NAZARBAYEV UNIVERSITY

Computer Networks
(CSCI-333)

Department of Computer Science
School of Engineering and Digital Sciences (SEDS)

Homework 3

Problem 1: ***(4 Points)*** Write a Python program to implement Code Division Multiple Access (CDMA). Take an input from the user for the number of transmitters/receivers which can be 2, 3, or 4. It then takes the input from user against each transmitter as 1 or -1. Each pair of transmitter/receiver is assigned one chip sequence of 4 bits or 8 bits. The chip sequence must be different for each sender. Next, each transmitter computes the signal to be transmitted (a sequence of 4 or 8 bits depending of chip sequence) and sends it to the joiner. After receiving signals from all four transmitters, the joiner combines the signals and sends the combined signal to the four receivers and prints it. Each receiver then computes the bit it has received and prints it to standard output.

Problem 2: Consider the figure below where two senders with different chipping sequences (i.e., code) are sending their data bits to their respective receivers using CDMA.

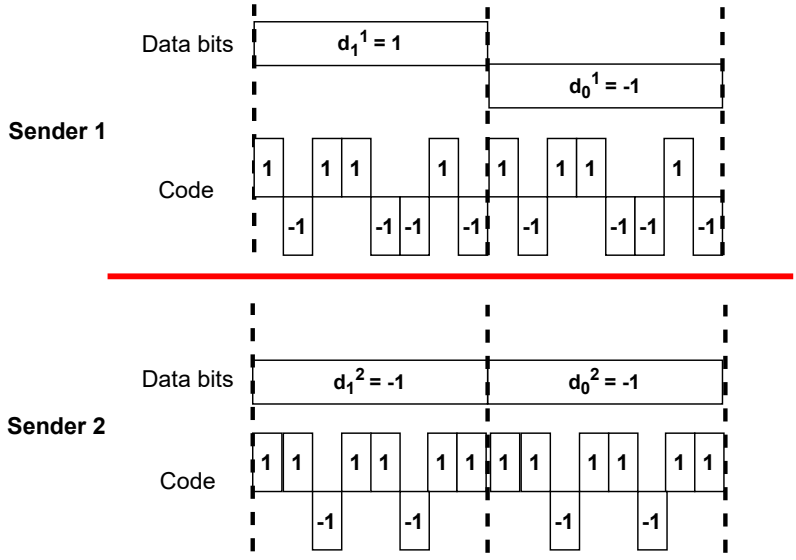

Figure 1: Sample scenario of CDMA.

a) ***(1.5 Points)*** What is the encoded output in this scenario, draw the waveform?

b) ***(1.5 Points)*** Solve the mathematical decoding process for receiver 2?

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Instructions

✓ Please note that the final date and time of submission on Moodle is **Friday April 12th, 2024 (23:00)**. No extensions will be given.

✓ Submit your assignment to Moodle as a Python (*.py) file with the name format as First-Name_SurName.py for first question, and pdf file with the name format as FirstName_SurName_a.pdf, and FirstName_SurName_b.pdf for second question respectively.

✓ For the first problem, your program files must contain detailed comments about the rationale you have followed. Files without comments will be discarded. Points will be deducted in case of inadequate explanations.

✗ The assignment is to be done individually. Do not share solutions with your colleagues, do not ask your colleagues to send you their code, and do not directly copy code from the Internet. All potential cases of misconduct will be reported to the school. Additionally, in case of misconduct, you will fail the assignment and get another 20% deduction in the final grade. Repeated misconduct means failure of the course.

✗ According to the code of conduct, making public this assignment on the Internet (e.g., forums, chegg.com, bartleby.com etc.) results in a category C misconduct and automatic fail of the course.

✗ Do not submit code in any programming language other than Python 3 for first problem.

✗ Do not submit hand written solution for second problem.

✗ Do not use the chip sequence given in Problem 2 for Problem 1.