

EECS 122: Homework 7

Instructors: Abhay Parekh and David Tse

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Question 1:

Kurose and Ross Chapter 6: Problem 5.

Question 2:

Kurose and Ross Chapter 6: Problem 7.

Question 3:

Kurose and Ross Chapter 6: Problem 8.

Question 4:

Kurose and Ross Chapter 6: Problem 10.

Question 5:

Consider the example considered in p.16 of lecture 23 slides. Suppose you are a mobile user moving at speed 3 km/hr towards the wall away from the transmitting base station. Signal is being sent at carrier frequency 1.9 Gigahertz (cellular band).

1. How much time does it take for the mobile to move from a point of destructive interference to a point of constructive interference?
2. If the base station sends a packet when the mobile is at a point of destructive interference (deep fade), then the received signal is too weak and the packet will be garbled. In this case, the mobile will detect an error, sends an NACK to the base station, and the link layer retransmission protocol will retransmit the same packet, and the process repeats until the packet is received correctly (which happens when the channel is in constructive interference). This is a way of exploiting the time diversity of the channel. However, any application has a latency requirement such that if the packet is received too late beyond a certain delay, it is useless and must be discarded. In the physical situation considered above, do you think time diversity can be exploited for voice, with latency requirement of 50 milliseconds? How about for video streaming, with an allowed playback latency of 2 seconds? Explain.