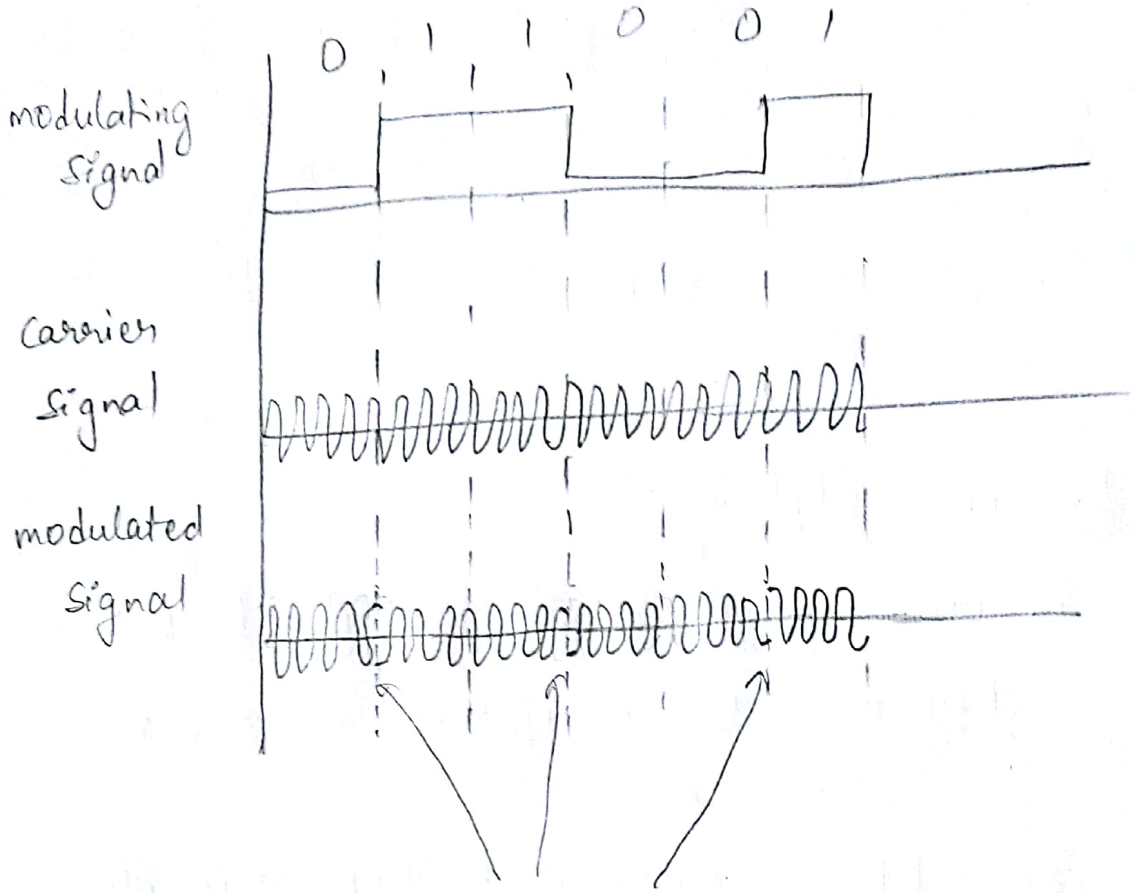
(c) Phase Shift keying : In PSK, phase of the carrier wave is changed according to the I/p digital signal.

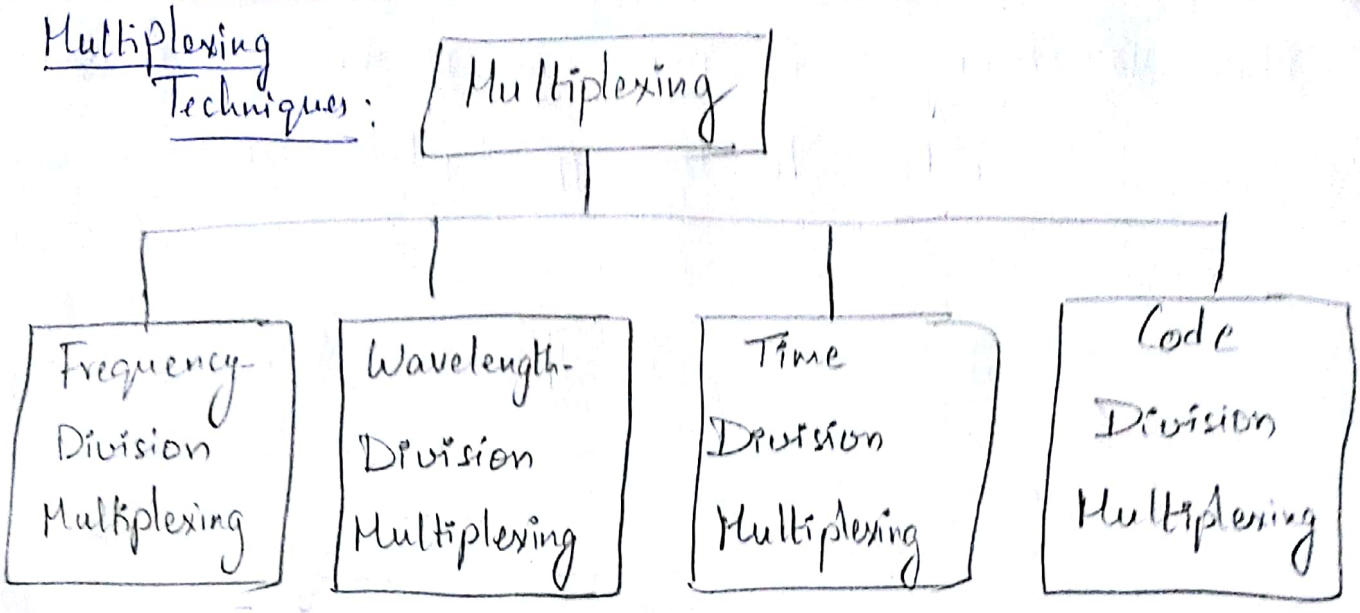


phase shift of π (180°) → when data changes from 0 to 1 / 1 to 0

Multiplexing : It is a set of techniques that allows the simultaneous transmission of multiple signals across a single data link.

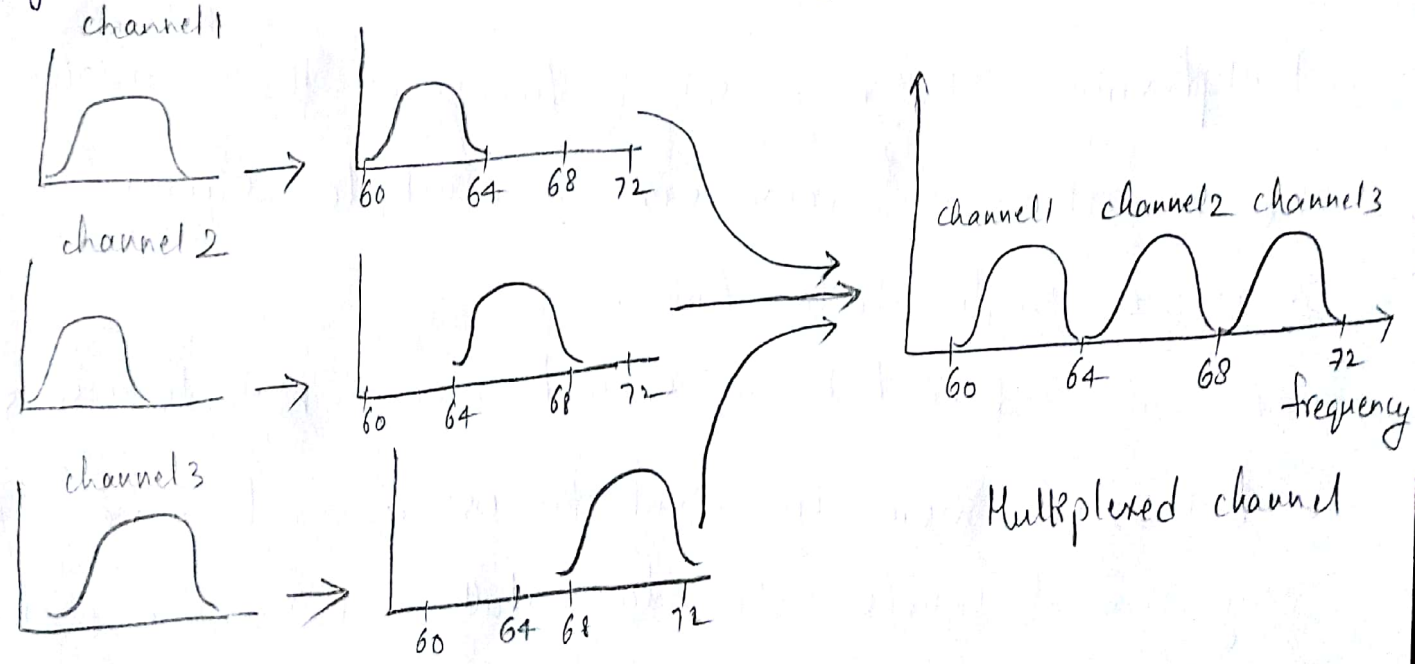
- A single data link is shared among multiple users.
- It is much more convinient to use a single wire to carry several signals than to install a wire for each every signal. This kind of sharing is called multiplexing.
- Categories of Multiplexing :—

Multiplexing Techniques:

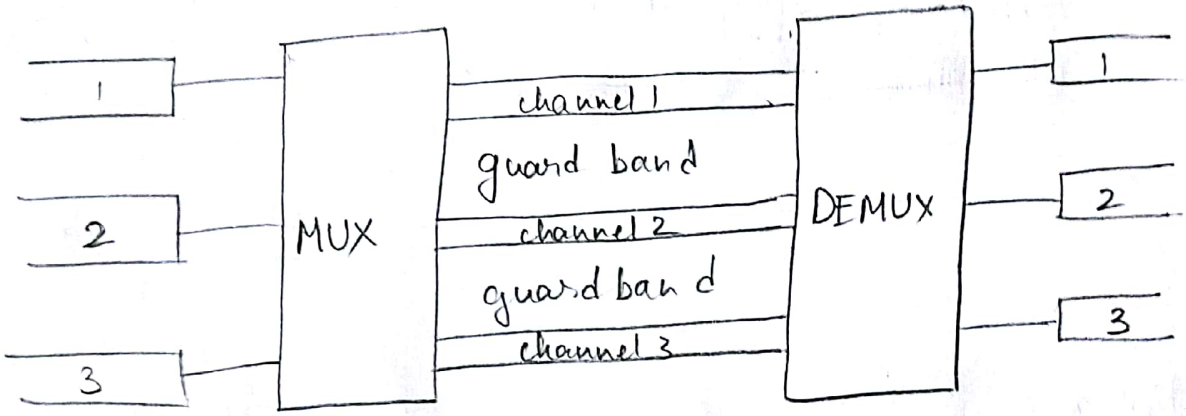


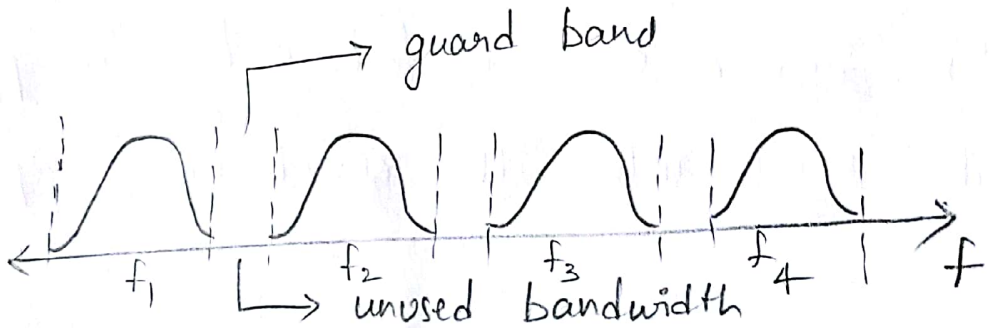
(a) Frequency-Division Multiplexing:

- In FDM, all users use the same channel at the same time but they are alloted different frequencies to prevent signal interference.
- There is a possibility of crosstalk in FDM since all signals are transmitted simultaneously.

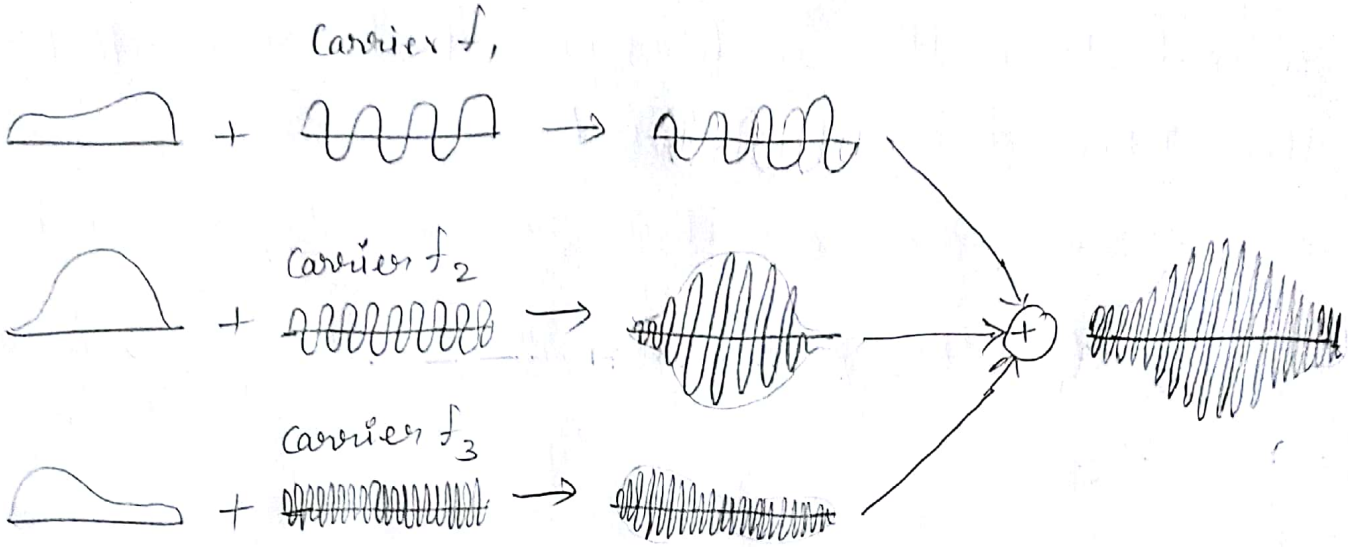


- If the bandwidth of a link is greater than the combined bandwidths of the signals to be transmitted, then FDM technique is used.
- Since signals are transmitted simultaneously, there is a possibility of overlapping and interference.



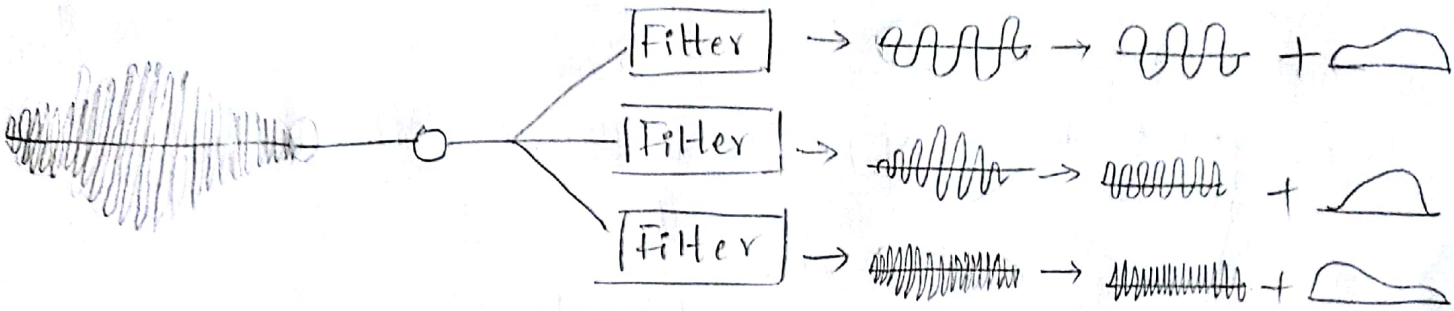


Multiplexing process : At the sender, multiplexing is done. In FDM, signals generated by each sending device modulate different carrier frequencies. These modulated signals are then combined into a single composite signal.



Demultiplexing process : At the receiver, demultiplexing is done.

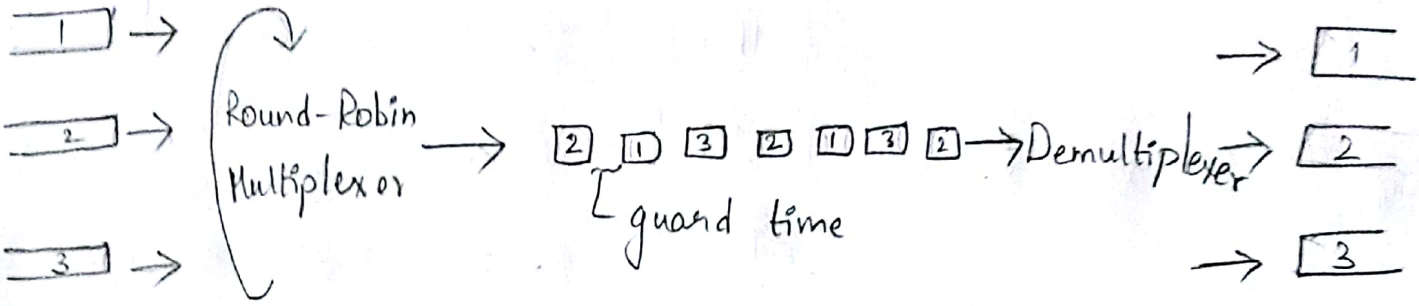
- demultiplexer uses a series of filters to decompose the multiplexed signal into its constituent component signals.
- The individual signals are then passed to a modulator that separates them from their carriers & passes them to the o/p lines.

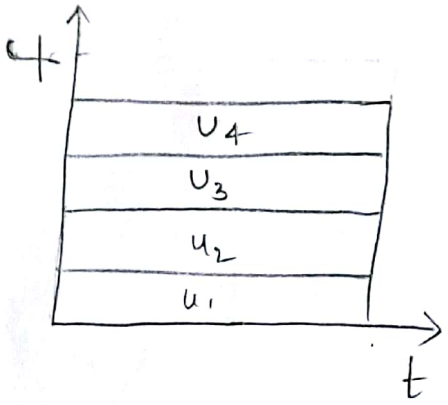


(b) Time-Division Multiplexing :

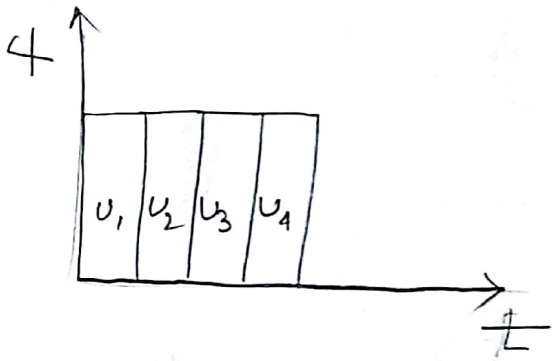
- In TDM, the users take turns (in a round-robin fashion) each one periodically getting the entire bandwidth for a little burst of time.
- Total time available in the link is divided b/w several users.
- Each user is alloted a particular time interval called time slot or time slice during which the data is transmitted by the user.
- Thus each sending device takes control of entire bandwidth of the channel for fixed amount of time.
- These time slots are separated by small intervals of

of guard time which is similar to the guard band in FDM.





FDM



TDM

- TDM is of two types :- Synchronous TDM
  Asynchronous TDM

Synchronous TDM : Each device is given same time slot to transmit the data over the link, irrespective of the fact that the device has any data to transmit or not.

Asynchronous TDM :- It is also known as statistical TDM.

- In this, time slots are not fixed i.e., the slots are flexible / variable.