CDMA TRANSMITTER AND RECEIVER IMPLEMENTATION

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IMPLEMENTATION OF CDMA

- What is CDMA ??

  - Short for Code Division Multiple access uses spread-spectrum techniques for encoding and decoding of the message

  - CDMA is a military technology first used during World War II by English allies to foil German attempts at jamming transmission

  - The spreading of the signal/message makes the message noise like which makes it difficult to jam

IMPLEMENTATION OF CDMA

- Narrowband signals are easily jammed by any other signal in the same band
- Idea behind spread spectrum is to use greater bandwidth than the message bandwidth but the power remains the same. Moreover, this broadband signal looks like noise, for that frequency band, and therefore would be hard to tell if there is any signal

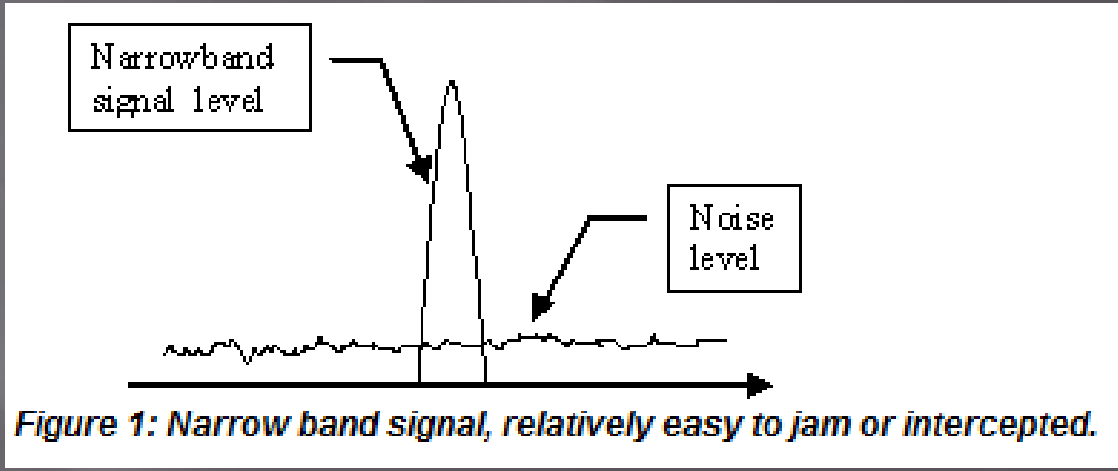
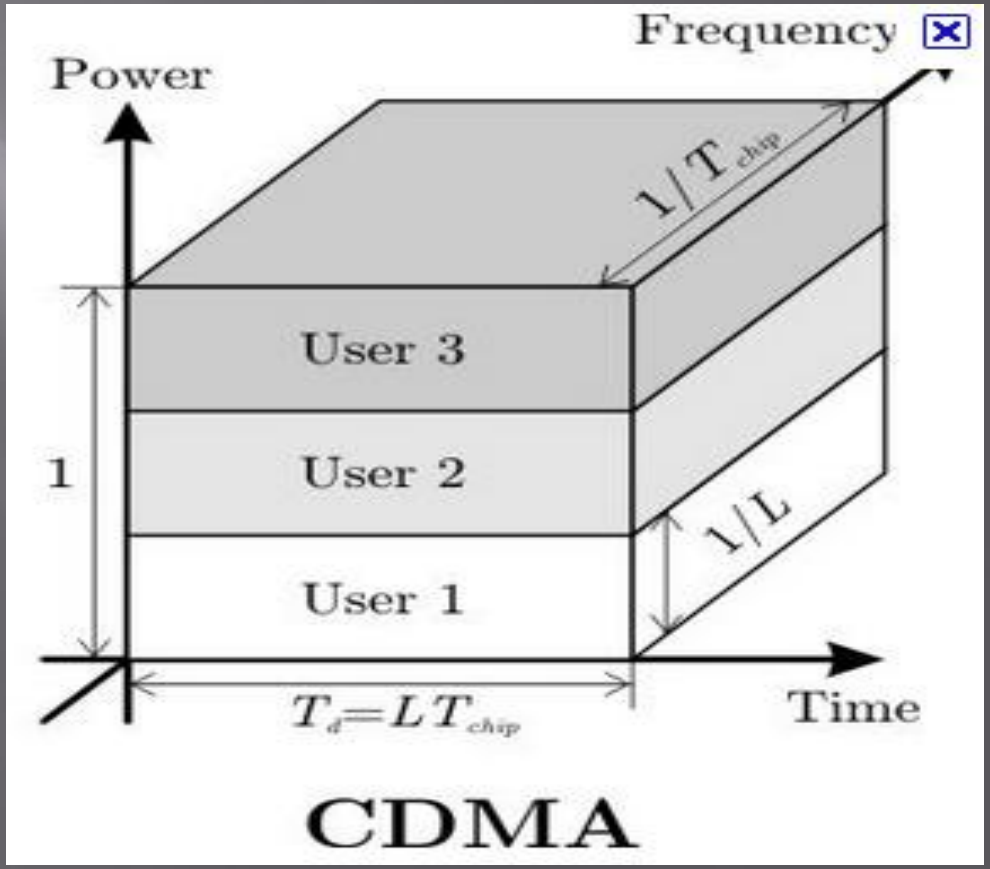


Figure 1: Narrow band signal, relatively easy to jam or intercepted.

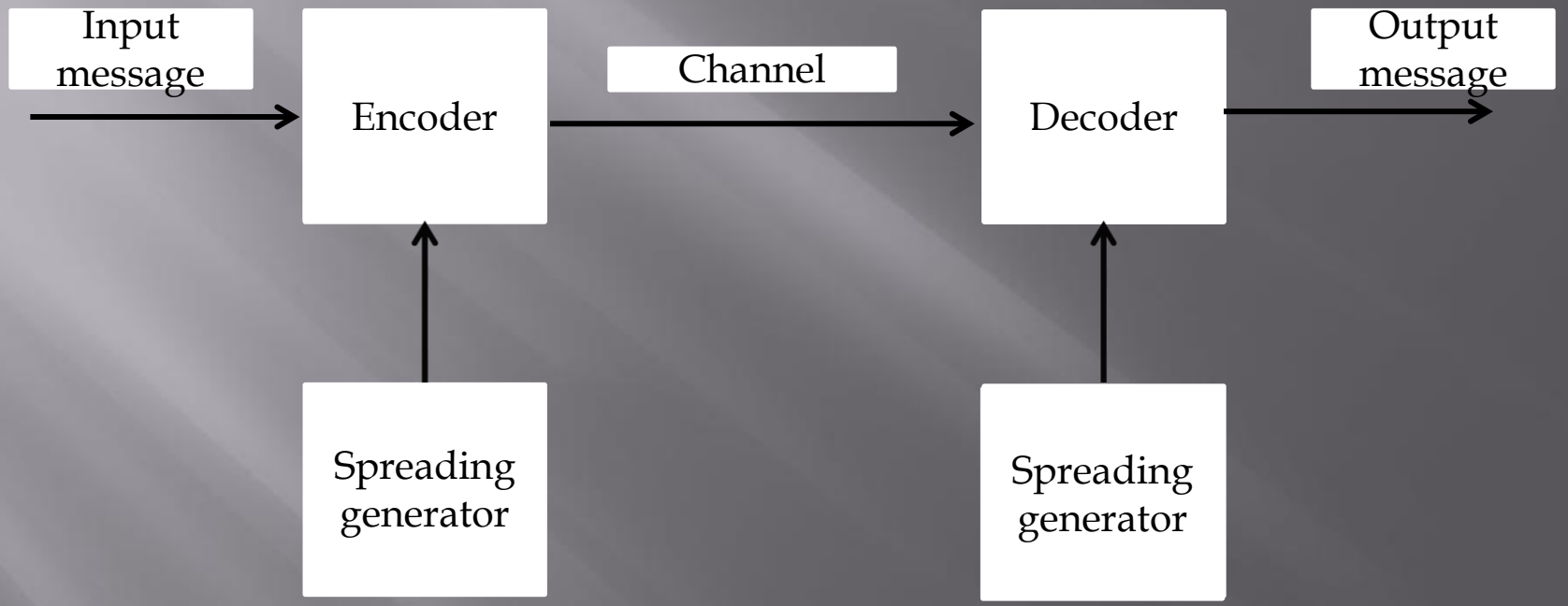
IMPLEMENTATION OF CDMA

Each user gets to transmit in the full available spectrum at all time unlike in FDMA and TDMA

Uses orthogonal codes to spread and de-spread the data bits

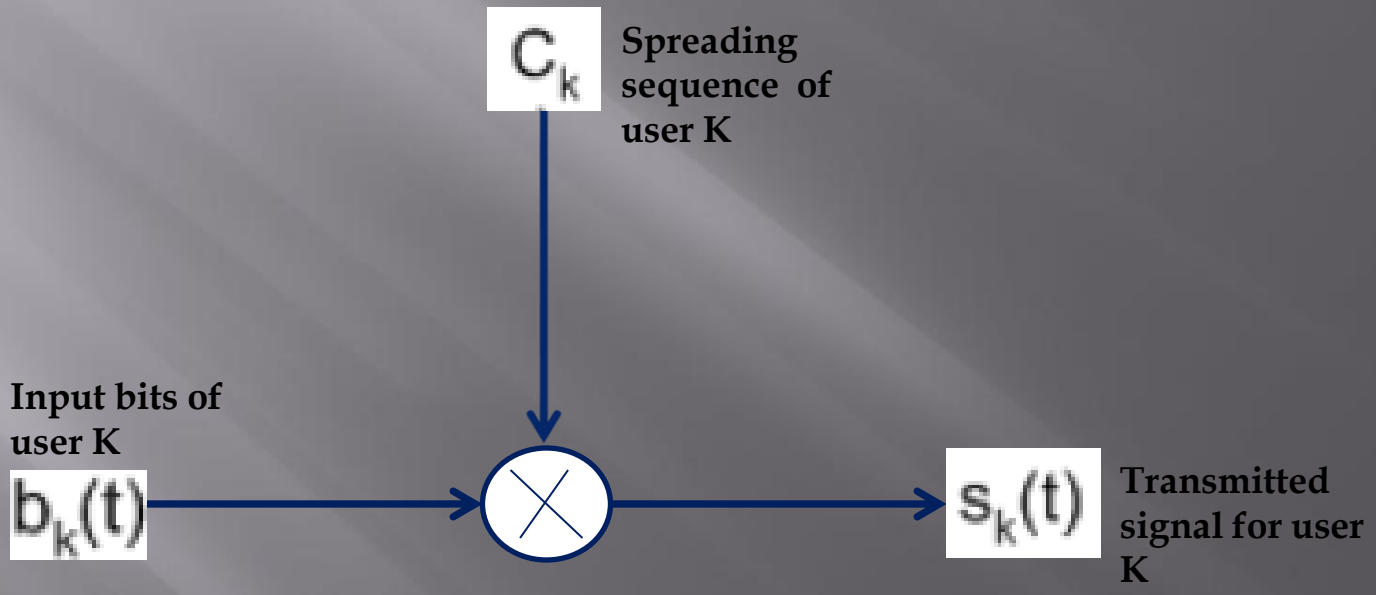


BASIC BLOCK DIAGRAM



IMPLEMENTATION OF CDMA

- How it works ?



b = Bits of user
C = Spreading code
s = Transmitted signal

IMPLEMENTATION OF CDMA

Data1=(-1 1 1 -1)

PN1 = (1 1 1 1)

Data2=(1 1 1 -1)

PN2 = (1 -1 1 -1)

Ssq1 = -1 -1 -1 -1 ,1 1 1 1 , 1 1 1 1 , -1 -1 -1 -1

Ssq2 = 1 -1 1 -1 ,1 -1 1 -1 , 1 -1 1 -1 , -1 1 -1 1

Y = 0 -2 0 -2 , 2 0 2 0 , 2 0 2 0 , -2 0 -2 0

(summed up)

IMPLEMENTATION OF CDMA

Y = 0 -2 0 -2 , 2 0 2 0 , 2 0 2 0 , -2 0 -2 0

(summed up)

Y1 Y2 Y3 Y4

< Y1,PN1 > = - 4

< Y2,PN1 > = 4

< Y3,PN1 > = 4

< Y4,PN1 > = - 4

< Y1,PN2 > = 4

< Y2,PN2 > = 4

< Y3,PN2 > = 4

< Y4,PN2 > = - 4

IMPLEMENTATION OF CDMA

[Yi,PNi] > 0 Recovered data = +1

[Yi,PNi] < 0 Recovered data = -1

< Y1,PN1 > = - 4 = **-1** < Y1,PN2 > = 4 = 1

< Y2,PN1 > = 4 = 1 < Y2,PN2 > = 4 = 1

< Y3,PN1 > = 4 = 1 < Y3,PN2 > = 4 = 1

< Y4,PN1 > = - 4 = -1 < Y4,PN2 > = - 4 = -1

Recovered data1 = -1 1 1 -1

Recovered data2 = 1 1 1 -1

IMPLEMENTATION OF CDMA

SUMMARY :

- CDMA system is implemented with the spread spectrum technique
- User data bits are spread and recovered using the orthogonal codes

REFERENCE

- CDMA development group (www.cdg.org)
- www.webopedia.com/TERM/C/**CDMA**.html
- Wireless Communications – Theodore Rappaport

THANK YOU