



INDIAN DEFSPACE SYMPOSIUM 2023

11-13 APRIL 2023

VENUE

United Service Institution of India (USI),
Shankar Vihar, Delhi Cantt, New Delhi

ORGANISED BY

Indian Space Association (ISpA)

IN ASSOCIATION WITH

Defence Research & Development Organisation (DRDO)
(Ministry of Defence, Government of India)

SUPPORTING PARTNERS

Sponsors & Partners

PLATINUM



LARSEN & TOUBRO



OneWeb



unlock potential

A **TATA** Enterprise



Kawa Space

Space Powered SIGINT & ELINT



**MICRONET
SOLUTIONS**



ELENA GEO SYSTEMS



GOLD



CENTUM

SILVER



**KEPLER
AEROSPACE**

KNOWLEDGE PARTNER



MEDIA PARTNER



**GEOSPATIAL
WORLD**
ADVANCING KNOWLEDGE FOR SUSTAINABILITY

**SOUTH ASIA
DEFENCE**
STRATEGIC REVIEW

**INDIAN AEROSPACE
& DEFENCE BULLETIN**

spacepreneur

ABOUT US

ISpA is an apex non-profit industry body, setup exclusively for the successful collaborative development of the Private Space Industry in India. ISpA was created to be the single Voice of the Private Space Industry and act as a bridge between the Government and the Private Industry. Besides undertaking Policy Advocacy, ISpA engages with all types of stakeholders from the Indian & Global Space Ecosystem to operate as a conduit for accelerating the knowledge sharing on various aspects of Space-related Science, Technology, Engineering, Management etc.. ISpA aspires to make meaningful contributions to make India self-reliant and technologically advanced so as to position India as a leading player in the Global Space arena.

ISpA endeavours to empower, collaborate, develop, excel and promote its members, associate organisations, academia, entrepreneurs, and start-ups by facilitating them with a platform to coalesce and create an enabling environment for strengthening the private as well as the public industry in the Indian Space sector.

OUR VISION

ISpA echoes the Hon'ble Prime Minister's vision of AtmaNirbhar Bharat. We work with all stakeholders to create an enabling environment to strengthen the private Space Industry in India with an aim to propel India to the forefront of the Global Space Ecosystem.

OUR FOCUS AREAS



**UNIFIED VOICE FOR
ENSURING ENABLING
POLICY FRAMEWORKS**



**ENERGISE
BUSINESS
GROWTH**



**INTERFACE WITH
DEFENCE AND
SECURITY
AGENCIES**



**GLOBAL HUB OF
SPACE INDUSTRY**



**CAPACITY AND
KNOWLEDGE
BUILDING**



**INTERNATIONAL
PARTNERSHIPS AND
COOPERATION**

OUR OBJECTIVES

To perform an all-encompassing role for the entire Space Domain, ISpA aims to be an Advocate and Facilitator for the participation, growth and capacity building of the private as well as the public industry in India's Space domain.

ISpA engages with the Indian Government; regulatory bodies; national and international bodies; and other stakeholders as well as participate in formulating effective; efficient and appropriate policies; and, regulatory frameworks for :-

EASE OF DOING BUSINESS AND POLICY STABILITY

Advocacy for easy Availability, Accessibility, Affordability and Efficient Utilisation of Space Resources.

International Partnerships

- ❖ Enhance and Strengthen Co-operation of International partners with the Indian Space Industry.
- ❖ Engage with global institutions on Space-related issues including policy matters.

PROMOTE AND COLLABORATE

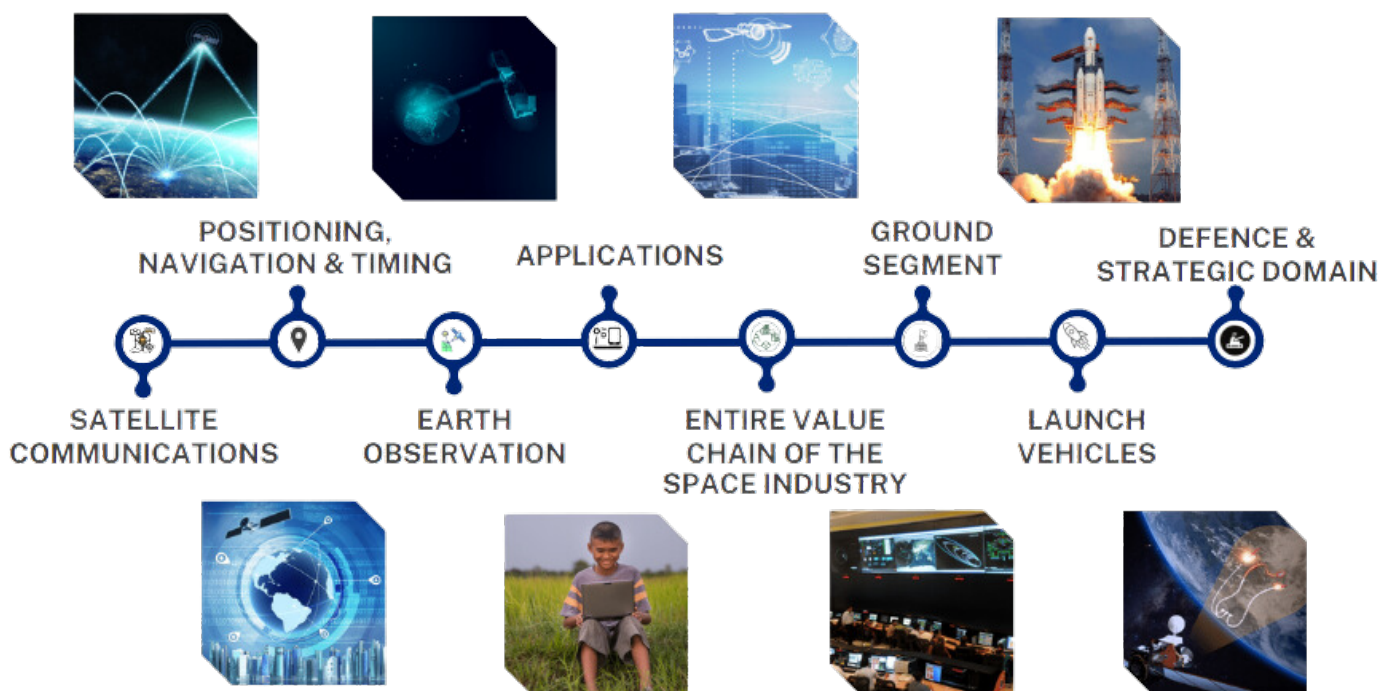
Technology, Infrastructure, Investments and Innovation.

ENCOURAGE AND FACILITATE ENTIRE SPECTRUM OF SPACE DOMAIN ACTIVITIES

Fostering Awareness and Promotion of :-

- ❖ **Design, Manufacture, Launch, Operate and R&D:** Satellites; Launch Vehicles; Payloads; Ground & Space Control Systems; and Testing & Scientific Equipment.
- ❖ **Communications:** Satellite-based Communication Services including Satellite Broadband Connectivity.
- ❖ **Applications and Services:** Space-based Navigation; Geospatial & Remote Sensing; Situational Awareness; Space Infrastructure Security and Protection; Scientific Explorations; Astronomy; Testing & Certification; and Others
- ❖ **Capacity Building:** Awareness, Education, Knowledge Sharing and Skilling.

SPACE VERTICALS



Our Member

Founding Members

- ❖ Alpha Design Technologies
- ❖ Bharti Airtel
- ❖ MapmyIndia
- ❖ Larsen & Toubro
- ❖ Nelco (A Tata Enterprise)
- ❖ One Web India Communications
- ❖ Walchandnagar Industries

Core Members

- ❖ Ananth Technologies
- ❖ Astra Microwave Products
- ❖ Azista-BST Aerospace
- ❖ Bharat Forge
- ❖ Centum Electronics
- ❖ Godrej & Boyce Mfg
- ❖ Hughes Communications India
- ❖ Maxar Technologies India
- ❖ MIL Industries

Associate Members

- ❖ Avantel
- ❖ BAE Systems India
- ❖ Bharat Electronics
- ❖ Broadcast Engineering Consultants India
- ❖ Inmarsat India
- ❖ Intelsat Inflight India LLP
- ❖ Planet Labs
- ❖ Rasu tools
- ❖ Siddhartha Logistics

Other Members

- ❖ Space Kidz India

Start-up Members

- ❖ Agnikul Cosmos
- ❖ Aidin Technologies
- ❖ Altz Technologies
- ❖ Astrome Technologies
- ❖ Augsense Labs
- ❖ Bellatrix Aerospace
- ❖ BES Space
- ❖ CYRAN AI Solutions
- ❖ Dhruva Space
- ❖ Digantara
- ❖ Dron Vayu
- ❖ Elena Geo Systems
- ❖ Enabletech Industries
- ❖ GalaxEye Space
- ❖ SkyServe
- ❖ Indian Technology Congress Association
- ❖ Kawa Space
- ❖ Kepler Aerospace
- ❖ Manastu Space Technologies
- ❖ Micronet Solutions
- ❖ Numer8 Analytics
- ❖ Pixxel
- ❖ Robinsons Cargo & Logistics
- ❖ Saankhya Labs
- ❖ SISIR Radar
- ❖ Skyroot Aerospace
- ❖ Space Machines Company
- ❖ Suhora Technologies
- ❖ Sunrise Ventures
- ❖ TheSpaceLabs
- ❖ TSC Technologies
- ❖ VEDCOMSPOC
- ❖ Xovian Aerospace

Members Achievements



HAL-L&T consortium bags INR 860 Cr contract from ISRO.



Digantara successfully launched the World's First Commercial, Space-Based Space Weather Monitoring System.



36 Satellites of OneWeb launched by ISRO, LVM3 M2 mission

36 Satellites of OneWeb launched by ISRO, LVM3-M3 Mission



Skyroot launched India's First Private Launch Vehicle Vikram S.

Skyroot Completes triumphant 200-second fire-endurance test of our enhanced, fully 3D-printed 'Dhawan-II' Cryogenic engine



Pixxel's 'Anand' satellite was successfully launched in ISRO PSLV C54 mission.

Pixxel bags 5-Year National Reconnaissance Organization (NRO) contract for hyperspectral imagery.



Dhruva Space launched 2 Nano satellites in ISRO PSLV C54 mission.



SpaceKidz's satellite 'FunSat' was successfully launched in Skyroot's Vikram S.



Nelco & Telesat complete successful LEO demonstrations in India

Tata's Nelco seeks GMPCS license to offer satellite broadband services.



Agnikul Cosmos Successfully Test Fired 2nd Stage Semi-Cryogenic Engine.

India's first private launch pad by Agnikul cosmos at Sriharikota.

ISpA Founding Team



Shri Sunil Bharti Mittal

Founder & Chairperson,
Bharti Enterprises.



Shri Jayant Patil

Member of Executive committee of Management
Larsen & Toubro, and Advisor Defence & Smart
Technologies to CEO & MD Larsen & Toubro.



Shri Chirag Doshi

MD & CEO,
Walchandnagar Industries Limited.



Shri Rahul Vatts

Director,
OneWeb India Communications.



Shri PJ Nath

MD & CEO,
Nelco Limited.



Shri Rohan Verma

CEO & Executive Director,
MapmyIndia.



Col HS Shankar, VSM (Retd)

Chairman & MD,
Alpha Design Technologies Limited.



INDIAN SPACE ASSOCIATION

Bhumandal Se Brahmaand Tak

NAC MEMBERS



DR ARVIND GUPTA
NAC Chairman



ACM RKS BHADAURIA (RETD)
PVSM AVSM VM ADC
NAC Member



LT GEN VG KHANDARE (RETD)
PVSM AVSM SM
NAC Member



DR SHAILESH NAYAK
NAC Member



**AMB. ARUN SINGH (RETD),
IFS**
NAC Member



**MAJ GEN DR R SIVA KUMAR
(RETD)**
NAC Member



**GP CAPT AJAY LELE
(RETD)**
NAC Member



MR JS DEEPAK (IAS)
NAC Member



DR SIDDHARTH SINGH
NAC Member



MR RAVINDER PAL SINGH
NAC Member



PROF V KAMAKOTI
NAC Member



MR AMIT K GHOSH (IAS)
Special Invitee



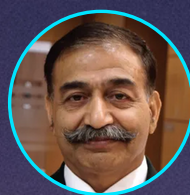
MR K KRISHNA
Subject Matter Expert



DR RANJANA KAUL
Subject Matter Expert



MR JD PATIL
Chairman, ISpA



LT GEN AK BHATT (RETD)
PVSM UYSM AVSM SM VSM
Convener NAC, Director General ISpA



**WG CDR SATYAM
KUSHWAHA (RETD)**
Secretary NAC, Director ISpA

www.ispa.space



Bhumandal Se Brahmaand Tak

ISpA PUBLICATIONS



VISIT

WWW.ISPA.SPACE
FOR PUBLICATIONS &
MORE RESOURCES.

Indian DefSpace Symposium 2023

Key Leaders & Mentors



Gen Anil Chauhan PVSM UYSM AVSM SM VSM

Chief of Defence Staff of the
Indian Armed Forces



Air Chief Marshal VR Chaudhari
PVSM AVSM VM ADC
Chief of The Air Staff



Dr AS Kiran Kumar
Former Chirman,
ISRO



Dr Samir V Kamat
Secretary, Department of Defence
R&D and Chairman, DRDO



Ex Gov. Shekhar Dutt
Sena Medal
Chief Mentor, ISpA



Lt Gen MV Suchindra Kumar,
AVSM YSM VSM**
Vice Chief of The Army Staff (VCOAS)



Air Marshal BR Krishna
PVSM AVSM SC ADC (Retd),
Former CISC



Vice Admiral
Sanjay Jasjit Singh AVSM NM
Vice Chief of The Naval Staff



Air Vice Marshal DV Khot
AVSM VM
DG DSA, HQ IDS



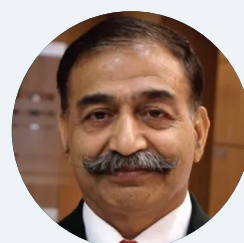
Lt Gen VG Khandare (Retd)
PVSM AVSM SM
Principal Adviser, MoD



Air Marshal SBP Sinha (Retd)
PVSM AVSM VM ADC
DRDO Chair (Prof MGK Menon Chair)



Mr J.D. Patil
Chairman,
ISpA



Lt Gen Anil Kumar Bhatt PVSM
UYSM AVSM SM VSM (Retd)
Director General, ISpA

Indian DefSpace Symposium 2023

BRIEF

ISpA echoes the Hon'ble Prime Minister's vision of 'Atma Nirbhar Bharat'. We work with all stakeholders to create an enabling environment for the private Indian Space industry to grow organically and thereby contribute towards addressing our National and Global aspirations.

In the recent past, one of the major achievements of ISpA has been to work closely with related stakeholder agencies for the formalisation of the New Space Policy, and curation of Def-Space Challenges which were announced by Hon'ble PM Narendra Modi during DefExpo-2022. As a follow-up of 'Mission DefSpace' challenges, we are bringing this event based on major inputs received from stakeholders and industry to promulgate the National Space strategy. It further aims to explore India's ambitions in the space domain, with a focus on innovation, thought leadership, and disruptive technologies.

OBJECTIVE

Create a platform for all stakeholders who have a keen interest in boosting India's military space capability and plans. Bring together experts from multiple domains to discuss the latest trends and challenges in the field of defence, making it an excellent networking opportunity for attendees from the defence, DRDO, and government sectors, as well as industry professionals.

Focus on delivering space domain awareness and satellite communications to enhance military operations, and address issues related to securing funding for new space capabilities, expanding international partnerships, and developing a Defence Space Strategy in line with the National Space Strategy.

Program Guide

APRIL 11, 2023 (Day 1): USI Auditorium

0915-0945 Hrs	Registration & Networking Tea
0945-1015 Hrs	Inaugural Session
Plenary Session : Theme- Global DefSpace Overview	
1030-1040 Hrs	Brief on 75 DefSpace Challenges
1040-1130 Hrs	Overview of key technology disruptions impacting Defense Space
1130-1220 Hrs	Emerging Space Power & Usage/Impact in Recent Conflicts
1220-1310 Hrs	Legal and Policy aspects linked to Utilisation of Outer Space
1310-1400 Hrs	Institutional Evolution and Modernization of Defence Space Structure & Establishments from a Space perspective
1400-1450 Hrs	Lunch Break
Session 01 : Theme- DefSpace Capabilities Neighbourhood Scan	
1450-1700 Hrs	Mapping of adversarial & neighbourhood capabilities: Measuring their impact with a special focus on China

APRIL 12, 2023 (Day 2) : USI Auditorium

Session 02 : Theme- Nurturing/Shaping a dynamic Defspace ecosystem for India

Panel Discussions	
1000-1100 Hrs	DefSpace R&D Ecosystem : Role of DRDO, ISRO, IN-SPACe, HQ IDS, DSA, iDEX, Industry & Academia
1100-1200 Hrs	Defence Space Procurement Mechanisms for Industry : Need for Innovation
1200-1300 Hrs	Refining/ Improving R&D, IPR & Funding climate for Industry & Academia
1300-1400 Hrs	Lunch Break

Session 03 : Theme- Disruptions in DefSpace: An emerging Force Multiplier

Panel Discussions	
1400- 1515 Hrs	Persistent & Precision ISR for Targeting & Decision Support : Reimagining the OODA Loop
1515- 1605 Hrs	Robust, Secure & Seamless Space based Communication: Emerging Trends
1605- 1620 Hrs	Special Address: Building Cyber Resilience in Space Sector
1620- 1710 Hrs	Resilient Space Force: Security, Protection & Sustainability

APRIL 13, 2023 (Day3)

	USI AUDITORIUM	USI SEMINAR ROOM 1 (By Invite Only)
	Industry Workshops	Roundtable: Policy, Strategy & Doctrines
1000-1130 Hrs	Azista BST AeroSpace (For Defence & Govt. Officers Only)	
1130-1300 Hrs	Kawa Space	Session 1 - Leveraging International Space Cooperation
1300-1400 Hrs	Lunch Break	
1400-1530 Hrs	Elena Geo Systems	Session 2- Building Comprehensive DefSpace Capability & Capacity: Policy, Strategy & Doctrines
1530-1545 Hrs	Break	
1545-1700 Hrs	Valedictory Session	

Detail Programme Day-1

APRIL 11, 2023 (Day 1): USI Auditorium	
Time	DAY 01
0915-0945 Hrs	Registration and Networking Tea
0945-1015 Hrs	INAUGURAL SESSION
0945-0950 Hrs	Welcome Address Lt Gen Anil Kumar Bhatt PVSM UYSM AVSM SM VSM (Retd) Director General ISpA
0950-0955 Hrs	Opening Remarks Shri J.D. Patil Chairman, ISpA
0955-1000 Hrs	Chief Guest Gen Anil Chauhan PVSM UYSM AVSM SM VSM Chief of Defence Staff of the Indian Armed Forces
1000-1005 Hrs	Special Invitee Air Vice Marshal DV Khot AVSM VM DG DSA, HQ IDS
1005-1010 Hrs	Special Invitee Air Marshal BR Krishna PVSM AVSM SC ADC (Retd) Former-CISC, HQ IDS.
1010-1015 Hrs	Guest of Honour Dr Samir V Kamat Secretary DDR&D and Chairman DRDO
	Visit to Exhibition Area
1030-1350 Hrs	PLENARY SESSION Theme- Global DefSpace Overview
1030-1040 Hrs	Brief on 75 DefSpace Challenges Wg Cdr Satyam Kushwaha (Retd) Director, ISpA
1040-1130 Hrs	Overview of key technologies disruptions impacting DefSpace Dr Narayan Prasad Director (Research & Operations), Spaceport SARABHAI
1130-1120 Hrs	Emerging Space Power & Usage/Impacts in Recent Conflicts Air Vice Marshal Anil Golani (Retd) Additional Director General, CAPS
1220-1230 Hrs	Break
1230-1320 Hrs	Legal and Policy aspects linked to Utilization of Outer Space Dr Ranjana Kaul Partner, Dua Associates
1320-1410 Hrs	Institutional evolution and modernization of defence space structure & establishments from a space perspective Gp Capt (Dr) Ajay Lele (Retd) Consultant, Manohar Parrikar Institute for Defence Studies and Analysis.
1410-1500 Hrs	Lunch
1500- 1700 Hrs	SESSION 02 DefSpace Capabilities Neighbourhood Scan: Overview Mapping & Impact Analysis of Adversarial and Neighbourhood Capabilities: their impact with a special focus on China Experts from the defence and technology sectors will analyze China's military capabilities, including its space-based assets, and how they are affecting the balance of power in the region. They will also examine the strategies and capabilities of China's & other neighbouring countries and how they are responding to the changing geopolitical landscape. 1. Lt Gen (Dr) S.L. Narasimhan (Retd) PVSM AVSM* VSM (10+5 mins) Former Member of the National Security Advisory Board, India Former Director General, Centre for Contemporary China Studies 2. Prof Chandrashekar, Member (45+5 mins) JRD Tata Chair, Visiting Professor, NIAS 3. Brigadier Anshuman Narang (45+5 mins) Indian Army 4. Dr Rajeshwari Pillai (10+5 mins) Director, Centre for Security, Strategy and Technology (CSST), ORF
1700-1730h	High Tea
	END OF DAY 01

Global DefSpace Overview

Speakers:



Wg Cdr Satyam Kushwaha (Retd),
Director,
Indian Space Association (ISpA)



Dr Narayan Prasad,
Director (Research & Operations),
Spaceport SARABHAI



Air Vice Marshal Anil Golani (Retd),
Additional Director General,
CAPS



Dr Ranjana Kaul,
Partner,
Dua Associates



Gp Capt (Dr) Ajay Lele (Retd),
Consultant, Manohar Parrikar Institute for
Defence Studies and Analysis

DefSpace Capabilities

Neighbourhood Scan: Overview

Speakers:



Lt Gen (Dr) S.L. Narasimhan (Retd)
PVSM AVSM* VSM

Former Member of the National Security
Advisory Board, India;
Former Director General, Centre for
Contemporary China Studies



Prof S Chandrashekar

Member JRD Tata Chair
Visitig Professor, NIAS



Brigadier Anshuman Narang
Indian Army.



Dr Rajeshwari Pillai

Director, Centre for Security, Strategy and
Technology (CSST), ORF

Detail Programme Day-2

APRIL 12, 2023 (Day 2): USI Auditorium	
Time	DAY 02
1000-1300 Hrs	SESSION 01 : Theme - Nurturing a Dynamic Defspace Ecosystem for India
1000-1100 Hrs	<p>Panel Discussion#1: DefSpace R&D Ecosystem: Role of ISRO, IN-SACe, MoD, DRDO, HQ IDS, DSA, iDEX, Industry and Academia.</p> <p>Chair- Lt Gen VG Khandare (Retd) PVSM AVSM SM, Principal Adviser, MoD Moderator- Dr PVGS Jayaram, CEO & Advisor Technology, PVGS Consultants</p> <p>Panellist (07)-</p> <ol style="list-style-type: none"> 1. Dr N. Ranjana, Director DSTA, DRDO 2. Brig G Manoj, Brig(SFE), DSA 3. Dr Sudheer Kumar N, CBPO Director, ISRO 4. Mr Shashank Saxena , Deputy Director IN-SPACE 5. Mr Vinod Chippalkatti, President SEBU, Centum Group 6. Mr Rajesh Muneshwar, Co-Founder & CTO, Vihaan Spacetech 7. Prof Manan Suri, Founder, CYRAN AI
1100-1200 Hrs	<p>Panel Discussion#2: Defence Space Procurement Mechanisms for Industry: Need For Innovation.</p> <p>Chair- Air Chief Marshal RKS Bhadauria (Retd) PVSM AVSM VM ADC, Former Chief of The Air Staff. Moderator- Mr Laxmesh BH, Vice President & Head - Missiles and Aerospace Business Head - Precision Manufacturing & Systems Complex L&T</p> <p>Panellist (07)-</p> <ol style="list-style-type: none"> 1. Air Vice Marshal Rajiva Ranjan, VM, ACAS Ops (Space) 2. Lt Gen Anil Kapoor AVSM, VSM (Retd), Former DG EME, DGID IIT Tirupati. 3. Major General AK Channan (Retd), PVSM SM, First ADG(Army Design Bureau) 4. Mr M.V. Reddy, Joint Managing Director, Astra Microwave Products Ltd 5. Mr Vish Sahasranamam, Co-Founder & CEO, Forge Innovation & Ventures 6. Capt Rahul Seth, Director, Antler VC 7. Mr Amit Cowshish, Fin Adv (Acq), MoD & Partner, Dua Associates.
1200-1300 Hrs	<p>Panel Discussion#3: Refining/Improving R&D, IPR and Funding climate for Industry and Academia.</p> <p>Chair- Air Marshal (Dr) Rajeev Sachdeva AVSM, PhD (Retd), Former DCIDS, HQ IDS Moderator- Prof. R M Vasagam, Indian Technology Congress Association</p> <p>Special Address- Dr Ranjana Kaul, Dua Associates (10 min)</p> <p>Panellist (07)-</p> <ol style="list-style-type: none"> 1. Dr Anupam Sharma, Associate Director, DSP, DRDO 2. Mr Vivek Virmani, PO(G)&COO, DIO 3. Mr Shashank Saxena , Deputy Director IN-SPACE 4. Dr Ranjana Kaul, Dua Associates 5. Dr Ravinder Pal Singh, Partner, Kalaari Capital 6. Dr Sanat K Biswas, Assistant Professor, IIITD 7. Mr Rohan Ganpathy, CEO & CTO, Bellatrix

1300-1310 Hrs	Special Address on India's Defence Space Architecture Lt Gen Raj Shukla (Retd), PVSM YSM SM ADC Member, UPSC
1310-1400 Hrs	Lunch
1400-1800 Hrs	SESSION 02 Theme: Disruptions in DefSpace: An emerging Force Multiplier
1400-1520 Hrs	Panel Discussion #1: Persistent & Precision ISR for Targeting & Decision Support: Reimagining OODA loop Chair- Air Marshal Sandeep Singh (Retd) PVSM AVSM VM Moderator- Mr Kris Nair, Founder, KawaSpace Panellist (07)- <ol style="list-style-type: none"> 1. Air Marshal Surat Singh AVSM VM VSM ,DG Air Ops, IAF 2. Air Cmde Baduni, Commandant DIPAC 3. Maj Gen Abhinaya Rai, ADG (Strat), IA 4. Lt Col Gopal Vivek, Defence Specialist, Military Wing, NSCS 5. Col Sai Arul (Retd), Head of Region SAARC, Maxar 6. Mr Rohan Verma, CEO & Executive Director, MapmyIndia 7. Mr Dheeraj Mehra, Founder & CEO Micronet
1520-1610 Hrs	Panel Discussion #2: Robust, Secure & Seamless Space Based Communication: Emerging Trends Chair- Lt Gen MU Nair AVSM SM, SO-in-C & Senior Col Commandant, Corps of Signals Moderator- Maj Gen P K Mallick (Retd), VSM Panellists (06)- <ol style="list-style-type: none"> 1. Maj Gen (Dr) Pawan Anand AVSM (Retd), Distinguished Fellow, USI of India 2. Air Cmde MR Kane, Ops (COM), IAF 3. Mr H Rayappa, Satcom Director, ISRO 4. Mr PJ Nath, Managing Director & CEO, NELCO 5. Mr Rahul Vatts, Chief Regulatory Officer, Bharti Airtel 6. Mr Vidyut Kak, AVP & Operations Head ,Hughes Communication India
1610-1625 Hrs	Special Address: Cybersecurity for Space Lt Gen (Dr) Rajesh Pant (Retd), PVSM AVSM National Cybersecurity Coordinator, NSCS
1625-1715 Hrs	Panel Discussion #3: Resilient Space Force: Security, Protection & Sustainability Chair- Air Marshal BR Krishna PVSM AVSM SC ADC (Retd), Former CISC Moderator- Mr Kranthi Chand, Head Strategy, Dhruva Space Panellists (08)- <ol style="list-style-type: none"> 1. Dr AK Anil Kumar, Associate Director, ISTRAC 2. Lt Gen Anil Bhalla (Retd), Former DG-DIA 3. AVM Sanjay Bhatnagar (Retd) VM VSM, Advisor to BEL 4. Air Cmde PJ Mohamed, Brig(Space Control), DSA 5. Dr C. V. S. Kiran. Lead, R&D and Strategy, Skyroot Aerospace 6. Mr Anirudh Sharma, CEO Digantara 7. Mr Navneet Singh, CEO Kepler Aero 8. Mr Tushar Jhadhav, CEO Manastu
	END OF DAY 02

DefSpace R&D Ecosystem: Role of ISRO, IN-SACe, MoD, DRDO, HQ IDS, DSA, iDEX, Industry & Academia.



Lt Gen VG Khandare (Retd)
PVSM AVSM SM,
Principal Adviser, MoD



Dr PVGS Jayaram
CEO & Advisor Technology,
PVGS Consultants



Dr N. Ranjana
Director DSTA,
DRDO



Brig G Manoj,
Brig(SFE),
DSA



Dr Sudheer Kumar N
CBPO Director,
ISRO



Mr Shashank Saxena
Deputy Director
IN-SPACe



Mr Vinod Chippalkatti
President SEBU,
Centum Group



Mr Rajesh Muneshwar
Co-Founder & CTO,
Vihaan Spacetech



Prof Manan Suri
Founder,
CYRAN AI

DefSpace R&D Ecosystem: Role of ISRO, IN-SACe, MoD, DRDO, HQ IDS, DSA, iDEX, Industry & Academia.



ACM RKS Bhadauria (Retd)
PVSM AVSM VM ADC,
Former Chief of The Air Staff



Mr Laxmesh BH
Vice President & Head - Missiles
and Aerospace Business Head
- Precision Manufacturing &
Systems Complex L&T



AVM Rajiva Ranjan VM
ACAS Ops (Space)



Lt Gen Anil Kapoor
AVSM VSM (Retd)
Former DG EME, DGID IIT Tirupati



Maj Gen AK Channan (Retd), PVSM SM
First ADG(Army Design Bureau)



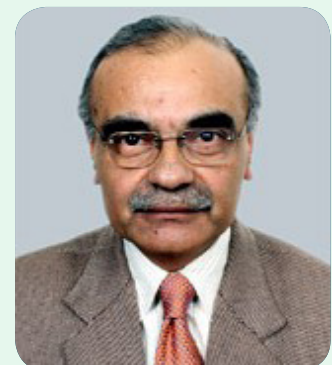
Mr M.V. Reddy
Joint Managing Director,
Astra Microwave Products Ltd



Mr Vish Sahasranamam
Co-Founder & CEO,
Forge Innovation & Ventures



Capt Rahul Seth
Scouting Director & Investor,
Antler VC



Mr Amit Cowshish
Former Fin Adv (Acq), MoD &
Partner, Dua Associates

Refining/Improving R&D IPR and Funding climate for Industry and Academia.



Air Marshal (Dr) Rajeev Sachdeva AVSM, PhD (Retd),
Former DCIDS, HQ IDS



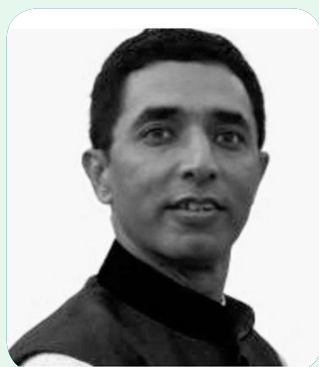
Prof. R M Vasagam
Indian Technology Congress Association



Dr Ranjana Kaul,
Partner,
Dua Associates



Dr Anupam Sharma
Associate Director, DSP,
DRDO



Shri Vivek Virmani
PO(G) & COO, DIO
MoD



Mr Shashank Saxena
Deputy Director,
IN-SPACe



Dr Ravinder Pal Singh,
Partner,
Kalaari Capital



Dr Sanat K Biswas,
Assistant Professor,
IIITD



Mr Rohan Ganpathy
CEO & CTO,
Bellatrix

Persistent & Precision ISR for Targeting & Decision support: Reimagining OODA loop.



**Air Marshal Sandeep Singh
(Retd) PVSM AVSM VM**
Former Vice Chief of Air Staff



Mr Kris Nair
Founder,
Kawa Space



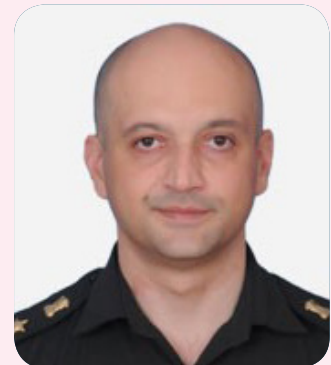
Air Marshal Surat Singh
AVSM VM VSM,
DG Air Ops, IAF



Air Cmde Baduni
Commandant,
DIPAC, HQ IDS



Maj Gen Abhinaya Rai
ADG (Strat),
Indian Army



Lt Col Gopal Vivek
Defence Specialist,
Military Wing, NSCS



Col Sai Arul (Retd),
Head of Region SAARC,
Maxar



Mr Rohan Verma,
CEO & Executive Director,
MapmyIndia

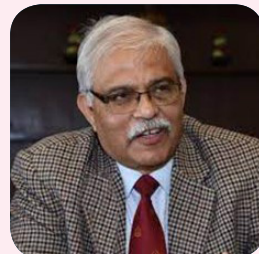


Mr Dheeraj Mehra,
Founder & CEO,
Micronet

Robust, Secure & Seamless Space Based Communication: Emerging Trends.



Lt Gen MU Nair AVSM SM
SO-in-C & Senior Col Comdt,
Corps of Signals



**Maj Gen P K Mallick
(Retd), VSM.**



Maj Gen (Dr) Pawan Anand AVSM (Retd)
Distinguished Fellow,
USI of India.



Air Cmde MR Kane
Ops (COM), IAF.



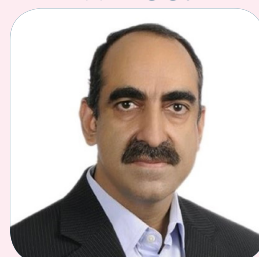
Mr H Rayappa
Satcom Director,
ISRO.



Mr PJ Nath
Managing Director & CEO,
NELCO.



Mr Rahul Vatts
Chief Regulatory Officer,
Bharti Airtel.



Mr Vidyut Kak
AVP and Operations Head ,
Hughes Communication India.

Resilient Space Force: Security Protection & Sustainability.



Air Marshal BR Krishna
PVSM AVSM SC ADC
(Retd),
Former CISC



Mr Kranthi Chand
Head Strategy,
Dhruva Space



Dr AK Anil Kumar
Associate Director,
ISTRAC



Lt Gen Anil Bhalla (Retd)
AVSM VSM ARMD
Former DG-DIA



AVM Sanjay Bhatnagar
(Retd) VM VSM
Advisor to BEL



Air Cmde PJ Mohamed
Brig(Space Control),
DSA



Dr C. V. S. Kiran
Lead, R&D and Strategy,
Skyroot Aerospace



Mr Navneet Singh
CEO,
Kepler Aero



Mr Anirudh Sharma
CEO,
Digantar.



Mr Tushar Jhadhav
CEO,
Manastu Space

Special Addresses

India's Defence Space Architecture.

Speaker:



Lt Gen Raj Shukla (Retd),
PVSM YSM SM ADC
Member, UPSC

Cyber in Space.

Speaker:



Lt Gen (Dr) Rajesh Pant (Retd),
PVSM AVSM
National Cybersecurity Coordinator, NSCS

Detail Programme Day-3

APRIL 13, 2023 (Day 3)	
Time	DAY 03 THEME: INDUSTRY WORKSHOPS (Auditorium)
1000-1130 Hrs	WORKSHOP 01: Azista-BST Aerospace (By Invite Only) Indigenous Enablers: Exploring the Role of Satellites in Strengthening Indian Defense. 1. Capabilities and Limitations of Satellites 2. Case Study: Satellites for Naval Applications 3. Case Study: Satellites for Army & Airforce Applications 4. Open-house discussion on the above topics after the presentations.
1130-1300 Hrs	WORKSHOP 02: Kawa Space Critical Infrastructure for Defence Space: Kawa Space A. Critical Infrastructure for Defence Space (15 min) 1. Introduction 2. Kawa Space's RF constellation Design and Data Parameters 3. ISR Products a. Maritime Domain Awareness b. Land-Based Applications (ELINT, SIGINT) c. RF Spectrum Monitoring B. MDA ISR platform Demonstration (45 min) 1. RF Capture, data fusion and insight generation (a) S and X band Waveform Matching - Dark Vessel Use Case (b) Sample data and AIS mapping (c) Downloadable RF raw data will be shared with d. Attendees Product trial the audience 2. AIS Toolkit and vessel tracking (a) Dashboard to track vessel activities in AOI (b) AI & ML in Maritime: Case Studies (c) Kawa ID for vessels and activity log management (d) Attendees Product trial
1300-1400 Hrs	Lunch
1400-1530 Hrs	WORKSHOP 03: PNT in the Security Forces of the Country and Proliferation of NavIC: Elena Geo Systems 1. The role, importance and Necessity of Position, Navigation and Timing in the Security of the Nation. 2. Means through which PNT is served for the Security Forces. 3. Efficacy of GNSS in providing PNT. 4. Various GNSS and their utility for Indian Security Forces. 5. Achieving Atma Nirbharta in PNT using NavIC. 6. The NavIC Concept and the Satellite System and it's applications. 7. Status of NavIC and it's induction into the services. 8. The bottlenecks and pain points in NavIC adoption. 9. Way ahead to adopt NavIC. 10. Status of NavIC Products Industries' preparedness to help the Defence Forces and the Government to adopt, proliferate NavIC.
1530-1545 Hrs	Networking Break
1545-1550 Hrs	Lt Gen Anil Kumar Bhatt PVSM UYSM AVSM SM VSM (Retd) Director General ISpA
1550-1555 Hrs	Mr J.D. Patil Chairman ISpA
1555-1600 Hrs	Guest Air Vice Marshal DV Khot AVSM VM DG DSA, HQ IDS
1600-1620 Hrs	Thought Leaders' Group Report Presentation Air Marshal SBP Sinha PVSM AVSM VM ADC (Retd), DRDO Chair (Prof MGK Menon Chair)
1620-1625 Hrs	Special Guest Lt Gen MV Suchindra Kumar, AVSM YSM** VSM, Vice Chief of The Army Staff (VCOAS)
1625-1630 Hrs	Special Guest Vice Admiral Sanjay Jasjit Singh, AVSM NM, Vice Chief of The Naval Staff
1630-1640 Hrs	Guest of Honour Dr Samir V Kamat Secretary, Department of Defence R&D and Chairman, DRDO
1640-1650 Hrs	Guest of Honour Air Chief Marshal VR Chaudhari PVSM AVSM VM ADC, Chief of The Air Staff
1650-1700 Hrs	Chief Guest Gen Anil Chauhan PVSM UYSM AVSM SM VSM, Chief of Defence Staff of the Indian Armed Forces
1700-1715 Hrs	Thanksgiving Wing Commander Satyam Kushwaha (Retd), Director, ISpA
END OF DAY 03	

ISpA Thought Leaders Group (TLG)



Dr AS Kiran Kumar
Chairperson, TLG
Former Secretary Dept of
Space & Chairman ISRO



**Air Marshal M.
Matheswaran (Retd)**
AVSM VM PhD
Former DCIDS, HQ IDS



**Air Marshal SS Soman
(Retd) PVSM AVSM VM**
Former AOC-in-C, WAC IAF



**Air Marshal SBP Sinha
(Retd) PVSM AVSM
VM ADC**
DRDO CHAIR (Prof MGK
Menon Chair); & Former
AOC-in-C, CAC IAF.



**Lt General Vinod G. Khandare
(Retd) PVSM AVSM SM.**
Principal Advisor, MoD; Former
Military Advisor, NSCS; &
Former DG DIA, HQ IDS



**Air Marshal BR Krishna
PVSM AVSM SC (Retd)W.**
Former CISC,
HQ IDS



**Vice Admiral S N Ghormade
(Retd) PVSM AVSM NM ADC**
Former Vice Chief of the
Naval Staff



Dr. PVGS Jayaram
MIE (Coordinator, TLG)
CEO and Advisor Technology,
PVGS Consultants



**Wing Commander Satyam
Kushwaha (Retd):**
(Convenor, TLG) Director,
ISpA

Indian DefSpace Symposium 2023

Workshop Holders



Kawa Space
Space Powered SIGINT & ELINT



Exhibitors



A **TATA** Enterprise



Larsen & Toubro is a major technology, engineering, construction, manufacturing and financial services conglomerate, with global operations. Larsen & Toubro, India's largest private sector defence company, has been a partner to the Indian Armed Forces for more than three decades. L&T provides indigenous, end-to-end solutions across the defence spectrum – from surveillance to strike. Our philosophy and operational effectiveness are characterized by our long-term commitment, dedicated capability, and specialized collaborations. Collectively, these characteristics have empowered us to consistently deliver the decisive edge.

L&T Technology Services Limited (LTTS) is a listed subsidiary of Larsen & Toubro Limited focussing on Engineering and R&D (ER&D) services. It also offers consultancy, design, development, and testing services across the product and process development life cycle.

As in other strategic & core sectors for the nation and the world, L&T has been a growth partner to ISRO in every of its SPACE endeavour over the last 5 decades

1. L&T in Space – Upstream

1.1. Launch Vehicles

L&T has been manufacturing launch vehicle hardware since 1975. Today, L&T is the trusted partner for end to end realization of PSLVs, along with HAL. L&T has developed Mobile launch platforms for multiple Indian Missile programs including all the strategic Missile programs & hence ready to take up the challenge of LOD for LV using mobile solution.

Track Record

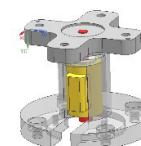
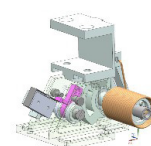
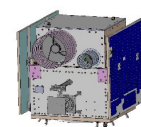
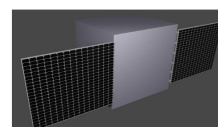
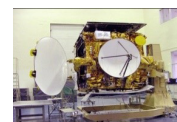
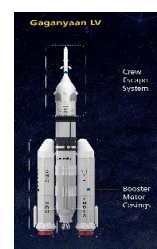
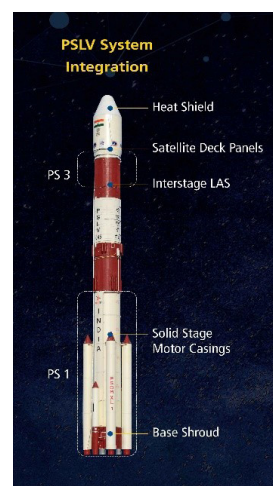
- ❖ Building Rocket motor casings for the solid stages of all operational Launch vehicles of ISRO using maraging steel and 15CDV6 have reached the maturity levels of serial production.
- ❖ Fabrication and assembly of light alloy structures such as metallic heat shield, inter-stages, nozzle hardware for PSLV, composite heat shield for the GSLV MK-III and light alloy structures for the SSLV.
- ❖ **Crew Escape System** in Gaganyaan
- ❖ L&T is the development partner for the critical sub-assemblies like Main Turbo Pump and Mixing Head Assembly in Semi Cryo engine SCE-200

1.2. Satellite Subsystems

L&T has been manufacturing and supplying several mission critical hardware for satellite subsystem.

Track Record

- ❖ **Solar Array Deployment Mechanism** is which stows and deploys the solar array of a satellite. Delivered more than 60 SADM wings to ISRO in the last two decades.
- ❖ **Reflector Array Deployment Mechanism** is which stows and deploys the reflector array of a satellite. Delivered more than 10 RDM wings to ISRO
- ❖ **Titanium gas bottles** for fourth stage of PSLV and INSAT
- ❖ Solar Substrates, Bus Structure, development of deployment mechanism for **Defence Satellites**



1.3. Satellite Platform

L&T is developing a Satellite Platform for Micro Satellites (<200 kg) along with indigenously developed subsystems.

2. L&T in Space – Midstream

2.1. Tracking Navigation and Exploration Systems

- ❖ The **32 m wheel-and-track antenna** is a state-of-the-art structure installed by L&T at the Indian Deep Space Network (IDSN) at Byalalu, near Bengaluru to track and send commands to ISRO's deep space missions.
- ❖ The antenna is a 32 m parabolic-shaped reflector fashioned from 180 stretch-formed panels. It has been designed and assembled to an overall accuracy of 0.3mm RMS.
- ❖ L&T has installed **Precision Monopulse Tracking Radars (PMTR)** at the Satish Dhawan Space Centre, Sriharikota (SDSC SHAR) and ISRO for fast acquisition and tracking of satellite launch and re-entry vehicles. Available in both C and S-band versions, these radars have been operational since 2009.



2.2. SATCOMM infrastructure

GSAT-11, GSAT-20 & GSAT-29 Ground Systems

- ❖ L&T has been entrusted with the installation and commissioning of the complete Ground System Network comprising all gateway stations and related equipment for GSAT-11, GSAT-20 and GSAT-29.
- ❖ The project includes system engineering, associated design and development, supply of hardware and software, installation, integration, commissioning and testing of the gateways.
- ❖ Major OEMS partnered with M/s Viasat, USA & Gilat Satellite Networks, Israel



2.3. Ground Testing Infrastructure

L&T have developed and built critical aerodynamic test facilities for ISRO

- ❖ L&T designed & set up a one-metre hypersonic wind tunnel - one of the world's largest – at the Vikram Sarabhai Space Centre (VSSC).
- ❖ As part of the hypersonic wind tunnel project, a one-metre shock tunnel was set up by L&T at VSSC.



3. L&T in Space – Downstream

L&T Infotech-Mindtree, helps businesses evolve next gen processes and products by fusing design thinking with cutting edge technologies including Geospatial Engineering, Internet of Things (IoT) and AI/ML led analytics for better decision making. Geospatial Technologies focuses on integrating data from a wide range of advanced locational technology sources, including global navigation satellite systems (GNSS), EOS, Light Detection and Ranging (LiDAR), Drones, RADAR and other 3D scanning technologies plus all desktop and enterprise geographic information systems (GIS). The selective and strategic integration of multiple data sources results in a more accurate understanding of the realities of structure and terrains. Enterprise GIS dashboards elevate insights to inform real-time business decisions.

Airtel Business is India's leading and the most trusted technology services provider, offering a gamut of solutions for seamless connectivity, IoT, cloud services, data centre, network security, Ad Tech, and CPaaS. The company also provides state-of-the-art network integration, managed services, enterprise mobility, and digital media solutions. Airtel Business ensures that it caters to the digital needs of businesses of all type be it enterprises, government entities, carriers, start-ups and small medium businesses. Customer not only in India but also across the globe are reaping the benefits of the company's solutions.

While continuously refining its existing diverse portfolio of offerings, Airtel Business is consistently innovating in the realm of digital service delivery to provide an exceptional end-user experience, round-the-clock infrastructure availability, and top-notch support service.

Explore the wide spectrum of technology solutions offered by Airtel Business:

1. Airtel connectivity:

Airtel Connectivity is an umbrella for various solutions that extends seamless business connectivity. With solutions from Airtel Office Internet, which is a business broadband solution bundled with business management solutions to Airtel Dedicated Internet, a high-performance internet leased line to accelerate business productivity, Airtel ensures high-speed, secured, and reliable connectivity for businesses. The company also offers Airtel Intelligent VPN to help businesses accelerate their cloud-ready network transformation with its hybrid connectivity services & industry-leading managed SD-WAN solutions.

2. Airtel IQ:

Airtel IQ is a cloud communications platform-as-a-service that enables brands to engage with their customers through omni-channel platforms such as voice, SMS, and WhatsApp. Airtel IQ is one of the largest CPaaS companies in India and the only telco based CPaaS companies in the world. In fact, Airtel is the first telecom company in the world that serves as a Business Service Provider (BSP) for WhatsApp.

3. Nxtra by Airtel:

Nxtra by Airtel offers India's largest network of secure, scalable, and sustainable data centres in India to leading enterprises, hyperscalers, start-ups, SMEs, and government entities. Nxtra provides state-of-the-art inter-connected 12 large and 120 edge data centers. Airtel is a futuristic

company that is focused on providing sustainability solutions. Thereby, Nxtra has become the first data center

company in India to implement hydrogen-ready fuel cell technology to provide clean energy.

4. Airtel Secure:

Airtel Secure is a multi-layered, full-service cyber security solution for business to protect themselves against threats of any kind and origin. Airtel Secure provides customers with managed endpoint protection, managed SOC services, cloud DDOS protection, and more. Airtel has partnered with the leading cybersecurity solution providers like Cisco, Radware, VMWare, and Forcepoint to deliver these services.

5. Airtel IoT:

Airtel IoT is an IoT platform powered by future-ready connectivity technologies to support the flexibility need of a business and its journey towards automation. Today, Airtel IoT powers 16 mn+ devices and is the No. 1 player in the IoT connectivity space in India.

6. Airtel Cloud:

Airtel Cloud offers customers a wide range of cloud products—Sovereign, Public & Edge to meet the hybrid-cloud requirement of businesses. Airtel guarantees SLA driven services, assisted migration, and a management platform backed by a network of 12 large data centres and 120+ edge data centres. Customers also get a superior price to performance as Airtel own the entire infrastructure.

Airtel Global Business:

Airtel Global Business is a US \$1.2billion B2B business assisting carriers, mobile operators, OTTs, multinationals, and content owners across the globe to have a better connectivity. Airtel adds value to businesses through its tailored, engineered-for-speed, state-of-the-art voice, data, connectivity, cloud, and digital solutions. Operating with the widest and largest ecosystem of partners and infrastructure, this business caters to 2000+ enterprises & government entities, 1+million SME's, 1200 global partners serving 480+ million customer base.



OneWeb: The Global Connectivity Solution for Government Customers.

An Evolving Defence and Security

Today, governments, agencies and departments must be suitably equipped to handle an increasing number of tasks, often conducted in complex and diverse operating environments.

These can include military operations against highly capable peer adversaries in contested environments through to emergency response missions in some of the most isolated areas of the World.

Wherever they operate, armed forces demand optimal levels in situation awareness and command & control (C2) to successfully plan missions; develop innovative concepts of operation; and integrate with national and international partners.



The OneWeb Solution

Critical to any mission or task are rapidly deployable communication networks which provide governments with Beyond Line of Sight connectivity in contested arenas as well as the most remote regions of the World.

OneWeb's Global Connectivity Platform is ideally suited to supporting operations anywhere in the World, at anytime.

Providing end users with an "ecosystem" of solutions, OneWeb enables a truly multi-domain capability to satisfy the most critical communications requirements.

OneWeb's global constellation of LEO satellites is supported by an eco-system of ground gateways, user terminals and software services, providing governments with secure voice and data communications.

This not only provides end users with robust, resilient and flexible levels in connectivity where it matters most, it also enhances situation awareness and C2 in addition to streamlining decision-making processes.

Use Cases include:

- **First Responders**
- **Humanitarian Aid/Disaster Relief**
- **Search and Rescue**
- **Peacekeeping Support**
- **Homeland Security**
- **Maritime Surveillance**

The first phase of OneWeb's Global Connectivity Platform- providing coverage across North America, Europe and the Arctic- went live in November 2021.

SNPs and POPs will be extended to South India as part of Phase 2 in Q4 2023 as OneWeb enables global coverage with the exception of China and Russia.

Advantages include:

- **Global Roaming**
- **Real-time C2**
- **Latency as low as <70ms**
- **High speed communications on-the-move**
- **High throughput (more than <100mbps)**
- **Multi domain terminals to be presented throughout 2023**
- **Low electromagnetic signature**
- **Competitive costs**

Operating alongside our strategic partners, OneWeb stands ready to support the global connectivity requirements of government customers, no matter where they are operating.

ELENA NAVIC PROCESSOR (ELNCE1A)

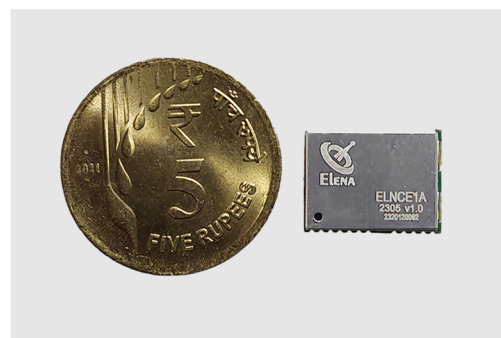


This is a high-performance dual-band (L1, L5) GNSS processor capable of tracking most global navigation systems. This is crafted through a 12 nm process. It integrates efficient power management architecture to perform low power and high sensitivity operations. The RF front end of the processor is specifically designed to comply with sensitivity specification for NavIC applications laid down by ISRO.

VISIT OUR STALL FOR MORE INFORMATION

This Multi GNSS NavIC processor can be used for in all Position, Navigation and Timing applications. Some are listed below:-

- High-Precision Position applications
- Timing Applications
- Automotive navigation
- Marine navigation
- Aviation applications



ACTUAL SIZE

ELENA GEO SYSTEMS PRIVATE LIMITED

No 62/1, 1st Cross, 2nd Main, Ganganagar, Bengaluru, India, PIN - 560032

+080 23554555 +91 9384864411 +91 9384864422

info@elenageosystems.com sales@elenageosystems.com

www.elenageosystems.com



ELENA GEO SYSTEMS

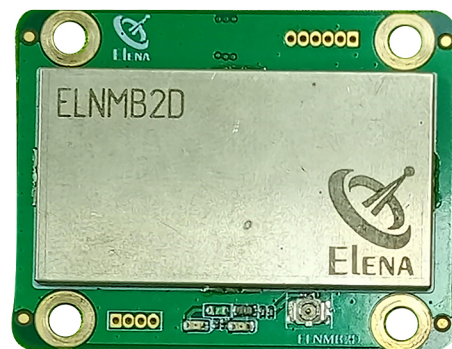
ISO 9001:2015 Certified



NavIC Module
ELNMC1A



NavIC Processor



NavIC Module
ELNMB2D

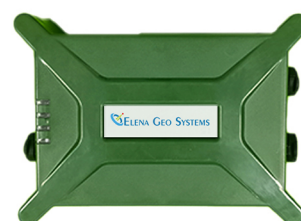
We have all hardware and software to enable use of NavIC



IVTS Receiver



Drone Unit With Stand



Marine Receiver



Antenna



NavIC Clock



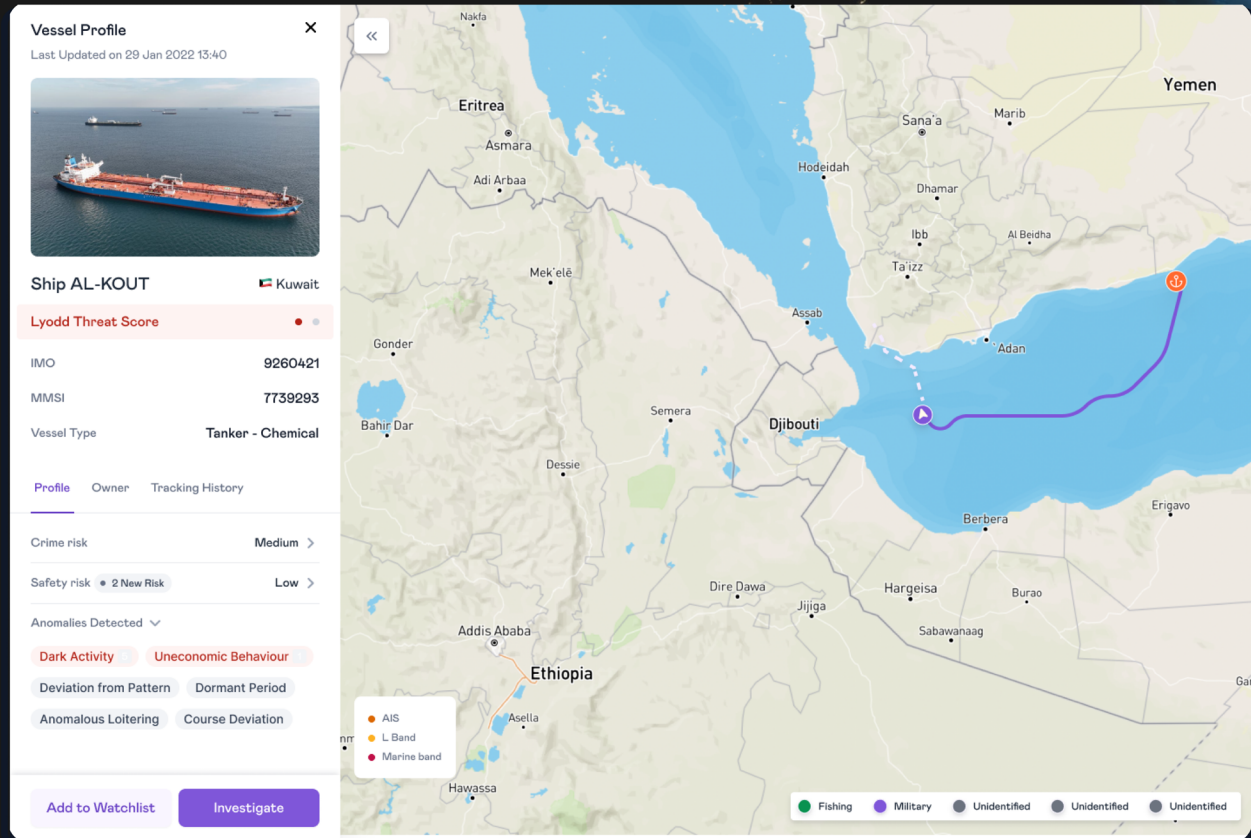
Drone Unit

Contact us

+91 9384864422
info@elenageosystems.com

www.elenageosystems.com
www.elenageosys.com

Kawa's ISR Stack



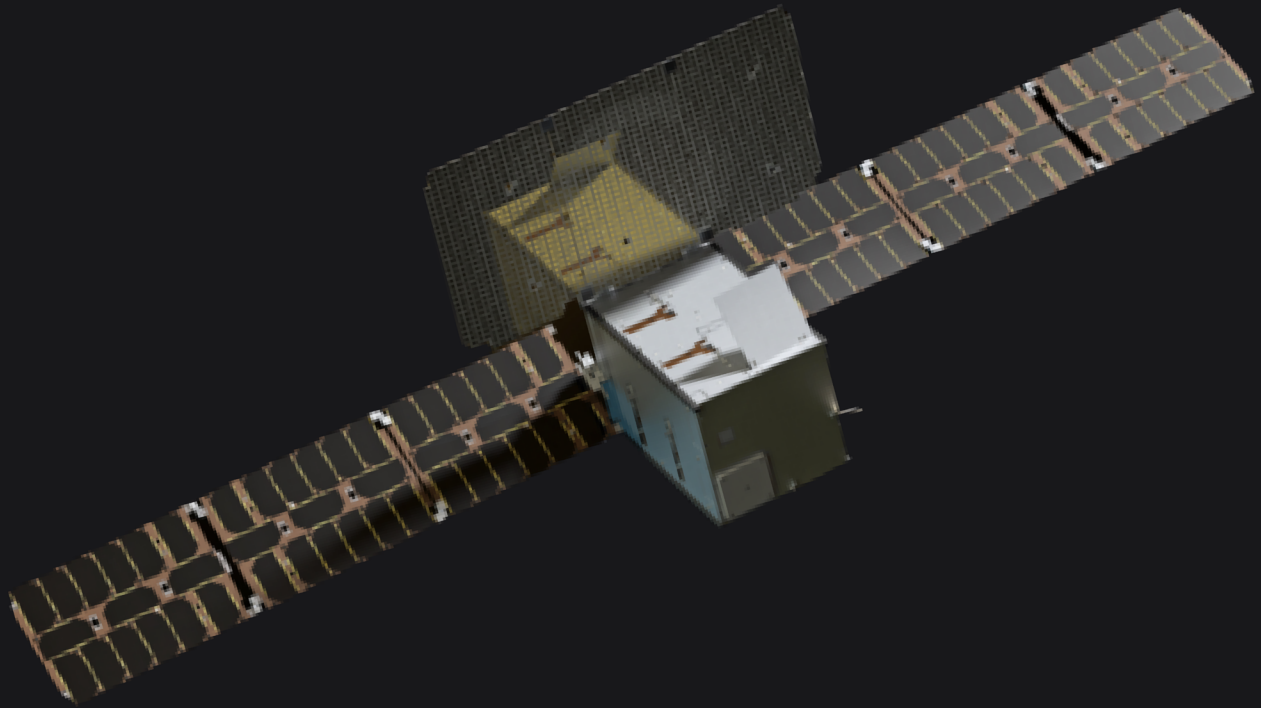
Battlefield OS powered by Data Fusion and AI.

- ✓ Powerful software platform to combine AIS, SAR & RF geo-Intelligence.
- ✓ Custom Area Domain Awareness and MDA toolkit for users.
- ✓ Deployment-ready solutions for IUU fishing, Decarbonizing Maritime Transport, and Global maritime logistics monitoring
- ✓ End user query processing within milliseconds

Visit us at <https://kawa.space/>



Space powered SIGINT and ELINT.



A unified SIGINT and ELINT platform powered by 18 Satellites with frequency mapping from 30MHz to 18 GHz.

Kawa Space is building an RF Constellation and a ISTaR focused platform that can geolocate RF signals up to 18 GHz, helping users visualise & analyse the RF signals, and track anomalous activity.

18 Satellite Constellation

- ✔ Equipped with AIS and RF Payload.
- ✔ Frequency mapping from 30 MHz to 18GHz.
- ✔ Near real-time revisit for any location.

Custom Tools for MDA

- ✔ Detect S & X Navigation Radars and Satcom emitters to track any vessel activity.
- ✔ Powerful software platform for multi sensor data fusion.
- ✔ AI powered MDA - DSS platform

Improve Area Domain Awareness.

- ✔ Geolocate and understand radar installations.
- ✔ Track channels and device type of Satellite Phones.
- ✔ Data parameters : Frequency and pattern, Pulse ID, PRI, Pulse width, location and many more.

Visit us at <https://kawa.space/>



India's leading and Innovative Satellite Communication service provider

Bringing the benefits of digital revolution to Enterprise, Government, Defence, Aero, and Maritime sectors

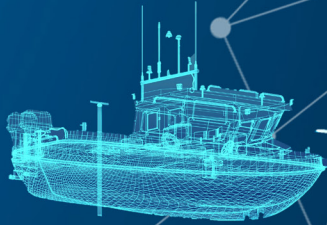
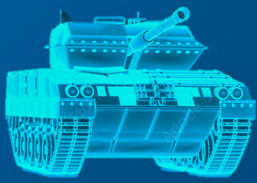
Adopting latest satcom technologies with unmatched agility

Pioneering customized services for critical applications

**Dedicated hub and shared hub
Satellite Communication Services**



**Bridging the digital divide
Connecting the unconnected**



Contributing to Indian Defence-Space aspirations

Providing connectivity and
Command & Control capability
in the remotest parts of the country
including border areas



**Critical Communication during
Crisis and Disasters**

**Fixed/ mobile/ On-the-pause
connectivity solutions (Land, Air, Water)**

**Flexible, Rapidly deployable, Secure and
Resilient ...even in hostile environment**



**Building a 'connected everything' world
Impacting lives where it matters most**

Geo-Intelligence

Pléiades

Spot the Detail

PLÉIADES BENEFITS

- 50cm data over 20km swath
- Data delivery in record time
- Guaranteed capacity
- Daily revisit

PRODUCTS

- Panchromatic: 50cm
- Multispectral: 2m
- Colour: 50cm (merge)

REVISIT RATE

- Daily (constellation)

SPECTRAL BANDS

- P: 470 – 830nm
- Blue: 430 – 550nm
- Green: 500 – 620nm
- Red: 590 – 710nm
- Near-infrared: 740 – 940nm

SWATH WIDTH

- 20km

TASKING

- Work plan updated every 8 hours

PROCESSING LEVELS

- Primary (1A), Ortho (automatic), or Tailored Ortho

Geo-Intelligence

WorldDEM™

Reaching New Heights

THE NEW STANDARD OF GLOBAL ELEVATION MODELS

WorldDEM™ at a glance:

- Superior elevation information anywhere on Earth
- Homogenous standardised pole-to-pole coverage
- Unrivalled accuracy: 2m (relative) / 4m (absolute) vertical accuracy in a 5m x 5m raster
- Easy access

Authorized Distributor: India

MICRONET SOLUTIONS

Plot No.80, KT Nagar, Katol road, Nagpur- 440013

Phone: +91-9422 104111, +91-844-6563560 | Fax: +91-712-2570055

Email: info@micronetsolutions.in, marketing@micronetsolutions.in

www.micronetsolutions.in

Authorised Partner
MICRONET

Pléiades Neo-30cm

AIRBUS SUCCESSFULLY LAUNCHES TWO 30 CM SATELLITES IN 2021



4-Identical Satellites

30 Cm Colour Imagery



Product resolution

Panchromatic
0.3m



Swath

14 km at Nadir



Geolocation Accuracy

<5m CE90



Revisit capacity

Daily, anywhere (30° off-Nadir)
Twice daily, anywhere (46° off-Nadir)



Spectral bands

Deep Blue, Blue, Green, Red,
Red Edge, Near-infrared, Panchromatic

Plot No.80, KT Nagar,
Katol Road, Nagpur - 440013

+91 94223 33449, +91-9422104111

info@micronetsolutions.in
marketing@micronetsolutions.in

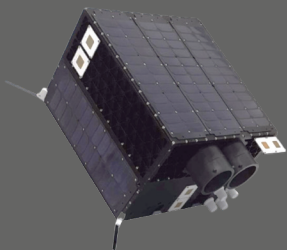
www.micronetsolutions.in

AIRBUS

MICRONET

Mass Manufacturer of Satellites & Subsystems

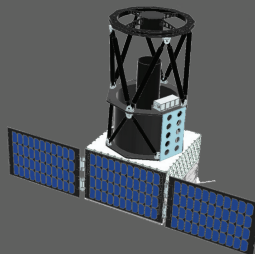
LEOS - 50



LEOS - 50 for small payloads
with normal power demand
– Optical, SIGINT

- EO Payload
- GSD: 4.5m
- Swath 70 km
- Wide Area Coverage

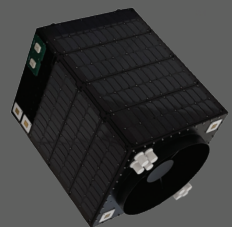
LEOS - 100HP



LEOS - 100HP for large payloads
with high power demand
– SAR/EO payloads

- SAR/EO Payload
- SAR - Mode: Spotlight, Stripmap and Scan SAR
- EO: Day/Night (NIR, RGB, MS)

LEOS - 200



LEOS - 200 for large payloads
with normal power demand
– 50cm resolution Optical

- EO Payload
- GSD: 50 cm
- Swath 10 km
- Day/ Night

Our Expertise

- Automated and Scalable Manufacturing
- 80% of the sub-systems made in house
- Our flexible bus platform enables mass manufacturing of small satellites in the 50-150kg class
- We offer capacity building for emerging space nations, in orbit demonstration for your payloads and provide entire mega constellations

Heritage and Manufacturing at Scale

- We bring experience of participating in 75+ satellite missions.
- With a team of 100 design and manufacturing engineers and 30,000sq ft of manufacturing facility

Geared up to deliver for the most demanding missions

The Facility

- Asia's first private satellite factory located in Ahmedabad , Our facility offers design, development, manufacturing, testing and qualification capabilities under a single roof
- Annual production capacity of 100 satellites/year

ABA Satellite manufacturing factory is equipped with all testing facilities:

- Vibration Shaker: 1 Ton, 2.5 Ton and 6.5 Ton
- Thermo-Vacuum Chamber: Temperature range -190° C to + 150° C with 36-inch wide and 54-inch long Chamber
- EMI - EMC with MIL-STD-461G Compatible with SAC 3Plus Anechoic chamber
- Climatic Chamber
- Additive Manufacturing Facility
- Helmholtz cage HIL Test Facility
- Satellite Bus system production facility
- Solar panel production and test facility
- Wheel balancing facility
- ADCS Integration and test facility
- Disassembled mode integrated test: 3 Facilities
- Satellite AIT: 6 Facilities
- Optical Payload Test: 2 Facilities
- Satellite Final Autonomous test: 2 Facilities
- Post production Satellite storage facility - 6 Satellites can be stored.
- Basic Machine Shop



ABA Facility



Testing Facility



EMI - EMC Facility



TVAC Facility



Climatic chamber



Vibration Test Facility

CENTUM AT A GLANCE

- Established in 1994 - 28 years of Solid experience in ESDM
- 2000 Employees
- Design, Engineering, Manufacturing & Test facilities spread across 350,000 SFT
- A new world class manufacturing facility at Bangalore Aerospace Park
- Customer list include Fortune 500 companies
- 80% of revenue from Exports to 17 countries World-Wide
- Revenues \$130M
- Public Listed Company (BSE, NSE)

CERTIFICATIONS

- AS 9100 Rev D
- ISO 9001:2008
- ISO 13485:2003
- ISO 14001:2004
- ESD 20:20 Certified
- OHSAS 18001
- CEMILAC & ISRO
- Independently Certified Reliability Test House

INDUSTRIAL

AEROSPACE

SPACE

DEFENCE

MEDICAL

COMMUNICATION

**TECHNOLOGY
AWARD FROM DEFENCE
MINISTER OF INDIA**

**GEOGRAPHICAL
PRESENCE**



OUR OFFERINGS

- End to End Product Development
- Redesign Value Added Engineering
- Electronic Manufacturing Services
- Product Life Cycle Management
- Complex Diagnosis & Repair

COMPETENCIES

- Power
- RF/Microwave
- Digital
- Electro-Optics
- System and Subsystems
- Microelectronics

**LISTED IN THE
FORBES ASIA'S 200
BEST UNDER
BILLION LIST**

**WORLD ECONOMIC FORUM -
TOP GLOBAL
GROWTH
COMPANY**

INDIA HQ

No. 44, KHB Industrial Area
Yelahanka New Town,
Bengaluru - 560106

UNITED KINGDOM

16, Great Queen Street,
Covent Garden,
London, WC2B 5AH

FRANCE

4, chemin du
Ruisseau 69130
Ecully

UNITED STATES

1621, Central Avenue
Cheyenne, WY

CANADA

3200 rue Guenette, Saint Laurent
Mortreal H4S 2G5, QC Canada
Tel.: +1 514 312 9012

INDIA : 'Avansa', Plot-58P, Survey No.8, KIADB, Bengaluru
Aerospace Park Industrial Area, Jala Hobli, Budigere Post
Bengaluru - 562129, Tel : +91 80 71214000

NCC Urban Windsor : 76/2, 6th & 8th Floor,
New Airport Road, Opp. Jakkur Aerodrome, Allalasaandra
Yelahanka, Bengaluru-560064, Tel : 91 80 46798800

BELGIUM : Espace Tresignes
Avenue General Michel 1 er, 6000 CHARLEROI
Belgium, Tel : +32(0) 477 643237

NEXT LEVEL ISR USING SPACE 2.0



SATELLITE AS A SERVICE
ALL WEATHER, DAY & NIGHT, ANALYTICS ON DEMAND.

High Res. Satellite Data for
ISR Requirement
SAR | OPTICAL | THERMAL

Solutions & Services
Sensor Agnostic | AI/ML Based



HIGH RESOLUTION:

- SAR: Upto 0.25 m
- OPTICAL: Upto 0.70m
- THERMAL*: 3.5m

GUARANTEED INTRA-DAY MONITORING

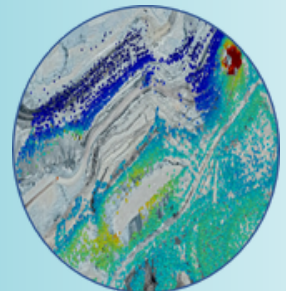
MOST ECONOMICAL

SPEED AND ACCURACY

INTEGRATED TASKING PLATFORM



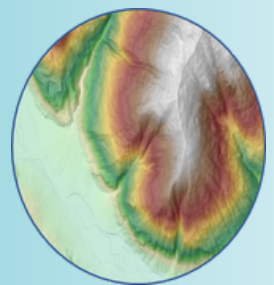
Disaster Monitoring



Slope/Infrastructure
Monitoring



Strategic Site
Monitoring



Topographic &
Hydrologic risk study

MONITORING EVENTS IN NEAR-REAL TIME

SUBSCRIPTION BASED SAAS PLATFORM

HIGHLY SCALABLE & CUSTOMISABLE

SUHORA
B-319 , NOIDA ONE
SECTOR-62, UTTAR PRADESH, 201309
+91 120 311 4171 , +91- 99996 64437
sales@suhora.com

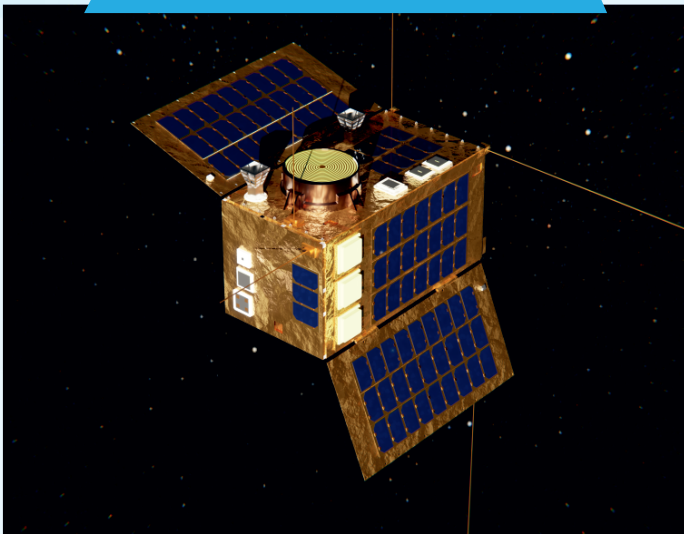
* Available by Q3

SEE IN ACTION:



DECODING THE **UNSEEN** SPACE POWERED DOMINANCE.

CITADEL EW/EO Satellites



V/UHF Ground Station System



- Multi-satellite constellations for Targeted revisit times
- Frequent revisit over target
- Each satellite equipped with AIS and EO/EO+IR/EW payloads
- Dedicated modular bus for adaptable payloads
- ITAR free component selection for EUC clearance
- Majority of satellite subsystems are in-house OEM designs of Kepler, reducing risk of technological access curtailment in case of international sanctions.
- Allows for customization as per customer specification
- > 5 year operational mission life

The Kepler Ground Station system is a turnkey solution to prioritize, autonomously track, and communicate with earth-orbiting satellites operating on VHF, UHF & S band frequencies.

The Kit consists of an antenna-rotor unit and an indoor tracking and communications system that work together to create a fully functional satellite tracking suite. Kepler's unified ground station suite allows for a turn key activation of SATCOM services for educational and commercial use. With indigenous components and mil grade encryption systems, security and ease of operation are paramount.

CONSTELLATION CAPABILITIES

- Data/Command link sharing
- Data fusion
- Coordinated imaging over target
- Attrition replacement
- Mesh Logics

V/UHF Transceiver

Frequency Range	RX / TX	Selectable Frequency 140-150 MHz 435-440 MHz 400-410 MHz
Frequency Stability		±2 ppm at 25 C

Event Gallery

ISpA Launch Ceremony: 11th Oct 2021



ISpA Space Track at Geointelligence 2022



ISpA-ISRO Seminar for MSME's



ISpA Indian Space Conclave 2022



Space Technology Conclave 2022



ISpA-Kalaari Connect: Delhi Edition 2022



ISpA-Blue Origin Workshop 2022



Seminar & STP Concept Paper Release at Aero India 2023.



BLOCK YOUR CALENDAR

INDIAN SPACE CONCLAVE

2023

Date

10-12 October 2023

Venue

**Manekshaw Centre, Delhi
Cantt, New Delhi**

JOIN US

We invite you to join the association to actualize the Hon'ble Prime Minister's vision of a five-trillion-dollar economy in an "Aatmanirbhar Bharat". The multi-billion-dollar world space economy, which is expected to grow to more than a trillion, needs to have a stronger Indian footprint with our industry playing a significant role.

Membership is open for Core, Associate, Start-up and Other categories



Address

Indian Space Association (ISpA)
Ground Floor, United Service
Institution (USI) Building,
(Opposite Signals Enclave),
Rao Tula Ram Marg,
Shankar Vihar,
Delhi Cantt, 110010.



Contact

+91 96673 03304



Email

coord.ispa.space@gmail.com
coord@ispa.space



@ISpA_India



@ispa.india



@ISpA- Indian Space Association