



ISRO Telemetry Tracking and Command Network (ISTRAC)

(ISO 9001:2008 Certified Unit of ISRO)



ISTRAC – Comprehensive Ground Segment Support

ISTRAC is the premier ground segment solution provider for ISRO's satellite and launch vehicle missions. As a part of this, ISTRAC has established Spacecraft Control Centres, TTC Ground Station Networks, Deep Space Network, Ground Segment for Navigation mission, which includes a precise timing facility, Space Science Data Centre among other things. In addition, ISTRAC performs a host of other activities including development of Radars, Search and Rescue Operations and hub services for Satellite Communication Networks. ISTRAC also provides TTC support for missions of other space agencies.



Mission Control Room

Spacecraft Operations

- Satellite health monitoring, analysis and control of remote sensing/science/deep space missions
- Flight dynamics operations
- TTC and payload scheduling operations

Mission Operations Complex (MOX)

- MOX is a state-of-the-art spacecraft control centre
- MOX consists of Mission Control Room (MCR), a Mission Analysis Room (MAR) and Dedicated Mission Control Rooms (DMCRs) to support 24x7 spacecraft operations
- The Alternate Satellite Control Centre (ASCC) is established at Lucknow for providing spatial redundancy

ISTRAC TTC Network

- ISTRAC supports all launch vehicle missions of ISRO (PSLV & GSLV) and provides vehicle telemetry data from lift-off to beyond satellite separation event
- Provides TTC services for all operational remote sensing and scientific satellite missions, including deep space planetary missions of ISRO



ISTRAC Network Control Centre

- ISTRAC provides tracking support for Advanced Technology Vehicle Program (ATVP) namely RH-200, RH-300 & RH-560 for testing of new technologies and for scientific experiments
- It operates a network of ground stations in India and abroad. The TTC stations are located at Bangalore, Sriharikota, Port Blair, Thiruvananthapuram, Lucknow, Brunei, Biak & Mauritius
- The Ground Stations operate in S, C & X bands and are fully automated and can be remotely controlled from Network Control Centre (NCC) located in Bangalore through well-established data communication links



ISTRAC Ground Stations



SHAR Ground Station for Launch Support



Transportable Terminal

- ISTRAC network has three 4.6 meter Transportable TTC Terminals, which can be deployed either on ship or on land depending upon the mission requirements. PSLV-C25/Mars Orbiter Mission (MOM) was successfully supported by two ship borne transportable terminals from Pacific Ocean

Indian Deep Space Network (IDSN)

- The Indian Deep Space Network consists of a 32-meter and 18-meter terminals and has successfully supported ISRO's maiden lunar mission namely Chandrayaan-1. It is currently supporting ISRO's maiden interplanetary mission, the Mars Orbiter Mission
- International space missions like VENUS Express, MAVEN, LRO, AKATSUKI have been successfully tracked by 32m terminal. MAVEN & LRO have also been tracked by 18m terminal
- An additional 18-meter terminal with X-band TT&C capability is planned to be realized in the near future. This is being planned as a complete indigenous effort



Communication Hub

Contributions to Societal Applications

ISTRAC plays a key role in the up keep of large VSAT networks, and provides space based services viz.

- Skylink connectivity between network stations and control centre
- Spacenet Services
- Telemedicine (TM) & Tele-education Services
- Village Resource Centre (VRC) Services

Space-based Search & Rescue Services

- ISTRAC provides space based Search and Rescue alerting services to maritime, aviation and land users covering 7 neighboring countries through GEO and LEO ground systems
- The services are being further augmented with the setting up of MEOSAR ground segment, which will use GNSS (GPS, Galileo, GLONASS) space segment. This system is expected to be operational by mid-2018



32m Antenna



INMCC: Search and Rescue Operations

Navigation with Indian Constellation (NavIC)

- **Indian Regional Navigation Satellite System (IRNSS)** also called as the **NavIC** is an independent satellite navigation system based on a constellation of Geo-Synchronous satellites
- IRNSS space segment consists of 7 satellites and provides navigation services to users in two frequencies namely S and L bands covering 1500 kilometers beyond the Indian geo-political boundary
- ISTRAC is responsible for the establishment and the operations of the IRNSS Ground Segment
- The system time for NavIC is maintained by an independent and precise time keeping facility called IRNSS Network Timing facility (**IRNWT**)
- Precise orbit determination is performed using precision range data collected from 17 geographically separated IRNSS Range and Integrity Monitoring Stations (IRIMS) & 4 IRNSS CDMA Ranging Stations (IRCDR)
- Real-time navigation mission operations support is provided by main and backup ISRO Navigation Centres (**INC 1 & 2**). The ISRO Navigation centers are linked to all the remotely located stations through reliable IRNSS Data Communication Network (**IRDCN**)



Indian Space Science Data Centre (ISSDC)

- Established in 2008, ISSDC serves the science data needs of the scientific community across the globe
- ISSDC facilitates data ingest, data processing, permanent long-term archival and dissemination of science data



from the space science missions like Chandrayaan-1, Mars Orbiter Mission (MOM), Automatic Identification System (AIS-Space Based) from Resourcesat-2, Youthsat, Astrosat and Megha-Tropiques

- MOM Long Term Archive (LTA) products acquired from all the five instruments during the first year of MOM's operations in the Martian Orbit has been hosted to the general public (<https://mrbrowse.issdc.gov.in/MOMLTA>)

Ground-based Radar Systems

- Radar Development Area (RDA) over the years has mastered the technology for realizing Atmospheric and Weather Radar systems and provides technology transfer/technical guidance to Indian industry for realizing the radar systems for ISRO and other national users
- RDA has also developed S/C band precision Tracking Radars, S/C/X band Polarimetric Doppler Weather Radars (DWR), MST Radar, Phased Array Radar Systems, VHF/UHF Wind profilers



Quality Policy

To strive for continuous improvement in Space Operations and provide fault-free Services



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