

2020

February

ELECTRONIC
Communication

WEDNESDAY

① 12
7th Week - 643-323

⊗ What is an electronics communication?

→ Electronic communication can be defined as, the communication which uses electronic media to transmit the information or message using computers, e-mail, telephone, video calling, FAX machine, etc. This type of communication can be developed by sharing data like images, graphics, sound, pictures, maps, software and many things.

→ So the means and modes of electronic communication are — e-mail, instant messaging, website, blog, social media, newsgroups, phone and FAX.

⊗ Need for modulation: —

i) Reduction of height of antenna. $[h_{min} = \frac{c}{4f}]$

ii) Increase the range of communication.

iii) Avoids mixing of signals.

iv) MULTIPLEXING is possible.

v) Improves quality of reception.

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13

THURSDAY

20 20

2 February

1. Reduction in the height of Antenna? —

For the transmission of radio signals, the antenna height must be multiple of $\frac{\lambda}{4}$, where λ is the wave-length.

$$\lambda = \frac{c}{f}$$

where,

c : is the velocity of light
 f : is the frequency of the signal to be transmitted.

So, height of antenna, $H = \frac{c}{4f}$.

The minimum antenna height required to transmit a baseband signal of $f = 10 \text{ kHz}$ is calculated as follows:

$$\text{Minimum antenna height} = \frac{\lambda}{4} = \frac{c}{4f} = \frac{3 \times 10^8}{4 \times 10^4} = 7500 \text{ m} = 7.5 \text{ km.}$$

The antenna of this height is practically impossible to install.

Now, let us consider a modulated signal at $f = 1 \text{ MHz}$. Then the minimum antenna height is given by:

$$\text{Minimum antenna height} = \frac{\lambda}{4} = \frac{c}{4f} = \frac{3 \times 10^8}{4 \times 10^6} = 75 \text{ m.}$$

This antenna can be easily installed practically.

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2. Avoid Mixing of Signals:

• When many transmitters are transmitting base band information signal simultaneously, they all get mixed up.

• This problem can be resolved by using the modulation technique.

• By using modulation, the base band sound signals

of same frequency range can be shifted to different frequency ranges. Therefore, now each signal has its own frequency range within the total band width.

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3. Increase the Range of communication :-

● The frequency of base band signal is low, and the low frequency signal cannot travel long distance when they are transmitted. They get heavily attenuated.

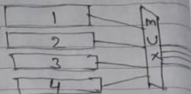
● The attenuation reduces with increase in frequency of the transmitted signal, and they travel longer distance.

● The modulation process increases the frequency of the signal to be transmitted. Therefore, it increases the range of communication.

4. Multiplexing is possible :-

4. Multiplexing is possible!

Multiplexing is a process in which two or more signals can be transmitted over the same communication channel simultaneously.

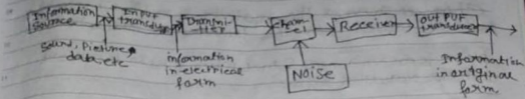


This is possible only with modulation.

5. Improved Quality of Reception:

With frequency modulation (FM) and the digital signal communication techniques such as PCM, the effect of the noise is reduced to a great extent. This improves quality of reception.

Block diagram of an electronic communication system



① Information Source:

The function of information source is to produce the required message which has to be transmitted.

② Input Transducer:

When the message produced by the information source is not electrical in nature, an input transducer is used to convert it into a time varying electrical signal.

③ Transmitter:

Inside the transmitter, signal processing such as restriction of range of audio frequencies, amplification and modulation of signal are achieved.

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④ The channel and The noise :-

Channel means the medium through which the message travels from the transmitter to the receiver.

Noise is an unwanted signal which tend to interfere with the required signal.

⑤ Receiver :-

The main function of receiver is to reproduce the message signal in electrical form.

⑥ Destination :-

This is the final stage where the received electrical message signal is converted into its original form.

Electromagnetic Spectrum:-

It is classification of em waves according to frequency.
It is range of frequencies over which em waves can propagate.

11	Gamma rays	→ less than 10 pm	
12	X-rays	→ 0.01 nm to 10 nm.	
13	Ultraviolet	→ 1 nm to 400 nm	
14	Visible	→ 400 nm to 700 nm	
15	Infrared	→ 700 nm to 1 mm.	
16	Micro wave	→ 1 mm to 1 m	
17	Radio wave	→ Greater than 1m	

Radio Waves:-

Wave length: Greater than 1m.

Frequency: Less than 10^9 Hz.

Source: Accelerated motion of charges in conducting wire.
The Sun.

Uses: Radio and TV communication (AM, FM, TV),
cellular phones transmit voice in ultra high frequency radio astronomy.

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SATURDAY

20 20
9
FebruaryMicro waves: —Wavelength: — 1 mm to 1 m.Frequency: — 10^9 Hz to 10^{11} Hz.Source: — Special vacuum tubes (oscillating circuit)Uses: — Microwave oven (heating water molecules) — 36 HzAircraft navigation & — RADAR
Accurate measurement of tempⁿ variation
in the universe.Infrared waves: —Wave length: — 700 nm to 1 mm.Frequency: — 10^{11} Hz to 10^{14} Hz.Source: — Atoms and molecules when they change rotational or vibrational motion.Objects with tempⁿ up to 3000K emit most intense radiation in form of infrared wavesUses: — maintains Earth's warmth.
Infrared detectors.
Household switches — tv remote.

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• Visible rays:—

• Wave length:— 400 nm to 700 nm.

• Frequency:— 4×10^{14} to 7×10^{14} Hz

• Source:— Objects emitting or reflecting visible rays.

• Uses:— Our eyes are sensitive to these rays.
Chemical composition, temp., motion of objects.

• Ultraviolet rays:—

• Wave length:— 1 nm to 400 nm

• Frequency:— 10^5 Hz to 10^{16} Hz.

• Source:— Very hot bodies - The Sun.

• Uses:— ~~Eye~~ Eye Surgery - LASIK
Study of hot stars.

• X-rays:—

• Wave length:— 0.01 nm to 10 nm.

• Frequency:— 10^{16} Hz to 10^{19} Hz.

• Source:— By bombarding high energy electrons on metal.

• Uses:— Bone X ray.

cancer treatment (certain forms)

Detection of interstellar gas clouds.

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TUESDAY

9th Week • 055-110

20 20

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Gamma rays :-Wave length :- Less than 10pm .Frequency :- Greater than 10^{19}Hz Source :- Decay of radioactive nuclei.
Nuclear reactionsUses :- Destroy cancer cells.
Forming an organ image.
To identify specific elements.

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