Certainly! Let's briefly explain each of these multiplexing techniques:

1. \*\*Frequency Division Multiplexing (FDM):\*\*

- \*\*Concept:\*\* FDM divides the available frequency spectrum into multiple frequency bands.

- \*\*Usage:\*\* Each band is allocated to a different communication channel, allowing multiple signals to be transmitted simultaneously.

- \*\*Example:\*\* In radio broadcasting, different radio stations use distinct frequency bands within the allocated spectrum.

2. \*\*Time Division Multiplexing (TDM):\*\*

- \*\*Concept:\*\* TDM divides time into fixed intervals or slots.

- \*\*Usage:\*\* Each communication channel is assigned a specific time slot, and data is transmitted in a cyclical manner.

- \*\*Example:\*\* In traditional voice communication over a T1 line, each conversation is given a specific time slot, and these slots repeat in a continuous cycle.

3. \*\*Code Division Multiplexing (CDM):\*\*

- \*\*Concept:\*\* CDM assigns a unique code to each communication channel.

- \*\*Usage:\*\* All channels share the same frequency and time but use different codes to distinguish signals from one another.

- \*\*Example:\*\* In CDMA (Code Division Multiple Access) used in mobile communication, each user's signal is spread across the entire frequency band, and unique codes are used to separate and identify each user's signal.

\*\*Key Differences:\*\*

- \*\*Frequency Division Multiplexing (FDM):\*\*

- \*\*Differentiation:\*\* Uses different frequency bands for each channel.

- \*\*Simultaneity:\*\* Channels operate simultaneously but on different frequencies.

- \*\*Time Division Multiplexing (TDM):\*\*

- \*\*Differentiation:\*\* Uses time slots for each channel.

- \*\*Simultaneity:\*\* Channels operate sequentially in time.

- \*\*Code Division Multiplexing (CDM):\*\*

- \*\*Differentiation:\*\* Uses unique codes for each channel.

- \*\*Simultaneity:\*\* Channels operate simultaneously in both frequency and time.

These multiplexing techniques are fundamental in enabling efficient sharing of communication channels, whether through dividing frequency bands, time slots, or unique codes. They find applications in various communication systems, such as telecommunication networks, radio broadcasting, and mobile communication.