

Quiz 2 Solution

1. List up at least three differences between TDD and FDD.

(2 points per item, total 6 points)

- TDD divides time resource in order to make up duplex (uplink and downlink) links, while FDD divides frequency resource.
- TDD adopts guard interval (guard time) in order to separate uplink and downlink resource, while FDD uses guard band for the same purpose.
- FDD needs two separate frequency bands for uplink and downlink, while TDD needs only one band.
- TDD generally requires tight synchronization between BS and STA, while FDD does not.
- In case of single cell environment, TDD provides more flexible resource sharing between uplink and downlink, while FDD does not due to RF limitation.
- FDD enables full duplex in cost of two transceivers at both transmitter and receiver side, while TDD cannot even with two transceivers.
- Since uplink and downlink of TDD share the same frequency band, a transceiver can estimate channel state of upcoming uplink transmission from previous downlink reception, or vice versa, assuming the channel reciprocity and slow fading. In case of FDD, however, it is not likely to be possible.

2. Explain what paging scheme is. What can be a problem if there is no paging scheme. Explain this in the context of the high/low mobility of the users.

(4 points. If you specify only the group paging scheme, you'll get 3 points. Also if you specify the problem only in sense of system overhead, you'll get 3 points.)

Sol) Paging scheme is positioning and tracking mobile user (terminal), not only in sense of geographical location but in which cell that mobile user resides, for delivering downlink traffic session. If there's no paging scheme, cellular system cannot tell with which base station a mobile user is associated if that mobile station moves to other cells without notifying, and hence downlink traffic cannot be initiated from opponent users in the network (i.e., except that mobile user) unless that mobile user reports its location. Such a problem is severe when the user mobility is higher, since associated base stations of mobile users vary more frequently. As an extreme case, paging scheme is not required if the network is static so that users do not move.