Hello students,

My name is Sameer Manohar Patil. I am working as associate professor at Dnyanprassarak Mandal's College and Research Centre, Assagao, Goa. I will be teaching Communication Electronics. And in the first module, we are covering introduction to communication.

This is the outline of my presentation. And, these are the learning outcomes of my presentation.

Let us start with the first topic. Introduction to communication. Now, what communication is? Communication refers to sending, receiving and processing of information by electronic means. In olden times, you might have heard that the message from one point to the other point was sent using some animals or birds, like for example, a pigeon. Here, in this particular picture, you will see that the message was communicated from one point to other point using this particular technique and then at a later stage using some loud speakers.

As far as the historical development in electronic communication is concerned, it started with wired telegraphy in1840s. The Telegraph was invented in 1844. Telephony, decades later. The telephone was invented in1876. Then, it started with radio communication. Wherein, the radio was discovered in 1887 and demonstrated in 1895. And later on, in the field of satellite and fibreoptic communication. And now we are in the era of computer and data communication.

If you look at this particular diagram, you will come to know the different means of electronic communications which were used. In the first part you will see that the smoke signals were used for transmission of this information. Then later on the pigeons were used as carrier. In the third case, if you see the Morse codes were used for transmission of data. Then later on wireless radio, then the telephone, then fax, then mobile telephones, Internet, email, and now handheld devices, and we don't know what is the future right now.

When we talk about the different modes of communication, we have two different modes. One is called as guided; another one is unguided. Now, in case of guided mode of communication, it is basically also called as wired mode of communication.

Now, in wired mode of communication we have three types.

The first one is a simple twisted pair cable. Wherein, the example of that is LAN. In the next case, it is coaxial cable, where, we use it in for cable TV. And the third case is optical fibre cable, where, light is used as a carrier.

In case of unguided, it is also called as wireless communication or also called as radio communication. And, in this case, air is used as a medium of communication.

Let us come to the next topic, Modulation. What is modulation? It is the process of super imposing the information contents of modulating signal on a carrier signal. Now, this carrier signal is of high frequency. And it is done by varying the characteristics of carrier signal according to the modulating signal.

Now, there are three characteristics of any signal, amplitude, frequency and the phase.

When we vary amplitude of the carrier signal with respect to amplitude of modulating signal, we get Amplitude modulation.

If we vary frequency of the carrier signal with respect to amplitude of modulating signal, we get Frequency modulation.

And, if we vary phase of the carrier signal with respect to amplitude of modulating signal, we get Phase modulation.

Now, why there is a need of modulation? The first important point is, to minimize the effect of interference made when we transmit the signals with nearly same frequency in the audio frequency range from 20 Hz to 20 KHz. So, what does that mean? It means, if we transmit the same signals or

signals with same frequencies, in the same environment, there is a probability or possibility that they may interfere. And, because of this interference, the information signal may be lost. So, that's why we need modulation.

Second factor is, higher frequency can give more efficient transmission. It is known that, as the frequency increases, the transmission becomes better.

The third important factor, and the most important factor here is, the height of the antenna required will be smaller.
Let us take an example. Consider that the voice signal used is of 3 KHz. Now, we know the relation between frequency and the wavelength.
$\lambda = \frac{C}{f}$ Where, C is the speed of light.
$= \frac{3\times10^8}{3\times10^3} = 10^5$ m

So, this comes to roughly around 10^5 m, when we consider 3KHz as the voice signal. 10^5 meters, so, you can imagine so many kilometers of antenna that is required. Whereas, if we do the same process using a carrier wave, and the carrier frequency is suppose say, 100 MHz. Then, the length of the antenna required will be hardly 3 meters. So, this example itself makes it very clear that, if you use a high frequency for transmission then, the height of the antenna required will be much much smaller. Higher the frequency. Lesser is the height of the antenna required.

The next important factor that is needed is to Multiplex the signal. Now, what does multiplexing means? We can multiplex means, that is transmitting of several signals simultaneously. So, by using high frequency carriers, we can multiplex the signals and transmit more signals in single channel simultaneously.

And the last one is, to reduce the noise and optimize the signal to noise ratio. Since, we are using higher frequencies, the noise will be less, and since the noise is less obviously, signal to noise ratio will be improved, or it will be higher.

Now, let us come to the block diagram of electronic communication. Now, if you see the block diagram of electronic communication. We have an information source. Now, this information source can be anything. Like suppose say, for example when I am talking, I will be the source of information. Now, whatever information which, whatever things which I am speaking suppose say, that will be given to a transmitter.

What transmitter will do? Transmitter will modulate the signal using some high frequency carrier and then, that modulated signal will be sent on the channel. As I told you that, the channel can be either a high frequency carrier that is guided or ungraded. The signal will be transmitted using the channel from transmitter to receiver. It will be received at the receiver. The signal will be demodulated at the receiver. When I say demodulated, what does it mean? We are recovering the information signal from the carrier and then, it is given to the destination. So, this is the link from information source to transmitter to channel and then to receiver and destination but in between what comes, one important factor is noise.

What is this noise? Noise is nothing but, some unwanted signal in the channel or in the main information that is transmitted. Like suppose say, for example, when I am communicating with the other person, if the third person is speaking, that will be a noise for the communication. So, the noise plays a very important factor and we cannot avoid noise. We can minimize the noise by using a particular channel. Noise is available in the surroundings everywhere, but remember that by using a proper channel we can minimize it.

For example, when we talk about the twisted pair cable, or maybe coaxial cable, or maybe fibre optic cable. In case of twisted pair cables, the noise will be more. In case of coaxial cables, noise will be comparatively less. Why? Because, in case of coaxial cable, there will be a shielding from outside and the signal will be carried by the inner core. Whereas, in case of fibre optic cable, the noise will be minimum in fact, and why it is so? Because, the signal is carried using light.

These are the References.