Digital Communications

Quiz for Lab exercise 2 (A): Spread Spectrum

Academic year 2024/2025

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Student | 1: | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . | T | Grade |
| Student | 2: | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . |

Fill in the data obtained in your simulations and give a reasoned answer to the following questions

# Transmission @ Chip time (1 user)

What is the energy of channel *d*[*m*]?

Fill the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | energy *p*[*n*] | Pe | | BER | |
|  |  |  |  |
| *x*0 |  |  |  |  |  |
| *x*1 |  |  |  |  |  |
| *x*2 |  |  |  |  |  |
| *x*3 |  |  |  |  |  |

In view of the simulations, explain the results obtained and relate them to the correlation function of each sequence.

In which order would you use the sequences given the previous results ?

# CDMA: transmission of 2 users

Fill the following tables:

* + Ideal channel

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Dot product | Pe | | | | BER | | | |
| *σ*2 =0  *zc* | | *σ*2 =1  *zc* | | *σ*2 =0  *zc* | | *σ*2 =1  *zc* | |
| Us. A | Us. B | Us. A | Us. B | Us. A | Us. B | Us. A | Us. B |
| *xA* = *x*1 y *xB* = *x*2 |  |  |  |  |  |  |  |  |  |
| *xA* = *x*1 y *xB* = *x*3 |  |  |  |  |  |  |  |  |  |
| *xA* = *x*2 y *xB* = *x*3 |  |  |  |  |  |  |  |  |  |
| *xA* = *x*2 y *xB* = *x*2 |  |  |  |  |  |  |  |  |  |

* + Channel proposed in (3)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Dot product | Pe | | | | BER | | | |
| *σ*2 =0  *zc* | | *σ*2 =1  *zc* | | *σ*2 =0  *zc* | | *σ*2 =1  *zc* | |
| Us. A | Us. B | Us. A | Us. B | Us. A | Us. B | Us. A | Us. B |
| *xA* = *x*1 y *xB* = *x*2 |  |  |  |  |  |  |  |  |  |
| *xA* = *x*1 y *xB* = *x*3 |  |  |  |  |  |  |  |  |  |
| *xA* = *x*2 y *xB* = *x*3 |  |  |  |  |  |  |  |  |  |

In view of the simulations, explain the results obtained and relate them to the correlation function of each sequence.

What would be the order of pairs of sequences according to the results? Reason this order with the results obtained in the single user section.