

MOBILE COMPUTING ASSIGNMENT PRESENTATION

-CHANDRASEHAR R(20PW06)

MULTIPLEXING:

Multiplexing is a technique used in telecommunications to combine multiple signals into a single transmission channel, allowing for more efficient use of the available bandwidth. There are several types of multiplexing techniques, including frequency multiplexing (FM), time division multiplexing (TDM), frequency and time division multiplexing (FDM/TDM), and code division multiplexing (CDM).

Frequency division multiplexing (FDM):

Frequency division multiplexing (FDM) is a technique used in telecommunications to combine multiple signals into a single transmission channel by allocating a unique frequency range to each signal.

In FDM, the transmission channel is divided into multiple frequency bands, and each signal is assigned a unique frequency range within the channel. The signals are then transmitted simultaneously, with each signal occupying its own frequency range. The receiver can then separate the individual signals by tuning to the appropriate frequency range.

FDM is commonly used in radio broadcasting, where multiple radio stations can transmit their signals over the same frequency range, and the receiver can tune to the desired station. It is also used in cable television systems, where multiple television channels can be transmitted over a single cable by assigning each channel a unique frequency range.

FDM is a simple and effective technique for transmitting multiple signals over a single transmission channel. However, it can be less efficient than other multiplexing techniques, such as time division multiplexing (TDM), which can provide more precise allocation of bandwidth to individual signals.

Time Division Multiplexing (TDM):

Time division multiplexing is a technique used to transmit multiple signals over a single transmission channel by dividing the channel into discrete time slots. Each signal is assigned a time slot within the channel, and the signals are transmitted sequentially within their respective time slots. The receiver can then reassemble the individual signals by identifying and extracting the signals within each time slot.

TDM is commonly used in digital telecommunications, such as in ISDN and SONET networks. In ISDN, for example, multiple voice or data channels are combined into a single transmission channel using TDM. Each channel is allocated a fixed time slot within the transmission channel, and the signals are transmitted sequentially within their respective time slots.

Frequency and Time Division Multiplexing (FDM/TDM):

Frequency and time division multiplexing is a hybrid technique that combines the principles of FDM and TDM. In FDM/TDM, multiple signals are divided into frequency bands and time slots within the transmission channel. Each signal is then transmitted within its designated frequency and time range. This allows for more efficient use of the transmission channel than using either FDM or TDM alone.

FDM/TDM is commonly used in modern digital telecommunications, such as in cellular networks. In a cellular network, multiple users can be connected to the same base station using FDM/TDM. Each user is allocated a unique frequency range and time slot within the transmission channel, allowing multiple users to share the same transmission channel without interference.

Code Division Multiplexing (CDM):

Code division multiplexing is a technique used in digital telecommunications to combine multiple signals into a single transmission channel. In CDM, each signal is assigned a unique code, which is used to modulate the signal and spread it across the entire frequency range of the channel. The receiver can then use the same code to demodulate and extract the individual signals from the transmitted signal.

CDM is commonly used in digital cellular networks, such as CDMA (Code Division Multiple Access) and WCDMA (Wideband Code Division Multiple Access). In a CDMA network, each user is assigned a unique code, which is used to spread the user's signal across the entire frequency band. Multiple users can then share the same transmission channel without interference, as each user's signal is separated by their unique code.

In summary, multiplexing techniques are essential for efficient use of the available bandwidth in telecommunications. FDM, TDM, FDM/TDM, and CDM are each suited to different applications, the "best" multiplexing technique depends on the specific application.

FDM is best suited for analog signals such as voice or video, where the bandwidth requirements are relatively constant. TDM is best suited for digital signals such as data or computer networks, where the data rate is variable and the number of channels required can change dynamically. FDM/TDM, or Hybrid Multiplexing, is best suited for situations where both analog and digital signals need to be transmitted over the same communication channel. CDM is best suited for situations where multiple users need to share the same communication channel, such as in cellular networks or satellite communications. In summary, the "best" multiplexing technique depends on the specific application.