SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore-35

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB301-ANALOG AND DIGITAL COMMUNICATION

III YEAR/ V SEMESTER

UNIT 1 – ANALOG COMMUNICATION

TOPIC – VESTIGIAL SIDE BAND

VESTIGIAL SIDE BAND

•Vestigial sideband (VSB) modulation is a type of amplitude modulation (AM) technique that is commonly used in television broadcasting.
•It is a compromise between full double-sideband (DSB) and single-sideband (SSB) modulation.

Double-Sideband (DSB) AM: Involves transmitting the carrier along with both the upper and lower sidebands, which are mirror images of each other and contain the same information.

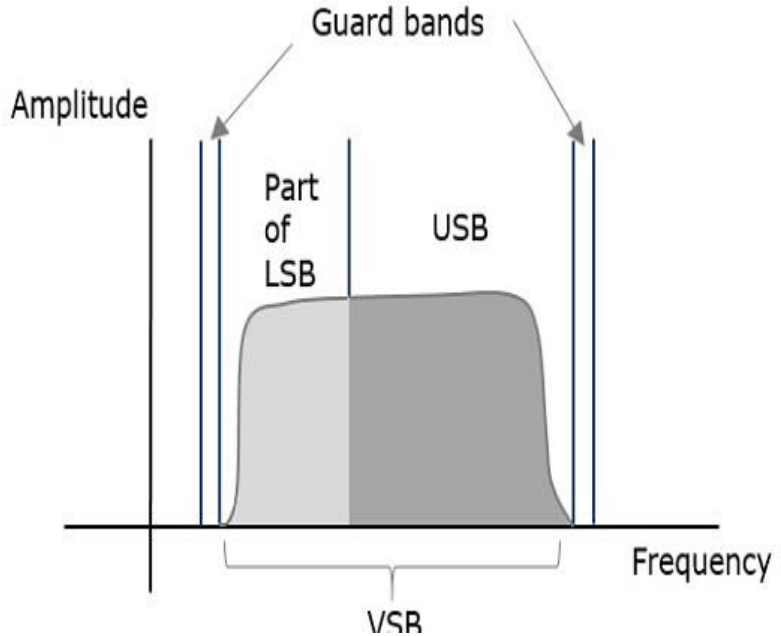
Single-Sideband (SSB) AM: Only one of the sidebands (either upper or lower) is transmitted, along with a reduced or suppressed carrier. This method is more bandwidth-efficient but complex to implement.
of DSB.

VESTIGIAL SIDE BAND MODULATION

•Both of the sidebands are not required for the transmission, as it is a waste. But a single band if transmitted, leads to loss of information.

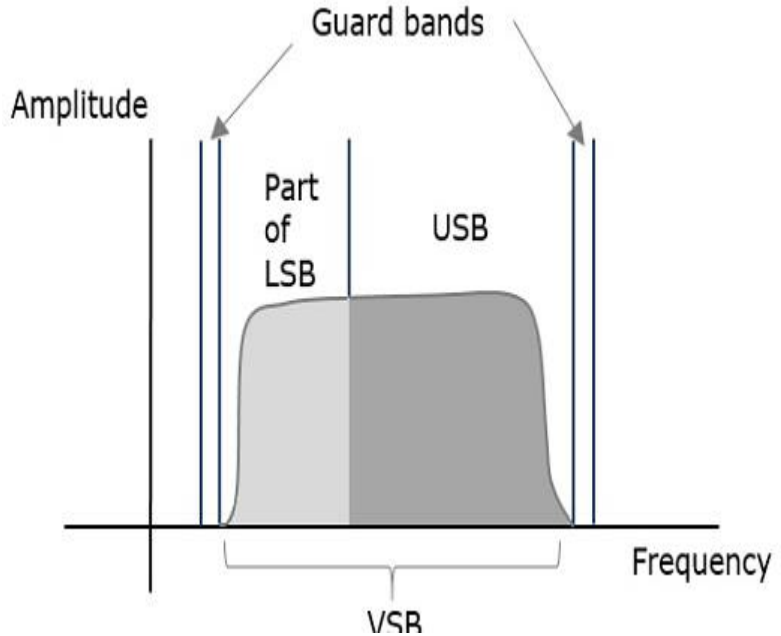
•**Vestigial Sideband Modulation** or **VSB Modulation** is the process where a part of the signal called as **vestige** is modulated, along with one sideband.

•A VSB signal can be plotted as shown in the figure.



VESTIGIAL SIDE BAND MODULATION

- Along with the upper sideband, a part of the lower sideband is also being transmitted in this technique.
- A guard band of very small width is laid on either side of VSB in order to avoid the interferences.
- VSB modulation is mostly used in television transmissions.



VSB MODULATION ADVANTAGES & DRAWBACKS

ADVANTAGES

- Highly efficient.
- Reduction in bandwidth.
- Filter design is easy as high accuracy is not needed.
- The transmission of low frequency components is possible, without difficulty.
- Possesses good phase characteristics.
- It combines the benefits of DSB and SSB. It conserves bandwidth (like SSB) while maintaining some of the simplicity of DSB.

DRAWBACKS

- Bandwidth when compared to SSB is greater.
- Demodulation is complex.

VSB MODULATION APPLICATIONS

•The most prominent and standard application of VSB is for the transmission of **television signals**.

•Also, this is the most convenient and efficient technique when bandwidth usage is considered.

ACTIVITY

A device that converts digital data to analog signals for transmission over telephone lines.

GUESS ???

COMPARISON OF ANALOG COMMUNICATION SYSTEMS

1. Amplitude Modulation (AM)

Principle:

The amplitude of the carrier signal varies in proportion to the instantaneous amplitude of the message signal.

Advantages:

•Simplicity in implementation.

•Longer transmission range compared to FM.

•Can be demodulated using simpler and less expensive receivers.

Disadvantages:

•Susceptible to noise and interference.

•Lower sound quality due to limited bandwidth.

•Less efficient in terms of power usage.

Applications:

•AM radio broadcasting.

•Aircraft communication.

COMPARISON OF ANALOG COMMUNICATION SYSTEMS

2. Frequency Modulation (FM)

Principle:

The frequency of the carrier signal varies in accordance with the instantaneous amplitude of the message signal.

Advantages:

•Better noise immunity compared to AM.

•Higher sound quality due to wider bandwidth.

•More efficient use of power.

Disadvantages:

•More complex receivers and transmitters.

•Shorter transmission range compared to AM due to higher bandwidth requirements.

Applications:

•FM radio broadcasting.

•VHF communication for television and other services.

COMPARISON OF ANALOG COMMUNICATION SYSTEMS

3. Phase Modulation (PM)

Principle:

The phase of the carrier signal varies according to the instantaneous amplitude of the message signal.

Advantages:

•Similar noise immunity and sound quality advantages as FM.

•Can be used as the basis for more complex digital modulation schemes (like QAM).

Disadvantages:

•More complex receiver design.

•Less commonly used for basic analog communication systems.

Applications:

•Specialized communication systems.

•Basis for digital modulation techniques.

COMPARISON OF ANALOG COMMUNICATION SYSTEMS

4. Single Sideband Modulation (SSB)

Principle:

A refinement of AM where only one sideband (either upper or lower) is transmitted, and the carrier may be suppressed.

Advantages:

•More efficient use of power and bandwidth compared to standard AM.

•Reduced interference and noise.

Disadvantages:

•More complex receivers and transmitters.

•Requires precise frequency control.

Applications:

•Long-distance voice communication.

•Amateur radio.

COMPARISON OF ANALOG COMMUNICATION SYSTEMS

5. Vestigial Sideband Modulation (VSB)

Principle:

A compromise between AM and SSB, where one sideband is partially suppressed.

Advantages:

•Efficient bandwidth usage like SSB but simpler receiver design.

•Widely used in television broadcasting due to its compatibility with video signals.

Disadvantages:

More complex than standard AM but simpler than full SSB.

Applications:

Analog television broadcasting.

ASSESSMENT

1.What does the term VSB mean?

2.What are all the applications of AM?

3.List the Applications of SSB.

THANK YOU