:83:c0:a3:49:a8  UHLWI                 en0    423
192.168.1.242      ca:ba:99:71:b2:49  UHLWI                 en0    636
ipad.fios-router.h 16:9a:c2:59:7d:e9  UHLWI                 en0   1155
192.168.1.254/32   link#12            UCS                   en0      !
192.168.1.255      ff:ff:ff:ff:ff:ff  UHLWbI                en0      !
224.0.0/4          link#12            UmCS                  en0      !
mdns.mcast.net     1:0:5e:0:0:fb      UHmLWI                en0
239.255.255.250    1:0:5e:7f:ff:fa    UHmLWI                en0
255.255.255.255/32 link#12            UCS                   en0      !

Internet6:
Destination        Gateway            Flags               Netif Expire
default            fe80::%utun0       UGcIg               utun0
default            fe80::%utun1       UGcIg               utun1
default            fe80::%utun2       UGcIg               utun2
```

a) The IPv4 address of the router (the default gateway) is **192.168.1.1**. This can be inferred from the fact that the default route (default) points to fios_quantum_gatew, and by convention in most home networks, the router is assigned .1 in the subnet (e.g., 192.168.1.1).
Regarding the network prefix:
Most home networks use a standard subnet mask of 255.255.255.0, which corresponds to a /24 prefix length. This means the first 24 bits are the network portion, and the last 8 bits are for host addresses. So for 192.168.1.1, the network prefix is 24 bits.

Explanation:

- A typical home network address, such as 192.168.1.x, usually falls under the private Class C range. By default, Class C networks have a subnet mask of 255.255.255.0 (or /24).
- In binary, the subnet mask 255.255.255.0 is 11111111.11111111.11111111.00000000. Counting the consecutive 1s gives us 24 bits of network prefix.

b) An example of a multicast IPv4 address from the table is **239.255.255.250**.

How we know it's multicast:

IPv4 multicast addresses are defined in the range 224.0.0.0 through 239.255.255.255. Any address in that range (referred to as Class D addresses) is reserved for multicast. Since 239.255.255.250 falls within this range, it is recognized as a multicast address.

Question 2:

a) No, the AP is not the ultimate receiver of this frame. In an IEEE 802.11 data frame, the "To DS" and "From DS" flags indicate the direction the frame is traveling relative to the Distribution System (DS, typically the wired network). Here, the flags show it is a frame "from DS to a STA via AP," meaning the AP received the frame from the wired network (the DS) and is now sending it

out over wireless to a specific station (STA). The AP is acting as a forwarding device, not the final destination. The ultimate receiver is the station (the wireless client) identified by the Receiver/Destination address fields.

b)The IP header shows:

- Version: 4
- Header Length: 20 bytes (indicated by “Header Length: 20 bytes”)
- Total Length: 493 bytes

The “Total Length” field in the IP header includes both the IP header and the IP payload. To find the payload size, subtract the IP header length from the total length:
IP Payload Length = Total Length – IP Header Length
IP Payload Length = 493 bytes – 20 bytes = 473 bytes.

c) The TCP flags set are: FIN, PSH, ACK.
For example, choose the FIN flag. The purpose of the FIN (Finish) flag in TCP is to indicate that the sender has finished sending data and wants to initiate a graceful closure of the connection. When a FIN is received, it tells the other side that no more data will be sent from that endpoint, though it can still receive data until the other side also sends a FIN.