

CREATING VALUE FROM SPACE.



SATELLITE SYSTEMS & SUB SYSTEMS

COMMUNICATIONS & EARTH OBSERVATION

SPACE TRANSPORTATION

MISSION SUPPORT

TESTING AND VALIDATION

ANTRIX CORPORATION LTD.



ANTRIX CORPORATION

END-TO-END CAPABILITIES & SERVICES

Antrix leads the effort in meeting the needs of global space programmes by integrating the heritage and expertise of Indian space organizations & research institutions, engineering skills of the industry and the best talent of academic institutions.

Antrix is a space company established by the Indian Space Research Organization (ISRO) as its commercial arm. Antrix markets space products and services to global customers, based on an impressive array of achievements and developments over past four decades in Indian space programme.

Antrix is committed to configuring a cost-effective, advanced and reliable solution for every space programme related need. Antrix makes sure that the integration of deliverables with the space programme is smooth. Close working relationship with various centers specializing in specific space activity ensures satisfactory resolution of technical issues and delivering on schedules. And that makes Antrix one source you can count on to capitalize on the benefits only space can provide.

Antrix optimizes the space systems keeping in view the specific customer objectives. Best practices built over many successful projects and multi-disciplinary expertise enables identifying and integrating appropriate technologies and mitigating risk factors.

The sustained commitment of the government, industry and academic institutions make Antrix a long-term partner organisations can trust.

In short, Antrix plays a pivotal role in delivering space systems and services that meet the expectations of leading global organizations.



Having access to specialized design, test and manufacturing facilities in ISRO staffed by experienced scientists and engineers with in depth knowledge of the crucial parameters of the space industry, Antrix focuses on enhancing functionality and value to the customer.

Antrix offers satellite systems and sub-systems with proven performance in space and incorporating advanced features of power & reliability and long life.

The earth observation data services powered by a state of the art constellation of Indian remote sensing satellites (IRS) and a network of ground stations provide a valuable and assured resource for business to our customers worldwide.

Antrix facilitates the utilization of Indian Space assets in the field of telecommunications & broadcasting for a variety of services including TV feed, DTH, VSAT, mobile communications and socially relevant services such as Telemedicine and Teleeducation.

A track record of successful space launches in a variety of earth orbits through India's PSLV and GSLV launch vehicles has made Antrix a compelling choice for many customers.

Antrix counts on the unmatched knowledge and experience of handling a wide range of space missions by Indian space programme to ensure effective mission support.



Ready to deploy capabilities, from mission-concept to spacecraft-operations

- Four decades of R&D experience
- Experience of over 50 spacecraft missions and 25 launches
- In-orbit experience accumulating to 1,000 communication transponder years
- Three flight proven buses: I-1K, I-2K, I-3K; versatile and reliable platforms for telecommunications and remote sensing
- **Payloads:**
 - S, C & Ku with varied EIRP
 - VHRR (Imager)
 - Earth observation Sensors, optical and radar imaging
- Capacity to build 3-4 spacecrafts per year
- Two operational launchers (PSLV/ GSLV) for LEO/MEO and GTO orbits
- All facilities under one roof
- Spectrum of in-house developed components and subsystems
- Multi-purpose mission design expertise

SATELLITE SYSTEMS

RELIABLE & COST EFFECTIVE

Antrix works with customers to design and integrate cost effective and innovative space systems to meet specific requirements.

Based on its end to end expertise in design, test and manufacture of satellite systems and subsystems, Antrix ensures an unmatched quality, reliability, on orbit performance and cost effectiveness. The level of involvement could range from complete satellite program to function specific components.

COMMUNICATION SATELLITES AND PLATFORMS

Through the highly successful, INSAT and GSAT programmes Antrix has standardized three flight proven satellite platforms in the weight range of 1000 to 3500 kg. These platforms, I-1K, I-2K and I-3K are offered to global customers of commercial communication satellites through an alliance with EADS-Astrium. The satellite based on these platform deliver cost effective solution for telecommunications and broadcasting applications with a payload power of 4.9 KW.

EARTH OBSERVATION SATELLITES

Antrix offers reliable satellite solutions for a variety of Earth Observation missions with the proven heritage of Indian Remote Sensing (IRS) satellites for land, ocean and atmospheric observations.



SATELLITE SUBSYSTEMS

Antrix ensures the best value through flexibility in design and manufacture to suit user requirements. Antrix offers satellite sub systems designed for effective integration including Structures and Thermals Systems, Mechanisms, Power Systems, Attitude Control, Digital and RF Systems and Propulsion Systems.

PAYLOAD SUBSYSTEMS

Designing, building and operating payloads for a variety of applications as per the demands of customers can be undertaken.

INTERNATIONAL SATELLITES	SATELLITE PLATFORMS	I-1K	I-2K	I-3K
<ul style="list-style-type: none"> W2M Satellite for Eutelsat HYLAS Satellite for Avanti Screenmedia plc. DEVAS Multimedia Satellite <p>DELIVERY OF SUB-SYSTEMS</p> <ul style="list-style-type: none"> Sail boom mechanism RWA, SADA Propulsion Components, Magnetic Torquers, Actuators, Hinge Assemblies Structures Power Systems 	Lift Off Mass (Kg)	1100-1300	2000-2300	3000-3400
	Max. Propellant loading (Kg)	850	1140-1400	1700-1900
	S/C Dry Mass (Kg)	500-600	800-950	1300-1500
	Payload Mass (Kg)	upto 100	upto 225	upto 400
	Solar Power Gen. (W)	1000-1500	2800	6500
	Solar Cell technology	GaAs/MJC	MJC	MJC
	Battery Capacity/	24 AH/	70 AH	125 AH
	Battery Technology	NiCd	NiH2	Ni-H2 or Li-Ion
	Payload Power (W)	550-750	2400	4900
	Eclipse Support	100%	100%	100%
Mission Life	7 yrs	12 to 15 yrs	12 to 15 yrs	
Launcher Compatibility	PSLV	GSLV MK-I/MK-II	ARIANE/others	

EARTH OBSERVATION

HIGH QUALITY DATA SERVICES

Antrix offers data from a constellation of state of art Indian Remote Sensing (IRS) satellites which assures data continuity and continuous upgradation of technologies. Currently, services are provided from IRS 1C/1D, Resourcesat-1, Cartosat-1, Cartosat-2 and Oceansat-1 satellites. New missions to enhance and replace satellites in the above constellation are on the anvil. These include radar-imaging satellite, Oceansat-2 and follow on missions for Resourcesat and Cartosat.

GROUND STATION NETWORK

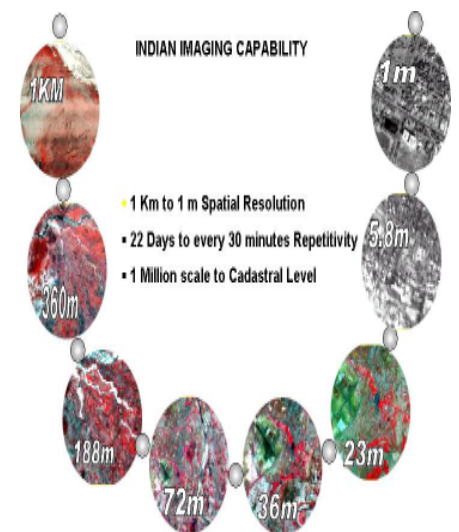
Antrix has established ground station network of over 20 stations for receiving, processing and distributing data from IRS constellation. A reliable reseller network promotes sales of data received at these ground stations. Antrix has an extensive collaboration from service providers such as EOTec (USA), SANBORN (USA) and Mitsubishi Corporation, Japan.

In order to ensure high turn around, Antrix also has arrangement to downlink data at higher latitude station in Norway.

IRS INTERNATIONAL GROUND STATION NETWORK



The quality of data services is based on fine resolution and wide swath with a broad range of spectral and temporal capabilities.



VERSATILE IMAGE DATA

CARTOSAT SERIES

- Stereo imaging capability
- High resolution with agility
- Multi mode imaging (Spot, Strip)

RESOURCESAT SERIES

- Spectral
- Multi Spectral (Vis, IR, SWIR)
- Panchromatic (Vis+NIR)
- Swath Range: 23 Km to 740 Km.

OCEANSAT SERIES

- Ocean Color Monitor
- Spectrometer: Active and Passive Microwave sensors.

APPLICATION AREAS

- Agriculture
- Forestry
- Land use/land cover
- Geology
- Urban and infrastructure
- Terrain Mapping
- Water Resources
- Ecology/Environment
- Disaster management
- Waterhed, Coastal, Oceans

PROVISION OF IRS GROUND SYSTEMS

- Complete receiving systems
- Upgradation of existing ground systems
- Mission specific Hardware and Software
- Turnkey Services

COMMUNICATIONS

TRANSPONDER LEASE SERVICES

Antrix enables service providers to deliver communication and broadcasting services by providing robust, reliable, scalable and leading-edge space based systems.

Antrix is backed by strong technical resources to support satellite communication services. Central to Antrix services is the commitment and capabilities to meet wide range of service requirements, today and in the future.

A long term approach to satellite communication programme equips service providers to meet the challenges of keeping pace with the competitive communications market, achieving service levels and meeting expectations of end-users. The existing portfolio of transponders supports wide array of advanced services and applications.

The reliability and performance are proven in a fleet of state of the art communication satellites with coverage over India and other regions. The services realized through these satellites cater to wide range of business and social needs. These include high quality audio, video & data services for businesses and education, medical & disaster management related social initiatives.

Fired by the vision for growth and advancement in technology, our future satellites will support the expansion and diversification of communication services.



SATELLITES IN ORBIT

(Satellite, Freq.Band, No.of Tx)

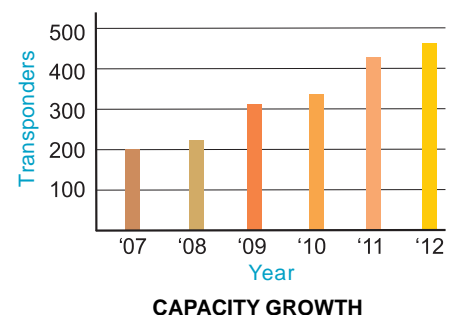
INSAT-2E	C	14	GSAT-2	C	04
EOL:2010	Ext.C	05	EOL: 2009	Ku	04
INSAT-3A	C	12		MSS	06
EOL: 2015	Ext.C	06	GSAT-3	Ext.C	06
	Ku	06	EOL: 2011	Ku	06
INSAT-3B	Ext.C	12	INSAT-4A	C	12
EOL:2010	Ku	06	EOL: 2017	C	12
INSAT-3C	C	24	INSAT 4B	C	12
EOL 2011	Ext.C	06	EOI:2019	Ku	12
	BSS	02	INSAT 4CR	Ku	12
	MSS	01	EOI:2019		
INSAT-3E	C	24			
EOL: 2015	Ext.C	12			

APPLICATIONS

- Television Broadcast services
- High speed Internet services
- Digital Satellite news gathering
- Direct to Home (DTH) applications
- VSAT
- Radio Networking
- Tele-education
- Telemedicine
- Multimedia
- Video services
- Telephony
- Disaster Communications
- Positioning/Navigation
- Satellite Aided Search & Rescue

FUTURE SCALING UP PROGRAMME

GSAT-4	Ka	2007-08
GSAT 5	C	2008-09
GSAT 6	S,C	2009-10
GSAT 7	S,C,Ku	2010-11
GSAT 8	Ku	2009-10



SPACE TRANSPORTATION

PERFORMANCE & ECONOMY

Antrix offers two proven launch vehicles, Polar Satellite launch Vehicle (PSLV) and Geo Synchronous Satellite Launch Vehicle (GSLV) to meet needs of international customers for launches into a wide range of earth orbits.

Polar Satellite Launch Vehicle (PSLV) is designed to launch payloads weighing upto 1.6 tons in sun synchronous orbits and higher mass in inclined orbits. The vehicle is capable of launching remote sensing satellites into polar sun synchronous orbits. It has proven capabilities of launching multiple satellites in the same launch mission and placing satellites in equatorial, inclined as well as polar orbits.

The Geo Synchronous Satellite Launch Vehicle (GSLV) caters to positioning 2.2 tons class of communication satellites in Geo Synchronous Transfer Orbit (GTO). New versions are under development to launch satellites of higher mass.

Satish Dhawan Space Centre (SDSC)- SHAR is a launch complex with facilities for satellite launch preparations, checkout and logistics meeting international standards. The two launch pads at the complex assure greater flexibility and quick turnaround.



Reliable launch capabilities, expert human resources and excellent infrastructure enable Antrix to provide cost effective and timely launch services for satellites into a variety of earth orbits.

ISRO LAUNCHERS	PSLV	GSLV	GSLV-MKIII
Number of stages	4 (with 6 solid strapon)	3 (with 4 solid strapon)	3 (with 2 liquid strapon)
Propulsion	Solid and liquid	Solid,liquid,cryogenic	Solid,liquid, cryogenic
Lift of weight (t)	295	414	629
Vehicle Height (m)	44	49	42.4
Payload (t)	1.6/1.1GTO	2.2-2.4 GTO	4.0GTO/10LEO
Number of flights	12 (1993-2007)	4 (2001-07)	2008-09

FOREIGN PAYLOADS LAUNCHED

- Agile, Italy, 352 kg, PSLV C8, '07
- Pehuensat-1, Argentina, 6 kg, '07
- Lapan-Tubsat, Indonesia, 56 kg, '07
- Proba, Belgium, 94 kg, '01
- Bird, Germany, 92 kg, '01
- Kitsat, Korea, 110 kg, '99
- DLR-Tubsat, Germany, 45 kg, '99

FUTURE MISSIONS

A number of customer satellite launches are on the anvil, indicating strong customer confidence

MISSION SUPPORT

IN ANY FREQUENCY, IN ANY ORBIT

Antrix mission support services are backed by advanced multi-mission control centers and the experience of over 50 missions & 25 launches.

Antrix can offer mission support services for a variety of satellite missions, taking advantage of the rich experience gathered through successful space applications and scientific satellite missions of ISRO.

The services are extended through state of the art facilities and networks built for both low orbiting and geo stationary satellite missions. The facilities are backed by strong technical expertise and experience in satellite operations and management.

The earth stations can support operations in a variety of frequency including UHF, S, C and Ku bands. The facilities are configured to provide uninterrupted services to support the critical mission functions.

Through these resources, Antrix offers complete turnkey solutions for

- Launch and Early Orbit Phase support
- Telemetry, Tracking and Command support
- In-orbit Test service



MISSION SUPPORT CENTRES

ISRO Telemetry, Tracking and Command Network (ISTRAC)

ISTRAC comprises network of ground stations providing mission support to low-earth orbit satellites as well as launch vehicle missions.

Master Control Facility (MCF)

comprises two centres monitoring all geo-stationary satellites of ISRO.

TRACK RECORD

- 50 missions and 25 launches
- TCR station for Worldspace
- NMC station for SES New Skies
- RFAT station for SHINSAT
- IOT support for PANAMSAT
- LEOP Support for Eutelsat, DLR, SS/L, INMARSAT
- LEOP-TTC operation for Lockheed Martin
- Training for ARABSAT Engineers

OPERATIONAL EXCELLENCE

- Station keeping in orbit within $\pm 0.1^\circ$
- Experience of collocated satellite operations
- Capability of orbital repositioning
- Multi-mission satellite health monitoring and command software
- Powerful satellite simulators

TESTING AND VALIDATION

PROVEN FACILITIES AND PROCESSES

Antrix can provide to the user access to various test facilities for satellite and launch vehicle testing and qualification. These include world class simulation, testing and manufacturing facilities. The facilities are fully geared for testing of solid and liquid engines, electronic components and subsystems. Manufacturing facilities include electronics fabrication, composites and Clean Rooms.

The ISRO Satellite Integration and Test Establishment (ISITE) is a world class Assembly, Integration and Test (AIT) complex with all spacecraft integration and test facilities under one roof. Complete assembly and test sequence enables rolling out of flight worthy spacecraft from the stage of a bare structure. It includes checkout facility for the test protocols of large high power satellites, thermovacuum chamber (CATVAC) for thermovacuum performance qualification of the spacecraft, vibration shaker (CATVIB) for dynamic tests, physical parameter measurement facilities. and comprehensive Antenna Test Facility (CATF)

Antrix provides state of the art test facilities for Qualification, Manufacturing and Testing of satellites and launch vehicles.



STATE OF THE ART FACILITIES

FACILITIES AT ISITE

- CATF
- CATVAC & CATVIB
- AIT Facility

AERODYNAMICS AND HEAT TRANSFER

- Subsonic, Supersonic and Hypersonic Wind Tunnel
- Shock Tube / Shock Tunnel
- Kinetic Heating Simulation

- Standards and Calibration
- Chemical and Material Test
- Electromagnetic and Magnetic test
- Environmental & Space Simulation

MECHANICAL

- 3-axis Motion Simulator and Servo Table Facility
- Dynamic Balancing Machine
- Shock Test Facility
- Vibration Test Facility

SPECIAL TESTS

- Component Screening and Failure Analysis Laboratory
- Electro Optics Test
- Life Test
- Non-Destructive Test
- Acoustic Test

STATIC TEST FACILITIES FOR SOLID AND LIQUID ROCKET MOTORS

THE ANTRIX ADVANTAGE

DEEP RESOURCES AND COMMITMENT

DEPARTMENT OF SPACE

- Antrix Corporation Ltd.
- Indian Space Research Organisation (ISRO)
- National Remote Sensing Agency
- Physical Research Laboratory
- Semiconductor Laboratory
- North Eastern Space Applications Centre
- National Atmospheric Research Laboratory

ANTRIX

OWNERSHIP &
ORGANIZATIONAL LINKS

ISRO

- Vikram Sarabhai Space Centre
- ISRO Satellite Centre
- Space Applications Centre
- Satish Dhawan Space Centre
- Liquid Propulsion Systems Centres
- Master Control Facility
- ISRO Telemetry, Tracking and Command Network
- ISRO Inertial Systems Unit
- Laboratory for Electro Optic Systems
- Development & Educational Communication Unit
- Regional Remote Sensing Service Centre

Antrix Vision

To emerge as a globally significant space company fully utilising the strengths of Indian Space Research organization (ISRO) and other Indian entities in the field of space.

MISSION

ANTRIX CORPORATION LIMITED, the commercial arm of Department of Space (DoS) promotes and markets the products and services from Indian space programme (1992).

CORPORATE CREDENTIALS

- Services in: America, Europe, Asia, Africa and Latin America
- Equity Capital: Rs. 10 million
- Networth (2007): Rs. 2,368 million
- Dividend (2006): Rs. 212 million
- Turnover (2006-07): Rs. 6,055 million
- PAT (2006-07): Rs. 1,056 million

LEADERSHIP

Antrix is managed and guided by a board of eminent leaders in the national space programmes, doyens of the industry and policy makers. To reinforce organizational effectiveness, the Chairman of Antrix also holds the positions of Chairman of ISRO and Secretary, Department of Space.

BACKED BY ISRO

Antrix offerings are backed by ISRO's specialized experience and facilities which ensure the best value to the customer. The organic linkage with ISRO ensures high level of contribution and commitment to customers' programmes from the workforce of ISRO and other space entities.

A PARTNERSHIP FOR

MISSION SUCCESS

Antrix strives to be a beneficial partner in the success and growth of companies worldwide by offering best-in-class and cost effective space solutions and services.



ANTARIKSH COMPLEX, BANGALORE, INDIA





Antrix is committed to
meeting every challenge
the space industry encounters.

TODAY AND TOMORROW.



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