

# Literature review of Wide band code division multiple access (WCDMA)

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## ABSTRACT

Wide band code division multiple access(WCDMA) is the third generation air interface application which is widely used in present. As the result of this technology communication over network increased. In this paper we will study about how the communication process improves in compression to last years. This paper present that how WCDMA radio interface provide and support higher bit rate services .UMTS (Universal mobile telecommunication system)is a best example to understand WCDMA.WCDMA shows the tremendous growth of cellular technology with guaranteed quality of services. Inthis paper we will also discussed characteristic of WCDMA and see that how WCDMA is better than GSM

**KEYWORDS:** WCDMA, QOS, UMTS, GSM

## 1. Introduction

Now a day's WCDMA is a most popular term in the mobile communication sector is WCDMA.In WCDMA each user have a unique code and transmitted over the same frequency band.WCDMA is a new technology in present world which is based on 3G And provides high rate to multimedia services to mobile users with multiple Quality of services. A latest example of WCDMA is UMTS (Universal mobile technology System) which support many different application and services with equal QOS requirement. Quality is services defined in different classes "Namely, Conversational, Streaming and last is background. INUMTS (Universal mobile technology system) each and every application is based on these QOS classes and each application gives appropriate result according to its QOS.WCDMA is use radio interface for UMTS system. In this paper we also study about the System model of WCDMA in which we can see that how single user and multiple user communicateby using WCDMA air interface.WCDMA is widely used technology over GSM that people wants most.

**2.The Growth of Mobile and Internet Services:** The growth of mobile and Internet services is Millions which can be shown in following figure 1.

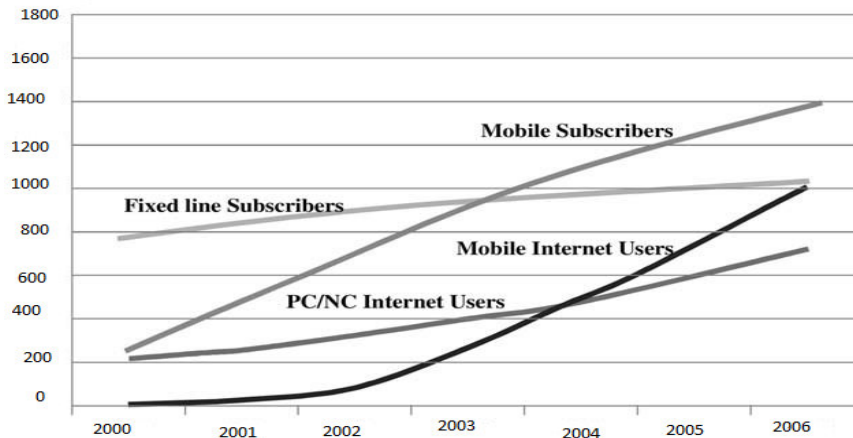


Figure 1. Growth of Mobile & Internet Services

## 3. Basics of WCDMA

- WCDMA is a third generation air interface which is popular in present
- WCDMA was deployed in United States of America in the US frequency band .Its deployment started in Europe and Asia
- WCDMA flexible support high bit rate media files like file transfer,vedio teleconferencing, telemedicine and multiple services
- WCDMA defined in two parts:  
Evolved WCDMA

Basic WCDMA

**3.1. Evolved WCDMA:** Evolved WCDMA provides linear online access to corporate data By using WLAN (Wireless local area network), which gives smooth communication and Higher bandwidth and many other application for end user which is the result of better Performance.

**3.2. Basic WCDMA:** Basic ECDMA is not provide high bit rate for corporate data Because in basic WCDMA WLAN (wireless local area network) is not use. Thts why No direct communication is made between user and it’s a main drawbacks of basic WCDMA.for this reason evolved WCDMA is developed.

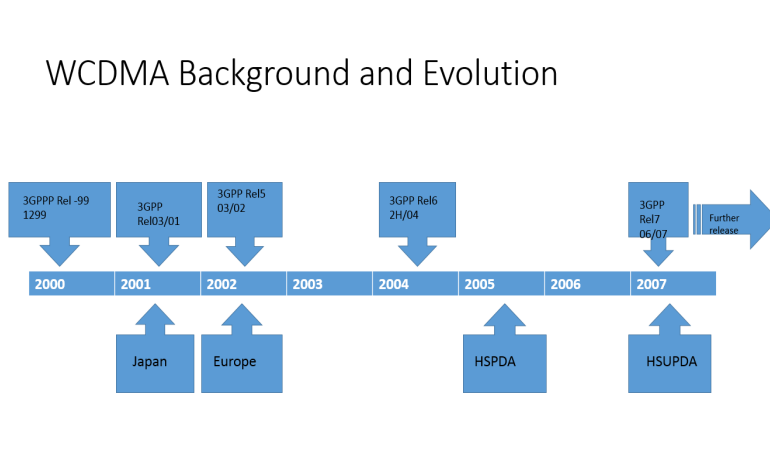


Figure 2. WCDMA background

**4. Characteristics of WCDMA**

- Frame length is 15 slots per frame
- Data modulation: QPSK (downlink) and BPSK (uplink)
- Chip rate: 3.84MHz
- Coding: Walsh code, Turbo code and no code are used for the spreading sequence
- Packet data scheduled by load based packet scheduling
- Power control frequency is 1.5 KHz
- Channel bandwidth is 5MHz
- Self-interference System
- WCDMA system use adaptive multi rate (AMR) speech coding
- Soft /Hard handover
- Support synchronous and asynchronous node operations
- Support UE locating services
- Power control frequency – 1500Hz
- Support load based packet scheduling

Basic Diagram of the WCDMA system:



Figure 3. Basic diagram of WCDMA

## 5. WCDMA System Model

- WCDMA is an air interface for 3<sup>rd</sup> generation system.
- 3<sup>rd</sup> generation systems are known as IMT-2000 and in Europe it is known as UMTS(universal mobile telephone service)
- WCDMA system is a couple of FDD and TDD
- FDD (Frequency division duplexing): It use different frequency band for uplink and downlink according to the frequencies.
- TDD(Time division duplexing):It use same frequency for both uplink and downlink

According to timeslots

Classification of WCDMA system model:

According to the communicating users WCDMA is classified into two system Models

**A: Single user WCDMA system model**

**B: Multiple users WCDMA system model**

Above two system model shows the communication between single user and multiple User in WCDMA air interface.

### 5.1.Single user WCDMA system model

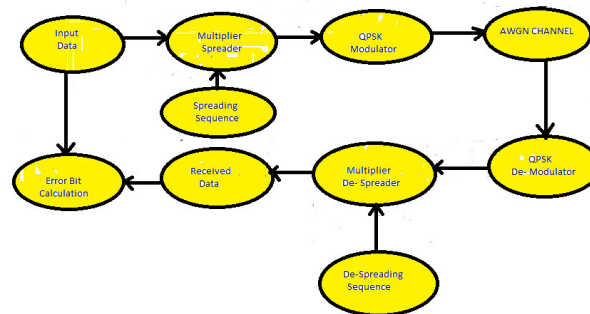


Figure 4. Block diagram of WCDMA system model

- Input Data: All incoming signals are used as input data which is stored in Memory of system
- Spreading Sequence: In WCDMA system walas code is used as spreading system. It's a coding terminology which is used in WCDMA Application .It consist n rows And n columns and form  $n*n$ Walascodesquarematrix
- Spreader: Spreader is use for spreading data at higher bandwidth And high bit rate
- Modulator: QPSK and BPSK is used as a modulator.Modulator, Modulate data sequence which is coming from spreader
- AWGN channel:AWGN channel is depends on single to noise ratio Per sample. It added white Gaussian noise to the signal
- Demodulator: Demodulator ,demodulate the modulated data Sequence to its original form
- Error Calculation: error calculation is a method for calculating bit error By comprising input data and received data

### 5.2 .Multiuser WCDMA system model

- Multiuser WCDMA shows the communication between multiple users by using different channel and with different Quality of services.
- Each User system held a specific Quality of service for an application and corporate data.
- Below diagram is shows the way of single processing for starting user to end user:-

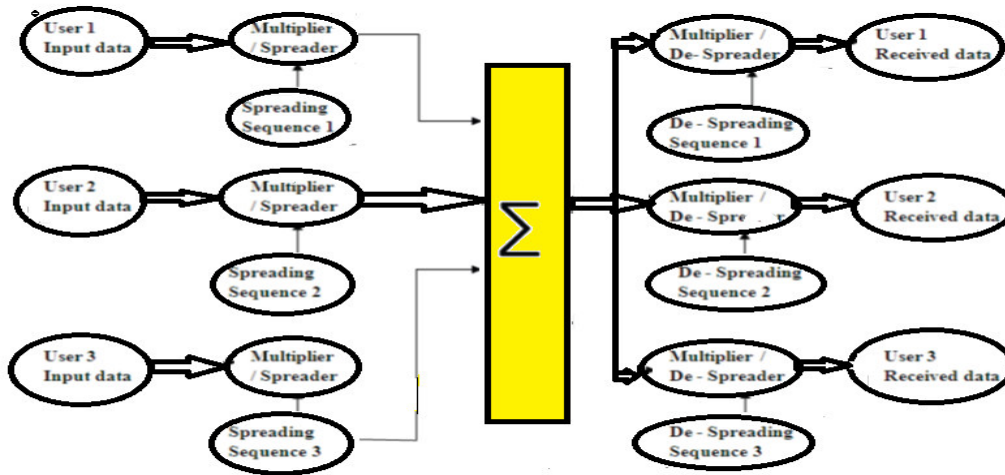
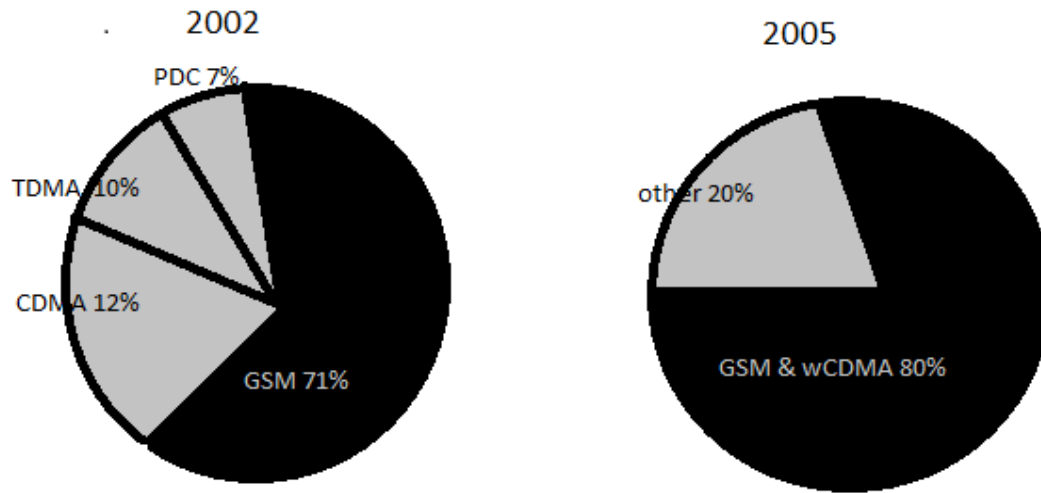


Figure 5. Block diagram of multiple user WCDMA system

- Input Data: Audio signal from N user are stored in memory and each user operate
- Signal simultaneously.
- Spreading Sequence: Walsh code is used as spreading sequence .we take an example
- of 4 user
- sequence is (0,5,3,2)
- [0000]=0, [0101]=5,[0011]=3,[0001]=2
- De-Spreading sequence: user date is reform by composite signal.

## 6. GSMvs. WCDMA

GSM	WCDMA
Provide Voice & Data Services	Provide Voice Data & Video Services
Its 2G technology	It's a 3G group of technology
Comparatively data speed is low	Much faster data speed
GPRS and EDGE data standards	Normal 3G and HSPDA standard
Speed: 9.6kbps	Speed:12.8kbps-4.5 kbps
Use TDMA access method for any application	Use Spread spectrum technique with high Bandwidth
Access media- TDM	ACCESS Media- ATM,IP,TDM
Air Interface,Abis,A,Ater,Gb	AirInterfacelu,CS,PRACH,DPDCH,DPCCH
Narrow band CDMA	Wide band CDMA
Channel bandwidth-1.25MHz	Channel bandwidth-5MHz



Mobile digital subscribers

## 7. CONCLUSION

This paper describes the WCDMA Architecture and the scope of WCDMA in present. A Discussion according to this paper shows that WCDMA now the most popular technology Which is widely used by people and it's a demanding technology also. This paper first describes Introduction and Basics of WCDMA, then describes Basic structure, characteristics of WCDMA, System model of WCDMA. In System model of WCDMA we discussed how single user and multiple user communicate Over WCDMA air interface and how they transfer corporate data from one hand to another hand. Other topic discussed were background and evolution of WCDMA from starting year to Present, comparison between GSM and WCDMA system We can see the rapidly growth of mobile subscribers and it's a big challenge for us to provide a Best way of communication around the world

## REFERENCES

1. Real Time Implementation and Performance Evaluation of WCDMA System over AWGN Channel on TMS320C6713DSK C3IT-2012
2. All IP in 3G CDMA Networks the UMTS Infrastructure and Service Platforms for Future Mobile Systems Jonathan P. Castro Orange Communications SA/AG, Switzerland
3. Wideband Code Division Multiple Access Laurence B. Milstein, Fellow, IEEE
4. WCDMA—the Radio Interface for Future Mobile Multimedia Communications Erik Dahl man, Per Being, Jens Knutson, Fredrik Ovesjö, Magnus Person, and Christian Robot
5. WCDMA – Requirements and Practical Design Edited by Rudolf Tanner and Jason Woodard Ubieties Ltd, UK