

Test Preparation > GATE > GATE (ECE) > Communication > Digital Communications

# Comparison between FDMA, TDMA, CDMA & SDMA

**LESSON 15 OF 15** 



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Comparison between Multiple Access
Techniques
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# HELLO!

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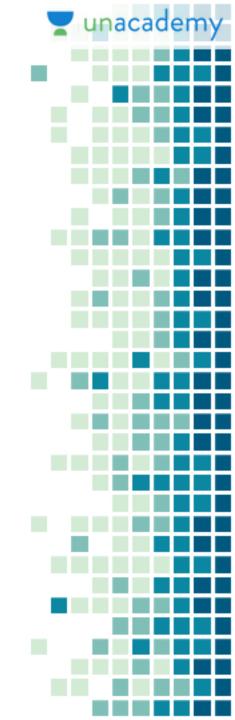
#### RATE REVIEW RECOMMEND

## 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).



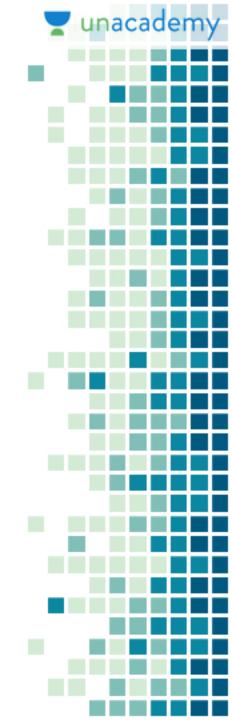
# Types of MA Techniques: Frequency Division Multiple Access — Frequency band divided into small frequency channels and different channels are allocated to different users – like in FM radio. Multiple users can transmit at the same time but on different frequency channels.

**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.



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### Comparison:

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

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### Comparison:

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

# THANKS!

