

## TIME DIVISION MULTIPLE ACCESS (TDMA).

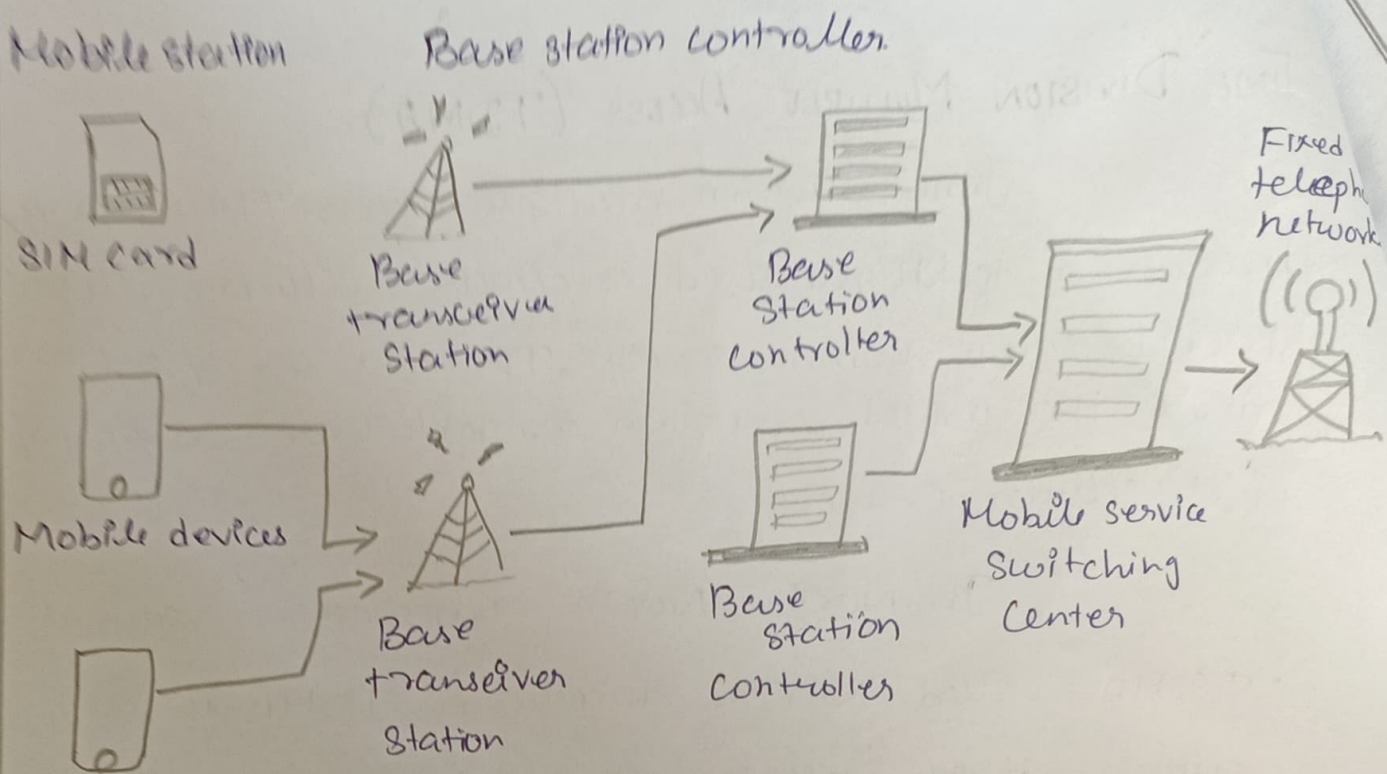
Time division multiple access (TDMA) is a digital modulation technique used in digital cellular telephone and mobile radio communication. TDMA is one of two ways to divide the limited spectrum available over a radio frequency (RF) cellular channel.

In North America a variant of TDMA called North American TDMA is used. Almost all 2G cellular systems use TDMA including the following:

- \* Digital Advanced mobile phone services
- \* Global system for mobile communication (GSM).
- \* Personal Digital Cellular (PDC).
- \* Integrated Digital Enhanced network.

TDMA is also used in digital enhanced cordless Telecommunication a standard used to create cordless telephone systems in Europe, Australia, South America and Asia.

In TDMA users transmit in rapid succession each using their own time slot. This shuttling process is so fast each user thinks they occupy the same RF Channel at the same time.



## GLOBAL SYSTEM FOR MOBILE (GSM) NETWORK.

TDMA is not the same as time division multiplexing (TDM) although the two concepts are often confused for each other.

In TDM a specific time slot is always dedicated to user even if they're not using it furthermore multiplexed signals come from the same mobile node.

The biggest advantages of CDMA are that it offers high data rates and is highly flexible. further unlike TDMA, CDMA does not require synchronization. A drawback of CDMA is that different stations share both bandwidth and time necessitating both guard bands and guard time.



2G and 3G Cellular Network sunset Dates.  
 Cellular carriers are gradually shutting down their 2G and 3G network as they focus their attention on the next generations of wireless connectivity.

	AT&T	VERIZON	T-MOBILE	SPRINT
2G GSM TDMA Last Device ADDITIONS	-	June 30, 2018	-	-
2G GSM-TDMS Shutdown-	January 2017	Dec 31, 2019	Dec 31, 2020	Dec 31, 2021

TDMA divides RF into time slots that are allocated to multiple users. So, the available channel bandwidth is used by every user and sequentially time shared users take turns in using the channel in a efficient and timely manner.

All users are assigned nonoverlapping time slots to use the channel turn by turn. This avoid intersymbol interference an unwanted phenomenon. One symbol interferes with subsequent symbols to distort the signal decreasing communication reliability. As a result a guard band of unused frequencies is not required between adjacent channels. TDMA also permits flexible rates where multiple time slots can be assigned dynamically to a user.

## The evolution of 1G to 5G.

Type	Deployment	Technologies And standards	Features.
1G	Analog telecommunication deployed in 1980s	<ul style="list-style-type: none"> <li>* Advanced mobile phone service (AMPS)</li> <li>* Nordic mobile Telephone (NMT)</li> </ul>	Voice calls, NMT for simple integrated data & messaging.
2G	Digital cellular deployed in the 1990s	<ul style="list-style-type: none"> <li>* code division multiple access (CDMA)</li> <li>* Time division multiple access (TDMA)</li> </ul>	Voice, SMS text messages low rate data.
3G	First broad band deployed in 2000	<ul style="list-style-type: none"> <li>* CDMA2000 1X / Evolution Data Optimized (EVDO)</li> <li>* Universal mobile Telecommunication Service</li> <li>* Worldwide interoperability for microwave Access (WiMAX).</li> </ul>	offers speeds from 144 kbps to 2 Mbps indoors enabling such content.
4G	Deployed in 2010	* LTE	100s of Mbps to 1 Gbps with video and streaming capabilities.
5G	First deployed in 2018	* International Telecommunication Union (ITU) / International mobile Communication (IMT)-2020 defined technical objectives	3x higher spectral efficiency than 4G & peak downlink throughputs peak 20 Gbps.

⇒ In TDMA-based system guard time of 30-50 micro seconds between time slots are commonly used.

⇒ Synchronization is also necessary in TDMA due to burst mode of data transmission.

⇒ Another drawback of TDMA is that compared to CDMA it only offers medium data rates and moderates system flexibility.



# CASE STUDY - I

## CDMA

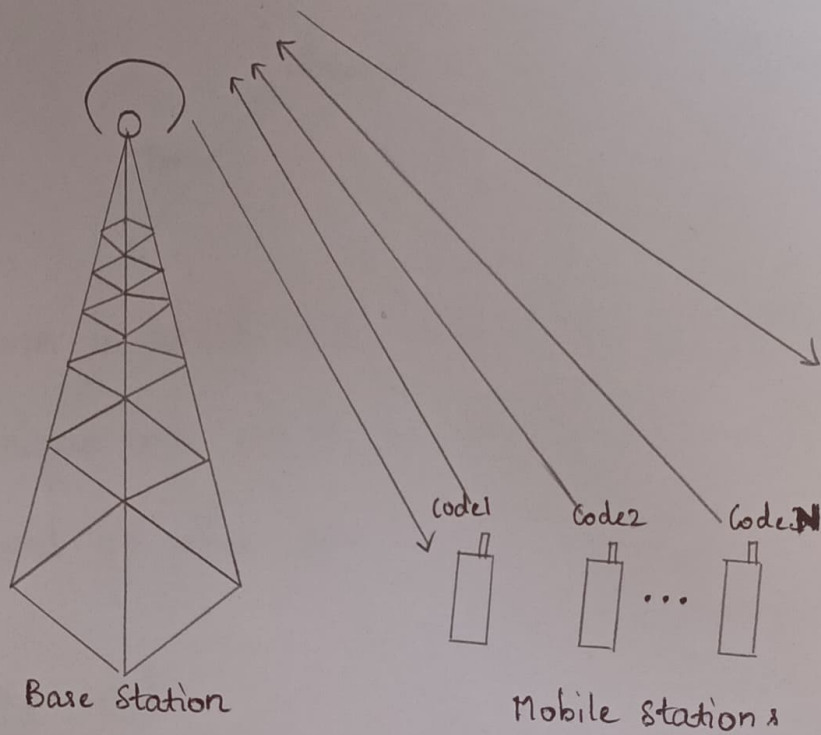
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### CDMA:

- CDMA is an acronym for Code Division Multiple Access, which is also a radio telecommunication standard.
- The CDMA came into existence in 2G and 3G generation as the protocol of wireless communication.
- It is based on the spread spectrum technology and makes optimal use of the available spectrum. Since it uses the spread spectrum technology, hence allows each user to transmit the data over the entire frequency spectrum at any time.
- The CDMA provides one of the most secure modes of communication due to its spread spectrum property.

- It is used in UHF or Ultra-high frequency cellular systems, with frequency bands ranging from 800 MHz to 1900 MHz.

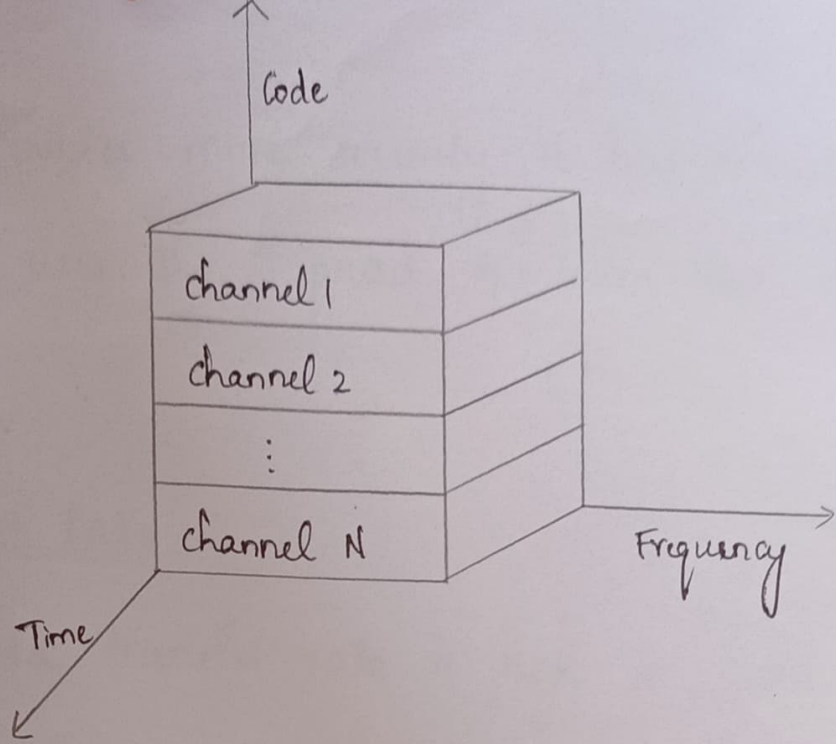


Forward Link:

The forward link is the transmission path from a base station to a mobile station.

Reverse Link:

The reverse link is the transmission path from a mobile station to the base station.



CDMA in which each channel is assigned a unique code which is orthogonal to codes used by other users.

### 1. Technology used:

CDMA uses the spread spectrum technology and hence it makes optimal use of the available bandwidth. It enables each user to transfer the data over the entire frequency spectrum at any time.

### 2. Spectrum Frequency

CDMA operates in the frequency range of 850 MHz and 1900 MHz.



### 3. Security

CDMA provides more security, it has inbuilt encryption and uses the spread spectrum for data transmission.

### 4. Data Transfer Rate

The data transfer rate is high in CDMA. EVDO technology is used, which provides a maximum download speed of 2Mbps.

### CHARACTERISTICS OF CDMA:

- It allows more users to connect at a given time and thus provides improved data and voice communication capacity.
- A full spectrum is used by all the channels in CDMA.
- CDMA systems make the use of power control to eliminate the interference and noise and to thus improve the network quality.



## ADVANTAGES:

- Increased user capacity and supports a lot of users.
- More secure as the information transmitted is below the noise floor making the intrusion of the spectrum difficult.
- CDMA provides a high quality of voice with almost no noise during the calls.

## DISADVANTAGES:

- Lacks the facility of international roaming.
- Self-jamming problem occurs in CDMA systems because of loss of orthogonality.
- The problem of channel pollution occurs in CDMA systems which thus degrades the quality of audio.
- Lack of handsets for CDMA technology.