



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Spring Term 2014



ADVANCED COMPUTER NETWORKS

Assignment 3: Wireless Networks: Part 2

Assigned on: **13 March 2014**

Due by: **20 March 2014**

Question 1:

Consider the simple CDMA example of slide 6 in lecture 4, with the difference that B is much stronger when it reaches the receiver. Assume that B's strength is 5 times A's strength. What would be different in this case? What can the receiver detect for sender A and B respectively? What would be the potential countermeasures?

Question 2:

Redo the simple CDMA example of slide 6 in lecture 4, with random 'noise' added to the transmitted signal $(-2, 0, 0, -2, +2, 0)$. Add, for example, $(1, -1, 0, 1, 0, -1)$.

- a) In this case, what can the receiver detect for sender A and B respectively?
- b) Now consider near/far problem. How does this complicate the situation?

Question 3:

Suppose a single computer is capable of generating output data at a rate higher than Bluetooth's bandwidth. If the computer was equipped with two or more Bluetooth masters, each with its own slaves, would that work if the computer wants to talk to one particular device?

Question 4:

Suppose that you have N Bluetooth devices and you want to form an ad hoc network out of these N devices. The ad hoc network must be built in such a way that 1) every device can communicate with each other 2) all devices operate in active mode. Describe an ad hoc network topology that meets these requirements. Draw a figure of the topology and assume $N=16$. Show the master and slave nodes in your figure.

Question 5:

In a Bluetooth network, how do Bluetooth devices find each other and establish connections? Briefly describe the Bluetooth device states and explain the transition from one state to the other.

Question 6:

- a) How is QoS provided in Bluetooth?
- b) What is *parked* state in Bluetooth and what does it imply?

Question 7:

Why is it not practical for each node in a sensor net to learn its location by using GPS? Describe a practical alternative.

Question 8:

Paper reading: "XORs in the Air: Practical Wireless Network Coding"

- a) What are the assumptions that COPE makes?
- b) What are the implementation related tricks that COPE plays?

Hand In Instructions

This is a paper exercise. Please hand it in during the exercise session on the due date.