

Quiz 6 Solution

Your Name:

12/4/2017

1. **[5 points]** Consider a wireless system that is using spread spectrum. The sender uses the pattern 1,-1,1,-1,-1,1,1,-1,-1,1 to send a bit value of 1 and the opposite pattern for a bit value of 0. In addition to the sender, a microwave oven is contributing interferences in the same frequency band, with a corresponding signal power equivalent to the pattern 2,2,2,2,2,2,2,2,2,2. Assuming that the microwave oven is producing steady interferences, what impact does the microwave have on the signal from A, after decoding by a receiver that knows A's patterns?

Decoding by a receiver relies on the dot product between the received signal and A's pattern. This dot product yields a value of 10 and -10, respectively, when A transmits 1s and 0s, i.e., $A(1) \otimes A(1) = 10$, and $A(0) \otimes A(1) = -10$. Superimposing (adding) the interference pattern from the microwave has actually no impact on the received signal. Specifically, denoting as I the pattern from the microwave, we have $I \otimes A(1) = 0$, so that $(A(1) + I) \otimes A(1) = A(1) \otimes A(1) = 10$, and similarly when the transmitted pattern is A(0), $(A(0) + I) \otimes A(1) = A(0) \otimes A(1) = -10$.

2. **[5 points]** Consider a mobile server S that relies on Mobile IP. On Monday, the server is located in the NY office, which is its home network. While in the NY office, server S is accessed by local host A that resides on the same subnet. Host A caches the MAC address of server S for future communications. On Tuesday, server S is in the Chicago office, where it registers with the local Foreign Agent that subsequently informs the Home Agent in the NY office of server S's new care-of address. What additional steps are required in the NY office to allow host A to successfully communicate with server S in the Chicago office?

Upon receiving S's registration in the Chicago office, the home agent in the NY office needs to issue a gratuitous ARP to flush S's MAC address from the ARP caches of all devices in the NY office, including that of host A, and replace it with its own MAC address.