

What is FM? Source :- <https://blog.myrank.co.in/> at 4-10-2018

Reasons making these applications use FM instead of other types of modulation:-

- FM in radio Frequency Modulation (FM) :- Has higher bandwidth with better sound quality
- Frequency Modulation (FM) :- is Less susceptible to noise
- Radar FM in medicine Micropower continuous wave FM radar is a reliable, robust, inexpensive, and harmless tool for real-time monitoring of the cardiac and respiratory rates.

Frequency modulation is a technique or a process of encoding information on a particular signal (analogue or digital) by varying the carrier wave frequency in accordance with the frequency of the modulating signal. Source:- <https://byjus.com/>

Commercial applications of FM in real life:-

- 1- radar and seismic prospecting, EEG monitoring of new-born's etc. Source :- Medical Applications of Microwave Imaging, edited by Larsen L. E. and Jacobi J. H. (IEEE, Piscataway, NJ, 1986)

Additionally, some of its uses are also found in radar, telemetry, seismic prospecting and in EEG, different radio systems, music synthesis as well as in video-transmission instruments. The antennae for FM systems need to be close by whereas AM systems can communicate with other systems throughout the world by reflecting signals off the ionosphere. This is done with the assistance of a filter that removes signal of wavelength greater than that of the transmitted signal thereby removing the noise. A higher frequency deviation means that the baseband signal can be easily retrieved from the FM signals, whereas less deviation means it is harder to separate the data from the noise.

- o FM systems work using a line of sight propagation whereas AM systems use skywave propagation

Consequently, the receiving area of an FM system is much smaller than that of an AM system. Much like in amplitude modulation, frequency modulation also has a similar approach where a carrier signal is modulated by the input signal. In FM systems, the power of the transmitted signal is proportional to the amplitude of the unmodulated carrier signal and it is constant. Whereas in the case of FM signal, the adjacent FM channels are separated by guard bands which results in very little interference between adjacent FM channels.

- o In an FM system, there is an infinite number of sidebands resulting in a theoretical bandwidth of an FM signal being infinite.

also use the technique of frequency modulation

- 2- Frequency modulation can be used for the broadcasting of FM radio. Differences between the presented approach and other types of radars used for biomedical applications are discussed. As we know, a modulating signal is nothing but information or message that has to be transmitted after being converted into an electronic signal. If we talk about the applications of frequency modulation, it is mostly used in radio broadcasting. It offers a great advantage in radio transmission as it has a larger signal-to-noise ratio.

Advantages of FM as compared to amplitude modulation(FM):-

- o The amplitude of an FM wave remains constant over time.
- o In FM systems, the frequency deviation of the signal is related to the noise ratio. In AM systems, the only method of reducing noise in the transmission is the increase in the transmitted power of the signal. This seriously increases the occurrence of interference of AM radio station unless one signal is strong enough to overpower the other.

Disadvantages of FM as compared to amplitude modulation(FM):-

- o The equipment needed for FM and AM systems is different. This bandwidth is limited by Carson's rule but it is still much larger than that of an AM system.

- 3- It is also used in music synthesis, some systems that use video-transmission and also for magnetic tape-recording systems. However, in the case of FM, the amplitude of the modulated signal is kept or it remains constant. This is the main reason that many radio stations use FM to broadcast music over the

radio. This allows the encoders and decoders the freedom to remove the noise from the received signal. Since the AM signal transferred information using the amplitude, the envelope of the waveform cannot be altered. In AM systems, the power consumption for signal transmission is higher when compared to FM systems. When MA reaches unity, the power consumption is 100%. The equipment cost of an FM channel is more since the equipment is much more complex and involves complicated circuitry. In an AM system, the bandwidth is only twice the modulation frequency. Meaning, it results in low radio frequency interference.