Quiz 3 Solution

1. Explain why "cell breathing" occurs in CDMA?

   Sol) The size of cell in cellular networks is determined by SINR, i.e., SINR should exceed a threshold vale to provide the suitable QoS. In CDMA system, interference increases as the number of users increases because the signals from multiples users cannot be perfectly orthogonal. Therefore, the size of cell decreases as the number of users in cell increases. It is called “cell breathing”

2. Explain why the guard intervals of OFDM symbol for 802.11a WLAN and 802.16e Mobile Broadband Access (i.e., Mobile WiMAX or WiBro) are designed differently. That is, the guard intervals of 802.11a and WiBro are under 1 usec and about 10 usec, respectively.

   Sol) Guard interval is needed to mitigate the inter symbol interference between the consecutive symbols. Inter symbol interference comes from the multipath propagation characteristics of signal in the air. The multipath characteristics are affected by the environments. IEEE 802.11a assumes the indoor environment with small coverage, but WiBro assumes the outdoor environment with large coverage. Therefore, the differences among multiple paths are large in WiBro system. In order to mitigate the big differences of multiple signals, WiBro system should employ larger guard interval comparing with IEEE 802.11a WLAN system.