

Repeaters: A Quick Article with Everything You Ever Needed to Know.

The functions performed by repeaters are amplification and frequency down conversion. Repeater amplifies signal from a low power level of the order of negative hundred decibels watt to an output power level of the order of ten decibel watts thus providing again of the order of hundred and ten decibel. Frequency down conversion avoids interference between strong transmitted signals and weak returning signal sometimes these repeaters perform the additional function of detection or demodulation then the repeater or the transponder is called regenerative transponder.

Parts of a typical satellite repeater are satellite antenna, diplexer, front end electronic system, carrier processing system and power amplifier. In diplexer the same antenna is being used by the satellite for receiving the uplink signal and transmitting the downlink signal. This is made possible by use of an electronic device called diplexer which serves a two way microwave gate. Since two different frequencies are used for uplink and down link there is no interference between the two transmissions and the same antenna serves satisfactorily. Front end electronic system is made up of radio frequency filter, equalizer and low noise amplifier. Signal from the diplexer is fed to the radio frequency filter. It is an integrated circuit microwave filter having merits of better packaging, smaller weight and lesser power requirements. This filter is designed to achieve requisite mask, noise rejection and equalization. It should not add any circuit noise.

Typical filters so used are Butterworth, Cheby Chev or Bessel filters. The delay introduced by the filter is cancelled by an equalizer without introducing any attenuation and distortion. Present communication satellite repeaters use dual mode filters using cavity coupling and having centre frequency to bandwidth ratio of about 100000 and C band and about 10000 at about k band. Accordingly C band filter has bandwidth of about thirty six mega hertz.

Primary function of carrier processing equipment is frequency translation that is to bring the uplink signal to lower frequency down link signal. Frequency translation can be done in the following four different ways. Conventional repeater use either radio frequency-radio frequency translation or radio frequency- Intermediate frequency-radio frequency translation where as regenerative repeater uses either intermediate frequency modulation method or demodulation-re modulation method. Thus the difference in the conventional repeater and regenerative repeater lies only in the structure of its carrier processing unit. Last unit of the satellite is the power amplifier. Traveling wave tube amplifiers re popularly used as power amplifiers. The size of traveling wave tube depends upon the purpose of the satellite. Typical parameters of traveling wave tube amplifiers are saturated output power is eight to twenty watts, saturated gain is fifty five decibel, carrier to inter modulation noise power ratio at saturation is ten to twelve decibel and amplitude modulation-pulse modulation conversion coefficient is 4.5 decibels.

About the Author

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