An overview Of "CODE DIVISION MULTIPLE ACCESS" model

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Abstract-**The performance of CDMA (Code Division Multiple Access) schemes applied to optical networks is analyzed in terms of the bit error probability. Code Division Multiple Access (CDMA) is a multiple access technique where different users share the same physical medium, the same frequency band, at the same time. CDMA is the spread spectrum technique which uses high rate signature pulses to enhance the single bandwidth far beyond what is necessary for a given rate. The system is characterized with high data rate. A new optical CDMA (Code Division Multiple Access) receiver with bipolar spreading and optical processing is presented. A study on the interference in optical CDMA system is performed. It is observed that this type of interference is negligible in such system.**

***Keywords*— CDMA,FDMA,TDMA,GENERATION.**

I. INTRODUCTION

Code division multiple access technology is based on a spread specturm communicatin technique.CDMA is compeletly different from FDMA(Frequency Division Multiple Access) and TDMA(Time Division Multiple Access).instead of deviding the allow frequency rang into a few 100 narrow channel.CDMA allow each station to transmit over the entire frequency spectrum all the time.

II. .BACKGROUND

Code division multiple access, or CDMA, is a channel access method often used in radio/cell phone communication. CDMA employs the spread-spectrum modulation format, which has the advantage of making the signals resistant to narrowband interference, since it would only affect a small portion of the spread spectrum signal it is easy to filter out without a significant loss of data, difficult to intercept and resistant to jamming. Direct-sequence spread spectrum for CDMA involves multiplying the data to be transmitted by a pseudo-random sequence of -1's and 1's. This spreads the original signal into a much wider band, hence the term "spread-spectrum." The original data can be restored by the receiver using a de-spreading technique. This involves de-spreading the received signal with the pseudo-random sequence respective to the original signal. To do this, the transmitted and received sequences must be synchronized.

III. CDMA OPERATION

CDMA is a based on h spread spectrum multiple access technology.CDMA user share a common frequency channel. All user are on the same frequency at a same time. In CDMA each user is assigned a unique code sequence it's information bearing signal. This is possible if the evolution of the CDMA era First generation (1G) - 1980

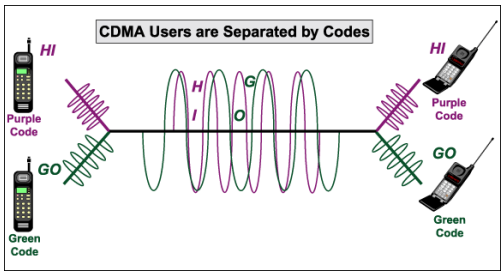
First generation was analog cellular system. Only voice communication possible in this generation. The system name AMPS(Advanced Mobile Phone Service) USA, NMT (Nodic Mobile Telephon service) 900 sweden, CDPD(Cellular DigitalPacket Data) America.

Second Generation (2G) - 1992

In second generation mobile phon was digital. 2G also known as PCS (Personal Communication System). The service provide by 2G is called GPRS (General packet radio service).

2.5 Generation - 1996

The incremental advancement in second generation interma of increas capacity and increased data rate introducced 2.5 generation. In this generation high speed internet service known as EDGE (Enhanced data rate for GSM evolution). Which is higher then GPRS.



Third Generation (3G) - 2000

3rd Generation Mobile Telecommunications (3G), is a set of standards that came about as a result of the International Telecommunication Union's (ITU) initiative known as IMT-2000 (International Mobile Telecommunications-2000).

Fourth Generation (4G) - 2002

Fourth-generation (4G) mobile communications concepts and technologies are beginning to evolve. In the simplest form, 4G consists of an evolution beyond the third-generation (3G) cellular communication systems now at or near deployment worldwide. Cellular

APPLICATION OF CDMA

Because of its inherent advantages over TDMA and FDMA (user capacity, soft handoffs, security, increased user resources etc.), CDMA clearly emerges as the winner in the battle over wireless services. CDMA allows for greater development and use of broadband devices such as GPS units, PDA's, wireless laptop modems, Internet capable cell phones, and other innovative devices.

Also, as shown here, subscriber growth for CDMA systems is accelerating at an explosive rate, demonstrating the shift in the wireless market from other protocal to CDMA.

Feature of CDMA

1. Use of wide boundwidth.
2. Level of security is high.
3. Multiple access.
4. Sprading codes used.

Advantages of CDMA

1. Improvement in network capacity.
2. Improvement in hand over and handoff.
3. One of the greatest things about CDMA is that the cost of calls is cheaper than in GSM.
4• As of now the call quality is better than GSM.
5• The phone calls are more secured because of the spread spectrum.

Disadvantage of CDMA

1. Reduce data capacity.
2. High power handset require.
3. There is no availability of variety of handsets in CDMA as in case of GSM for customers.
4• They are incompatible with GSM handsets.
5• CDMA has only 2 service providers to its credit & consumers have no option in case of their decreasing service level.
6• The CDMA services have not yet got the facility for the web based servics like messenger, downloading ringtones etc from websites.

Difination of FDMA and TDMA

FDMA - (Frequency division multiple access)

Frequency division multiple access or FDMA is a channel access method used in multiple-access protocols as a channelization protocol. FDMA gives users an individual allocation of one or several frequency bands, or channels. It is particularly commonplace in satellite communication. FDMA, like other multiple access systems, coordinates access between multiple users.

TDMA - (Time Division Multiple Access)

Time-division multiple access (TDMA) is a channel access method for shared-medium networks. It allows several users to share the same frequency channel by dividing the signal into different time slots.[1] The users transmit in rapid succession, one after the other, each using its own time slot. This allows multiple stations to share the same transmission medium (e.g. radio frequency channel) while using only a part of its channel capacity.

Differentiate between FDMA and TDMA

FDMA (Frequency Division Multiple Access) and TDMA (Time Division Multiple Access) technologies are used in P25 and in business and industrial digital radios (P25 Phase I & NXDN™ for FDMA; P25 Phase II & DMR for TDMA).

1. The basic difference between FDMA and TDMA is the definition of a channel and how it is used.
2. In FDMA, a particular bandwidth (e.g. 6.25 kHz) at a particular frequency (e.g. 150.000 MHz) is used to define a channel. This is the way channels have been allocated in analog land mobile radios (LMR) for decades. All information is contained in the channel – compressed to the smallest frequency footprint.

3.In regard to TDMA and digital technology, the 12.5 kHz channel bandwidth is maintained. The RF spectrum efficiency is achieved when two voice channels share time to create a 6.25 kHz equivalency. TDMA technology is possible only by using intelligent infrastructure to make and control the time slots.

FIGURE OF FDMA

FIGURE OF TDMA

1. Same frequency is used by every user and simultaneous transmission occurs
2. Every narrowband signal is multiplied by wideband spreading signal, usually known as codeword
3. Every user has a separate pseudo-codeword, i.e., orthogonal to others
4. Only the desired codeword is detected by the receivers and others appear as noise
5. It is mandatory for the receivers to know about the transmitter's codeword

FDMA

1. When the channel is not in use, it sits simply idle
2. Bandwidth of Channel is relatively narrow (30 KHz), known as narrowband system
3. Little or no equalization is needed for spreading symbol time
4. Analog links are suitable for FDMA
5. Framing or synchronization bits are not needed for continuous transmission
6. Tight filtering is needed to minimize interference
7. Combined with FDD for duplexing

CDMA Vs TDMA

CDMA

1. Power limited system.
2. While people talking, random noise band playing occurs.
3.Conversation need to be extracted from the background din.
4. GP is high when people speak different languages, which is easier to distinguish individual speakers.
5. It is difficult for distinguishing individuals, when GP is low.
6. The system performance will be degraded for every user when the number of users increases.
7. Fading would be reduced with wide frequency spectrum.
8. Need to have separate multipath signals with different delays by "chip" unit.

TDMA

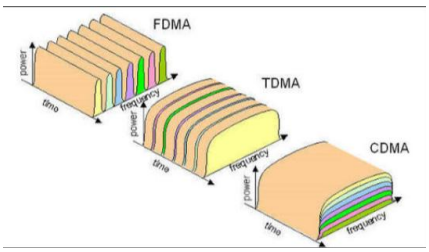
1. Receiving or transmission is allowed for only one user in a given slot.
2. All slots are assigned cyclically.
3. The transmission is non-continuous.
4. It is essential to use digital data and modulation.
5. Data rate overhead is between 20% – 30%.
6. Overhead tradeoffs are size of data payload and latency.
7. Multiple users are shared with single carrier frequency.
8. Handoff is made simpler by using non-continuous transmission.

Conclusions

CDMA is probably the most intresting multiple access method technology provided by spread spectrum technology. The basic problem of cellular traffic is removed by the use of CDMA. It provides about

10 times more capacity then analog networks- far more then TDMA & GSM systems.

CDMA is a "spread spectrum" technology, allowing many users to occupy the same timeand frequency allocations in a given band/space. CDMA consistently provides better capacity for voice and data communications.



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