



DON BOSCO INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION

IEEE-DBIT MTS STUDENT BRANCH



Report on “Industrial Visit to BSNL Satellite Earth Station”

Date: 5th Feb, 2020

Time: 11:00 am – 3:00 pm

Venue: BSNL Satellite Earth Station, Yeoor Hills, Thane(W).

Audience: BE-EXTC Students & 3 Faculty Members

Description:

The Department of Electronics & Telecommunication Department of Don Bosco Institute had organized an Industrial Visit to “BSNL Satellite Earth Station” on 5th Feb, 2020 for the Final Year students of Batch 2019-20. The visit began at 11 am with a prayer with all the students, faculty and the employees. Students were then taken to the Seminar Hall for the lecture on “Introduction to Satellite Communication” by Mr. Sachin Sir.

Sachin Sir delivered a talk on the satellite communication and all the operations that go on in that particular earth station. Yeoor Earth Station provides wireless satellite communication to Port Blair using C-Band and IPStar Technology having a bandwidth speed of 34Mbps. BSNL has 2 Earth Stations, one located in Thane and the other located in Kolkata providing services to Port Blair. The C-band equipment work on a uplink of 6 GHz and downlink of 4 GHz.

Need of Satellite Communication:

- Area of coverage is more than terrestrial area.
- Each and every part of the Earth can be covered.
- Transmission cost is independent of coverage area.
- More bandwidth and broadcasting possibilities.

Satellite communication equipment also consist of a transponder which acts as a repeater and performs frequency allocation and frequency reuse technology for effective communication and for a more robust system. The receiver part always consists of an LNA to amplify the low power signal and filter the unwanted noise. The oscillator frequency used to down convert is set at 2.225 GHz. For a satellite to stay in orbit there are various forces acting on it, such as, the centrifugal force and the centripetal force.

The Kepler’s three laws that were discussed are as follows:

Kepler’s First Law: The path followed by a satellite around the primary will be an ellipse.

Kepler’s Second Law: For equal time intervals, a satellite will sweep out equal areas in its orbital plane

Kepler's Third Law: The square of periodic time of orbit is proportional to the cube of the mean distance between the two bodies.

Other points discussed were:

LEO

- Satellites are Low Orbit Satellites and used for internal purposes.
- Have a range of 160-2000 km.
- Takes around 2-4 hours to transmit and receive signals.

MEO

- Medium Orbit Satellites.
- Have arrange of 2000-10000 km.
- Takes around 4-8 hours to transmit and receive signals.

GEO

- Geostationary Satellite.
- Sidereal Day of 23 hrs 56 min 41 sec.
- Communication Satellite, with relative velocity=0.
- Have a range of 35768 km.

Frequency band allocation:

| Band | Frequency |
|---------|-----------|
| L Band | 1-2 GHz |
| S Band | 2-4 GHz |
| C Band | 4-8 GHz |
| X Band | 8-12 GHz |
| Ku Band | 12-18 GHz |
| Ka Band | 18-27 GHz |

Losses:

- Equatorial Losses
- Feeder Loss
- Equipment Loss
- Environmental Losses

Free Space Loss (FSL): $32.4+20 \log F+ \log R$ dB

India has 16 beams, which is an augmented beam.

- Mumbai has 4 beams.
- Covers South West regions.
- Delhi has 12 beams.
- It uses Uplink Power Control (UPC) technology.

The next session began with a visit to the laboratory where all the equipment and sub-systems of the antenna were placed. The students were grouped into 2 different batches and visited different laboratories.

The first laboratory visited by our batch was the IPStar laboratory. In this laboratory, equipment used were Catalyst 4507R Router, Toll Rack, LUC (L-Band Up Converter), LDA (Line-in Drive Amplifier), DSTAR, SI (Star Interface), Access Router and Firewall for protection.

The second laboratory visited was the C-Band laboratory. It used an IDR & IP Modem, a TWT, divider, spectrum analyzer, etc. The IDR provided terrestrial data encoding and modulation.

The third site visited had the antenna structures placed in an open space for signal reception and transmission. There were two antennas, one for C-Band and the other for IPStar. Both the antennas had a feed-horn structure, reflector, high power amplifier, low noise amplifier and cut-off radar system since the frequency of this particular earth station is close to the radar frequency range.

After all the batches had completed the three visits, the event was concluded with a group photograph.

Event photograph:



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