Department of Computer Engineering

Academic Term : Jan-Apr 2023

Class : T.E Computer Sem -VI
Subject : Mobile Computing

Practical No:	**5**
Title:	To implement a basic function of Code Division Multiple Access (CDMA) to test the orthogonality and autocorrelation of a code to be used for CDMA operation
Date of Performance:	31/03/2025
Date of Submission:	27/04/2025
Roll No:	9913
Name of the Student:	Mark Lopes

Evaluation:

Sr. No	Rubric	Grade
1	**On time Completion & Submission(2)**	
2	**Output(3)**	
3	**Code Optimization(3)**	
4	**Knowledge of the topic(2)**	
5	**Total (10)**	

Signature of the Teacher :

ExperimentNo.:5

Aim: Theory:To implement a basic function of Code Division Multiple Access (CDMA) to test the orthogonality and autocorrelation of a code to be used for CDMA operation. Write an application based on the above concept.

Code-division multiple access (CDMA) is a channel access method used byvarious radio communication technologies. CDMA is an example of multiple access, whereseveral transmitters can send information simultaneously over a single communication channel.This allows several users to share a band of frequencies (see bandwidth). To permit this

withoutundue interference between the users, CDMA employs spread spectrum technology and a specialcodingscheme(whereeachtransmitteris assignedacode).

CDMAisusedastheaccessmethodinmany mobilephonestandards. IS-95,alsocalled"cdmaOne", and its 3G evolution CDMA2000, are often simply referred to as "CDMA",but UMTS, the 3G standard used by GSM carriers, also uses "wideband CDMA", or W-CDMA,aswellasTD-CDMAandTD-SCDMA, asitsradio technologies.

The intended 4G successor to CDMA2000 was UMB (Ultra Mobile Broadband); however, inNovember2008, Qualcomm announceditwasendingdevelopmentofthetechnology,favoringLTEinstead

CDMAOrthogonality:

Techniquesgenerallyusedaredirectsequencespreadspectrummodulation(DS-CDMA),frequency hopping or mixed CDMA detection (JDCDMA). Here, a signal is generated whichextends over a wide bandwidth. A code called spreading code is used to perform this action.Using a group of codes, which are orthogonal to each other, it is possible to select a signal with agivencodeinthepresence ofmanyothersignals withdifferent orthogonalcodes.

CDMAAutocorrelation:

Autocorrelation of the sequence, it determines the ability to synchronize and lock the spreadingcodeforthereceivedsignal.

https://www.youtube.com/watch?v=UzLUJuvNi_U

Conclusion:

Thus, we have studied the CDMA code to test auto correlation and orthogonality of codes and executed the same using the java code as above and got proper output for it. OUTPUT

```
Enter the data bits :
Enter D1 :10
Enter D2 :20
Enter D3 :30
Enter D4 :40
Resultant Channel [100 -20 -40   0]
Enter  the station to listen for C1=1 ,C2=2, C3=3 C4=4 : 2
Inner Product [100  20 -40   0]
Data bit that was sent 20.0
```

Postlab:

OBSERVATION:

MC - Postlab - 5

Observation of CMDA

In CMDA, we observed how multiple user can transmit data simultaneously over the same frequency spectrum using unique code

1. Spreading and despreading :-
each user data was spread using a unique pseudo random sequence ensuring user interfa

2. Multiple access
multiple signals were layered in time of frequency but remained distinguished due to their unique code.

~~Multiple access~~

Signal recovery
The intended recievers successfully extracted the original data using the correct spreading code demonstrating ~~exi~~ resistance to interference.