# Comparison between FDMA, TDMA, CDMA & SDMA

# Principles of Communication

## Comparison between Multiple Access Techniques

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# HELLO!

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# Multiple Access Technique

Multiple Access Techniques are ways to access a single channel by multiple users.

They provide multiple access to the channel.

A “channel” refers to a system resource allocated to a given mobile user enabling the user to establish communication with the network (other users).

# Types of MA Techniques:

- **Frequency Division Multiple Access** – Frequency band divided into small frequency channels and different channels are allocated to different users – like in FM radio. Multiple users can transmit at the same time but on different frequency channels.

- **Time Division Multiple Access** – Each user is allowed to transmit only in specified time-slots with a common frequency band. Multiple users can transmit at the same frequency band at different times.

# Types of Multiple Access Techniques:

- **Code Division Multiple Access** – Users may transmit at the same time using the same frequency band but using different codes so that we can decode to identify a particular user

- **Space Division Multiple Access** – Each user is allowed to transmit only in specified time-slots with a common frequency band. Multiple users can transmit at the same frequency band at different times.

# Comparison:

| Property | SDMA | TDMA | FDMA | CDMA |
|---|---|---|---|---|
| IDEA | Segment spaced into cells or sectors. | Segments sending time into disjoint time slots demand driven or fixed patterns | Segment the frequency band into disjoint sub-bands | Spread the spectrum using orthogonal codes |
| TRANSMISSION SCHEME | Continuous | Discontinuous | Continuous | Continuous |
| CELL CAPACITY | Depends on cell area | Limited | Limited | No absolute limit on channel capacity but it is an interference limited system |

# Comparison:

| Property | SDMA | TDMA | FDMA | CDMA |
|---|---|---|---|---|
| ADVANTAGE | Very simple, increases capacity per | Established fully digital, flexible | Simple, established, robust | Flexible, less frequency planning needed, soft handover |
| DISADVANTAGE | Inflexible, antennas typically fixed | Guard space needed (multipath propagation), synchronization difficult | Inflexible, frequencies are scarce resource | Complex receivers, needs more complicated power control for senders |

# THANKS!