

Transmission Impairment

When signals travel through the medium they tend to deteriorate. This may have many reasons as given:

1. Attenuation

It means loss of energy. The strength of signal decreases with increasing distance which causes loss of energy in overcoming resistance of medium. This is also known as attenuated signal. Amplifiers are used to amplify the attenuated signal which gives the original signal back and compensate for this loss.

Attenuation is **corrected** by placing *signal amplifiers* also called *repeater stations* along the medium at appropriate distances in order to *receive the weak signal, clean it, amplify it then retransmit it*.

2. Delayed Distortion:

Signals are sent over media with pre-defined speed and frequency. If the signal speed and frequency do not match, there are possibilities that signal reaches destination in arbitrary fashion.

Equalization techniques can be used to smooth out the delay distortion.

3. Dispersion

As signal travels through the media, it tends to spread and overlaps. The amount of dispersion depends upon the frequency used.

4. Noise

Random disturbance or fluctuation in analog or digital signal is said to be Noise in signal, which may distort the actual information being carried. Noise can be characterized in one of the following class:

1. Thermal Noise

Heat agitates the electronic conductors of a medium which may introduce noise in the media. Up to a certain level, thermal noise is unavoidable.

2. Crosstalk

This sort of noise happens when a foreign signal enters into the media. This is because signal in one medium affects the signal of second medium.

3. Intermodulation

When multiple frequencies share a medium, their interference can cause noise in the medium. Intermodulation noise occurs if two different frequencies are sharing a medium and one of them has excessive strength or the component itself is not functioning properly, then the resultant frequency may not be delivered as expected.

4. Impulse

This noise is introduced because of irregular disturbances such as lightening, electricity, short-circuit, or faulty components. Digital data is mostly affected by this sort of noise.