# **RF Subsystem –**

## **Introduction –**

The RF subsystem contains the uplink facility that transmits the signals to the transponders in the satellite, which in turn relay the signals back to the subscribers’ dishes. The signals after passing through the encoder and multiplexer undergoing compression are sent to the modulator. The modulator provides a carrier signal and the modulated signal enters the sub-system for further processing.

The signals entering the sub-system are all at different phases and which may cause interference & may cancel each other out. Hence, the GDE (Group Delay Equalizer) brings all the signals to one common phase. These signals are then sent through the UP converter, which converts the current L band frequency signals to the Ku Band. This step is essential as signals at higher frequencies are efficiently transmitted over long distances to widely distributed centers (subscriber’s receiving dish). The system is also closely monitored by the NMS (Network Monitoring System) which checks for any losses in the quality of video or audio.

Finally, the signals are sent over to the uplink station, which contain LNA (Low Noise Amplifiers) which amplify the signals before transmission, to travel such great distances and still have adequate strength.

The facility houses giant antennae pointed directly at the satellite so that transmission to the transponders can take place at maximum signal strength.

Group Delay Equalizer & UPC

Up linking

Antennae

LNA

UP Converter

Group delay equalizer –

This instrument processes the [signal](http://processing) and performs delay equalization by adjusting the relative phases of different frequencies to achieve a constant [group delay](http://delay).

Up converter –

The Up converter is a device that takes an input of [radio frequency](http://frequency) energy of a specific [frequency](http://frequency) range and outputs it on a higher frequency. The frequency of the signals are in L band, which is efficient in transmitting large data to a single centre with large receiving dishes (the Headend facility) however as it is not possible to install such large dishes at the receiving consumer end, the signals need to be converted to the Ku band. These signals can now be transmitted to a large no. of smaller receiving antennae at the customer’s end.

LNA –

The Low-noise amplifier (LNA) is an [electronic amplifier](http://amplifier) used to amplify the processed signals before they are transmitted to the customers. They are located very close to the uplink antennae to reduce losses in the [feedline](http://feedline).

Uplink Antennae –

Uplink satellite dishes are very large in diameter resulting in more accurate aiming and increased signal strength at the satellite. The uplink dish is pointed toward a specific satellite and the uplinked signals are transmitted within a specific frequency range, so as to be received by one of the [transponders](http://transponder) tuned to that frequency range aboard that satellite.

The Airtel DTH facility at Manesar has large satellite dishes of 11.3m diameter for transmitting signals to the satellite transponders.

RF Infrastructure -

* The RF base comprises of the uplink facility to transmit signals to the transponders in the satellite. The infrastructure includes equipment to continuously monitor and process the signals to deliver the best services.

Capex –

**Utility Infrastructure Augmentation:**

Network infrastructure requires periodic maintenance and redevelopment to ensure proper working and availability of redundancy in the system enables a high network uptime.

The Bangalore HUB is a Category-A building being a complete technical zone with critical network infrastructure & NOC. With the infrastructure proving inadequate, an RF room with 2 UPS rooms and Panel expansion rooms was constructed to accommodate the RF Network systems of Second Satellite operations.

**Expansion for new services:**

Expansion in the system is needed to cope with Business requirements and growing i.e. Construction of additional infrastructure and installation of new equipment.

The migration to 2nd satellite SES-7 required major RF up gradation at the Bangalore diversity site. An up gradation of NOC was also undertaken to install equipment for monitoring of new NMS and SES carrier with additional channels.

**Technical upgrade and maintenance:**

To provide better signal quality in an increasingly competitive market, up gradation and maintenance of the system is required to meet the delivery of the best quality RF carrier.

The expansion process of satellite capacity on SES-7 with 11 transponders needed installation of Spectrum analyzer to monitor and analyze the receive carrier of DTH services.