Quiz of L2 - MAC

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1. What does Medium Access Control (MAC) mean?
   It is a sublayer of the data link layer that controls the hardware responsible for interaction with transmission medium. In short, MAC is a set of rules to determine how to access the medium and send data. It is responsible for encapsulating frames, adding frame check sequence (to identify transmission errors), avoiding collisions, initiating retransmissions and more.

2. What is the MAC method used by a cellular network (4G, LTE, 5G)?
   4G, LTE: FDMA, TDMA, HARQ and more
   5G: PDCCH, HARQ and more

   o Fixed assignment or random access?
     combination of both

3. What is the MAC method used by WiFi (802.11)?
   CSMA/CA

   o Fixed assignment or random access?
     random access

4. What are the pros and cons of MAC protocols based on fixed assignment?
   pros: ensures performance, guaranteed quality of service, better security
   cons: lacks flexibility (wasted resources while idle), hard to implement when there are a large number of devices

5. What are the pros and cons of MAC protocols based on random access?
   pros: simple to implement, more flexible when there are changes in current traffic
   cons: unpredictable performance, no guaranteed quality of service, collision problems in high-traffic scenarios

6. What does half-duplex mean?
   It describes a system that provides communication in both directions but only one direction at a time.

7. What does a collision mean?
   A collision occurs when two or more devices are trying to send data over a shared transmission medium at the same time. The data will interfere each other and results in corruption.

8. What does collision avoidance mean?
   It refers to a set of rules or protocols to avoid the occurrence of collisions. The approach used in CSMA/CA is to sense if the channel is idle before transmission.

9. Why don't we eliminate collisions completely?
   It is impractical to eliminate collisions completely. In some highly congested networks, it might cost a lot of money to construct such hardware devices. Moreover, seeking completely idle channel might take much more time than retransmitting after collision, reducing the overall throughput. Lastly, collisions might still happen since devices are not able to detect transmissions from all other devices on the same channel.

10. What does the hidden terminal problem mean?
    This problem occurs when two or more wireless devices are within a common access point, but unable to sense each other's transmissions. It leads to devices transmitting data at the same time, causing collisions or other problems.