Study of FDMA, CDMA, TDMA

B.Tech
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1 Purpose of the Project

Purpose of this project is to do a comprehensive study on multiple access technologies like FDMA, CDMA, TDMA that is used in different technology and make our life easy and comfortable.

2 Multiple Access

It involves sharing a communications resource between several users that broadcast their transmissions so that more than one other user may receive them.

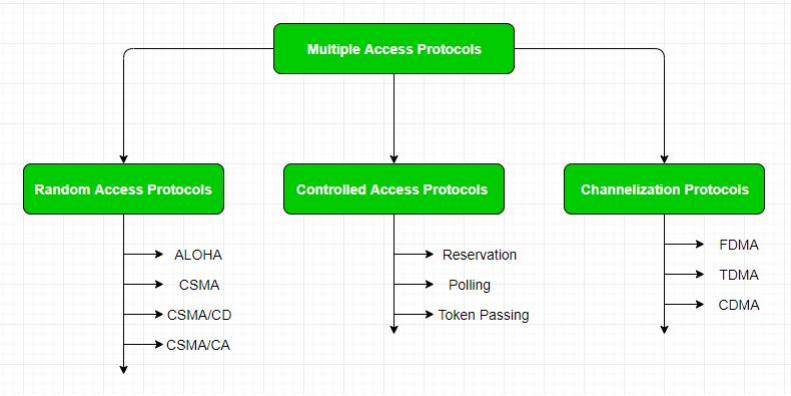

Figure 1: Multiple Access Types

2.1 FDMA

FDMA is a type of channelization protocol. This bandwidth is divided into various frequency bands. Each station is allocated a band to send data and that band is reserved for the particular station for all the time.

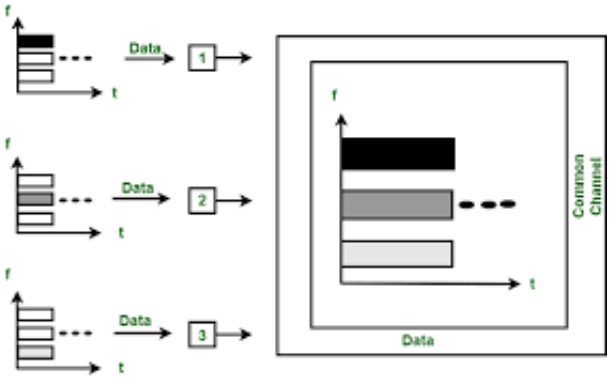

Figure 2: FDMA

Advantage of FDMA:

1. Use of efficient numerical codes increases the capacity.
2. It reduces the worth.
3. Simple to implement, from a hardware standpoint.
4. Lowers the inter symbol interference (Equalization isn't required).

Disadvantage of FDMA:

1. Due to the simultaneous transmission of a large number of frequencies, there is a possibility of inter modulation distortion at the transponder.
2. It is suitable only for analog signals
3. Storage, enhancement of signals is not possible.
4. The large bandwidth requirement for transponders.

2.2 TDMA

TDMA is the channelization protocol in which bandwidth of channel is divided into various stations on the time basis. There is a time slot given to each station, the station can transmit data during that time slot only

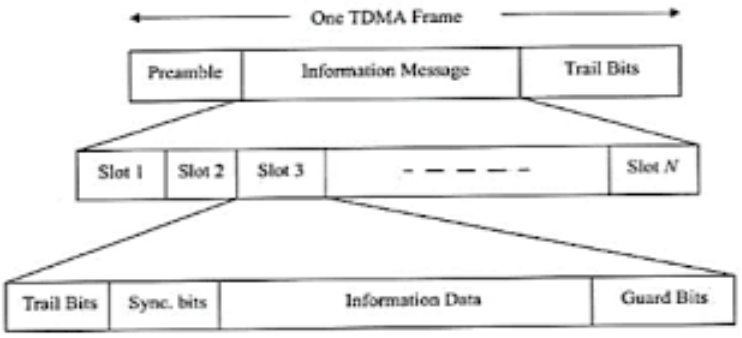

Fig: TDMA frame structure

Figure 3: TDMA

Advantage of TDMA:

1. TDMA can undoubtedly adjust to the transmission of information just as voice correspondence.
2. It can convey 64 kbps to 120 Mbps of information rate.
3. No impedance from the synchronous transmission.
4. TDMA is the savvy innovation to change a simple framework over to computerize.

Disadvantage of TDMA:

1. In TDMA every client makes some predefined memories space so clients wandering starting with one cell then onto the next are not distributed a scheduled opening.
2. High synchronization overhead.
3. Recurrence/opening assignment is to be intricate in TDMA.
4. Organization and range arranging is concentrated.

2.3 CDMA

CDMA stands for Code Division Multiple Access. It is basically a channel access method and is also an example of multiple access. Multiple access basically means that information by several transmitters can be sent simultaneously onto a single communication channel.

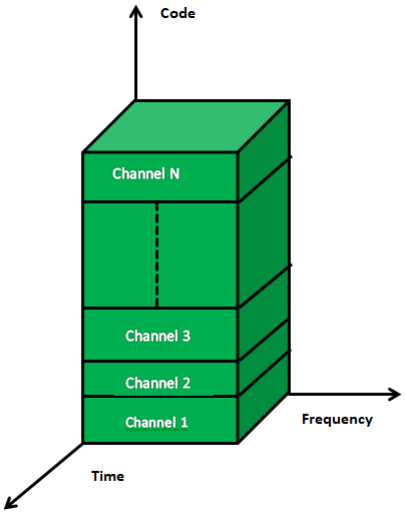

Figure 4: CDMA

Advantage of CDMA:

1. CDMA channel isn't effectively decodable thus it offers increments cell correspondence protections.
2. Call quality is better with more predictable sound when contrasted with GSM.
3. It has Better multipath execution.
4. The recurrence reuse plan is simpler to oversee.

Disadvantage of CDMA:

1. In CDMA, time synchronization is required.
2. It can't offer worldwide meandering, a huge GSM advantage.

3. The CDMA framework execution debases with an expansion in the quantity of clients..

4.At the point when the quantity of clients expands, the general nature of administration diminishes.

3 Conclusion

In conclusion, FDMA, TDMA, and CDMA are different methods to allow multiple users to share the same communication channel without interference: FDMA divides the channel into different frequency bands for each user. TDMA assigns different time slots to each user on the same frequency. CDMA uses unique codes to differentiate users sharing the same frequency band at the same time. Each method has its strengths and weaknesses, and the choice of method depends on the specific needs and constraints of the communication system. Understanding these methods helps us appreciate how multiple users can communicate efficiently and effectively.