

# DON BOSCO INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

## Technical Report on Industrial Visit to Satellite Earth Station, Yeur



भारत संचार निगम लिमिटेड  
(भारत सरकार का उपक्रम)

**BHARAT SANCHAR NIGAM LIMITED**  
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Department of Telecommunication is providing state of the art Satellite Technology to the nation since long back viz., MCPC for remote rural exchanges, SCPC for VVIP movements, BARC and All Atomic Power Stations, IDR for Metro cities connectivity, HVNET (C Band) & Ku Band VSAT for Banks, Railway, ONGC, Offshore Rigs, AI, State Governments, Mobile vans, USFO Govt. Of India Project for providing GSM services to under-development areas and many more important/Government Organizations, IMD, Doordarshan, AIR, Defenses & Police Network. And most importantly, the team from our organization has provided / established emergency communication through satellite at the time of natural calamities like Earthquake, Tsunami, Flood etc., on various intervals.

Satellite Communication is the fast growing / having advanced uninterrupted features and on huge demand in global market. Every Engineering / Science student should have a fair knowledge in this fast growing technology for the glorious next generation India.

Satellite Earth Station at Yeur, Thane, is about 9 Km. from Thane Railway station and located in the vicinity of Sanjay Gandhi National Park, Borivali, Mumbai. Entry is available from Thane West (Upvan). This is the only Satellite Earth Station available in Mumbai, Maharashtra and West Zone. This beautiful station is situated in the naturally surrounded green forests of Yeur village

**SPEAKERS:** 1. Mrs. REVATI B., Divisional Engineer (Satellite Mtce)  
2. Mr. VINOD BANSAL, Junior Telecom Officer  
3. Mr. DHARMENDRA KUMAR, Junior Telecom Officer

**DATE & TIME:** 16<sup>th</sup> March, 2018; 10 a.m. to 3.30 p.m.

**EVENT IN-CHARGE:** Prof. Madhavi S. Pednekar

### **Learning Objective:**

Satellite communications play a vital role in the global telecommunications system. Approximately 2,000 artificial satellites orbiting Earth relay analog and digital signals carrying voice, video, and data to and from one or many locations.

Industrial visit to the satellite station was organized with the objective of providing an enlightening experience for the students to see the real time set-up and a practical demonstration of the theory they had studied in the subject of satellite communication.

During lab sessions, students will be able to understand and effectively perform the experiments based on link design parameter measurement in the lab.

The day began with a prayer by Mrs. Revati B. who also spoke about the inescapable role of satellites in today's world. The students were then divided into three groups and each group underwent three vigorous sessions. In the first session, students were explained about the basic transmission and reception blocks of the C-Band INSAT 3C satellite system by Mr. Ganesh S. The students were shown a number of equipment that was handling satellite live traffic. He explained and demonstrated the precautions and measures that are taken while handling such equipment. Students were also able to visually observe the spectrum of C-Band (IDR), Ku- Band and Ka-Band HUB.

Corporations and organizations that require financial and other information to be exchanged between their various locations use Artificial Satellites (about 3000) to facilitate the transfer of data through the use of very small-aperture terminal (VSAT) networks. In the second session, VSAT architecture and networking by VSAT for data communication was demonstrated to the students. Mr. Vinod Bansal explained about back haul connectivity by OFC.

For the third session, students were taken outside the earth station but within the premises where various satellite antennas were located. Mr. Dharmendra guided the students to each of these antennas and explained in brief their work and function. He described the significance of their position and orientation. The students were also shown the generator systems responsible for

keeping satellite system running without any hindrance. At the end of each session the speakers handled the doubts and queries of the students. The students will be performing an experiment based on this visit wherein they will be required to observe and analyze the satellite spectrum. At the end a summarized session followed by interactive Q & A session was handled by the concerned authority.

### **Students have learned following technical points -**

#### **Satellite Earth Station Equipment**

- C- Band INSAT 3C :currently in use to connect Port Blair to Yeur, Kolkata and Delhi
- Link Capacity is 34Mbps
- Intermediate Frequency used is  $70 \pm 18$  MHz i.e. 52 to 88 MHz
- Receiver Range is 3.7 to 4.2 GHz. Radar cutoff filter at receiver attenuates frequencies up to 3.6GHz with 50dB attenuation
- Trans. rejection filter prevents mixing of transmitted and received data.
- Beacon signal is measured to determine quality of signal
- Network Operation Control Central (NOCC), Sikanderabad, controls all operations
- Antenna used has diameter 11m (remote antenna has 3m diameter, primary antenna has 7.5m diameter)
- LNA used is  $45^\circ$  K ( remote uses  $90^\circ$  K LNA, Primary uses  $120^\circ$  K LNA)
- Antenna Control unit for tracking satellite movements, it performs a check every 30 minutes
- Antenna Movements are of two types : azimuth and elevation
- Beacon Tracking Receiver (BTR) works at 4187.5 MHz and its spectrum is observed using spectrum analyzer
- Bit Error Rate (BER) limit is  $10^{-6}$  (anything more, say  $10^{-5}$ , is not acceptable)

### **INSAT series has**

- 500 MHz Bandwidth with 24 C Band Transponders, 6 S Band Transponders, 2 Extended C Band Transponders
- Each transponder has a bandwidth of 40 MHz of which 4 MHz is used as Guard bands and the rest 36MHz is utilized for traffic
- Out of the 24 C Band Transponders, 1-12 are horizontally polarized (used for uplink) and 13-24 are vertically polarized (used for downlink)

### **Antenna Control Unit (ACU)**

- Modem uses 1+1 configuration

Report Prepared By:

Ms. Madhavi S. Pednekar

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