



Synergetic NAVCOM Applications (ICG-15)

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Presentation Overview

(Synergetic NAVCOM Applications using NavIC)

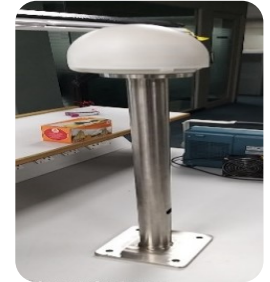


- **NavIC Based Asset Tracking in Maritime Domain**
 - Two-way S-band Transceiver with NavIC for tracking & emergency messaging
- **NavIC Based Asset Tracking of Airborne Systems**
 - Real-Time Aircraft Tracking System using NavIC
 - Real-time Crew Module Tracking System
 - UHF transmitter with NavIC for Search & Rescue Operations
- **NavIC for Safety of Life Applications**
 - Distress Alert Transmitter with NavIC Messaging Receiver
- **NavIC for Land Mobile Asset Tracking Systems**
 - Oxygen Tanker Tracking System for Covid Management
 - Real-time Train-tracking Information System
 - Personnel Tracker System

S-band Transceiver Terminal with NavIC for tracking of small boats

MSS Network designed for

- NACOM solution for periodic tracking of boats/ships
- Emergency Messaging (SoS) from Boat/Ship to Control Station
- Emergency Broadcast from Control Station to Boats/Ships
- Mobile App for Connectivity with Terminal using Bluetooth
- Technology developed and available with five Indian Industry



NAVCOM for Maritime

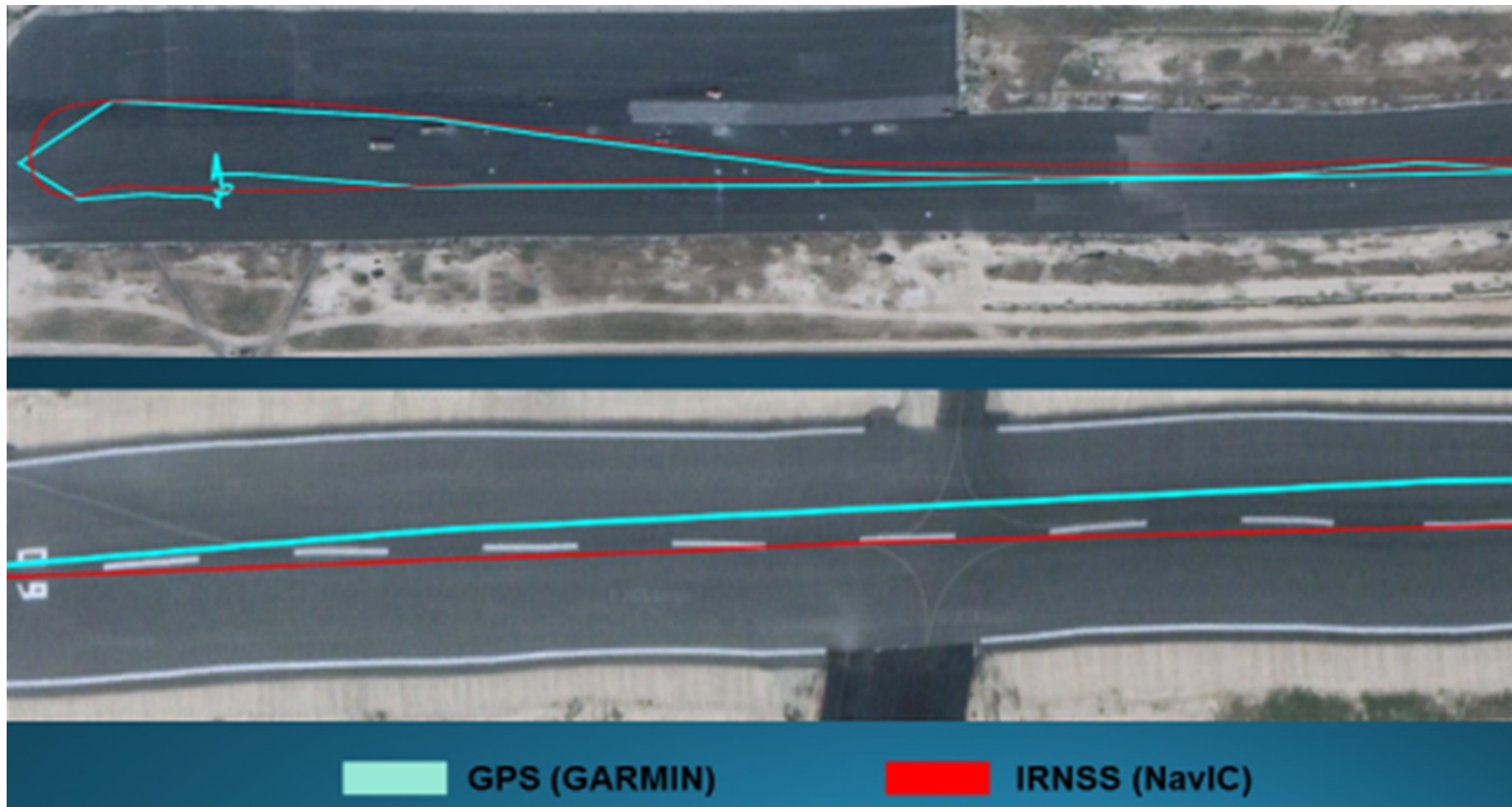
GNSS Performance evaluation for Airborne Application

MODE	HORIZONTAL POSITION ACCURACY (Mts)	VERTICAL POSITION ACCURACY (Mts)	PDOP VALUE	C/No (dB-Hz)	NUMBER OF SATELLITES	POSITION AVAILABILITY (%)
NavIC + GPS (HYBRID)	1.5	2.5	1.2-1.4	35-40	17-18	100
NavIC Only (L5 MODE)	3	4	3.5	35-40	07	100
GPS Only	3	4	1.8	40-45	9	100
GPS + GaGalileo	2	3	1.5	40-45	11	100

The tests were conducted to establish the **Accuracy and Availability** of the positioning in the above modes and to validate the operation of receivers under the **Dynamic conditions** of the aircraft

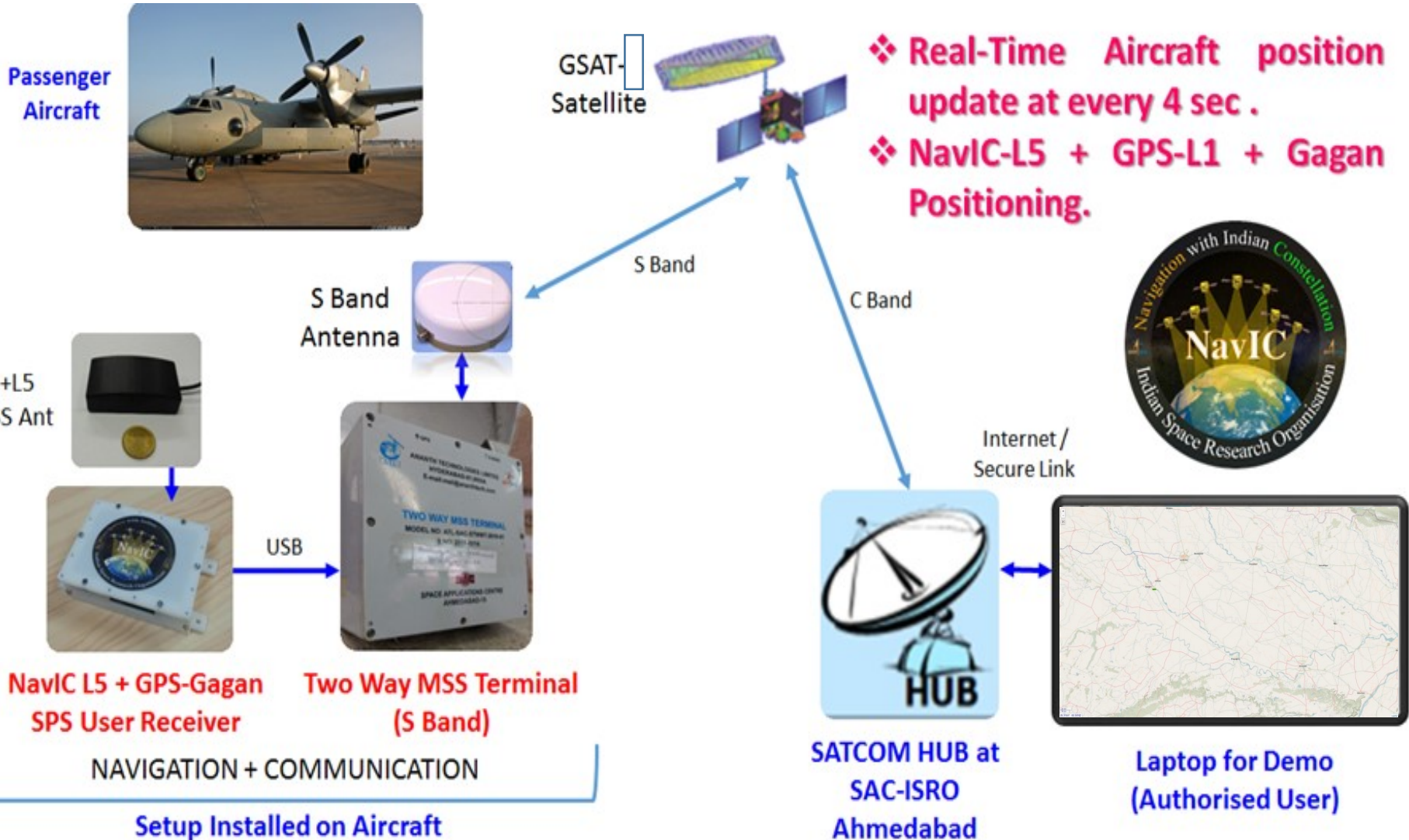
The NavIC and NavIC+GPS Receivers had a **very good accuracy** with **100% position availability**

Visual Performance Comparison



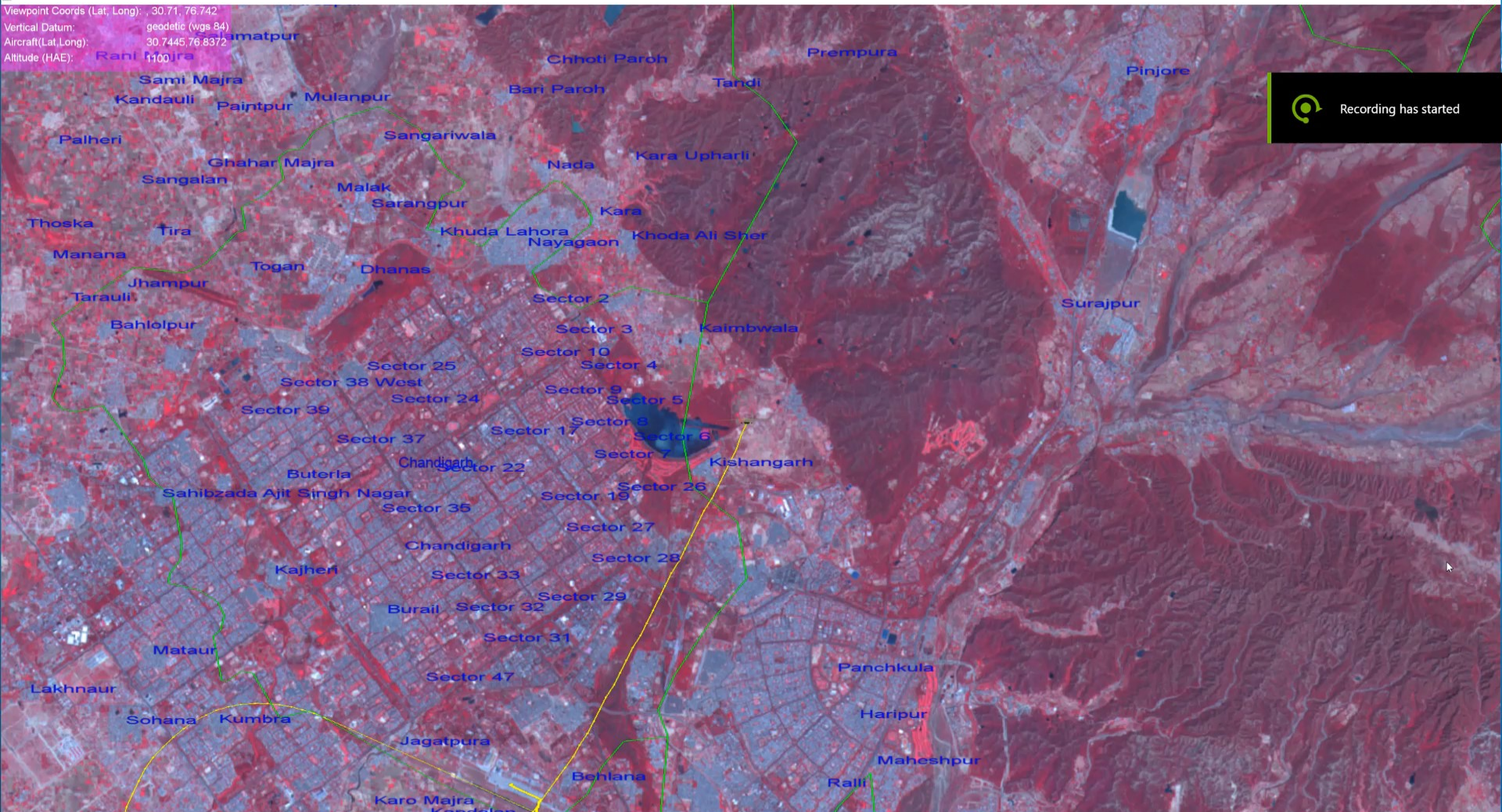
Real-time Aircraft Tracking System

(A NAVCOM Solution)



Real-time Aircraft Tracking System (A NAVCOM Solution)

Viewpoint Coords (Lat, Long): , 30.71, 76.742
Vertical Datum: geodetic (wgs 84)
Aircraft (Lat, Long): 30.7445, 76.8372
Altitude (HAE): 1100



NAVCOM: NavIC with MSS

(A technology demonstration for real-time tracking of crew module)

Launch Time : 07:00:00 IST

Splash Down Time : 07:04:19 IST

Communication Link

Before CM Fairing Separation:

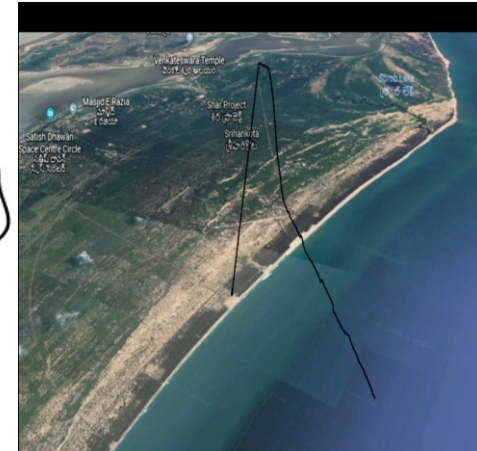
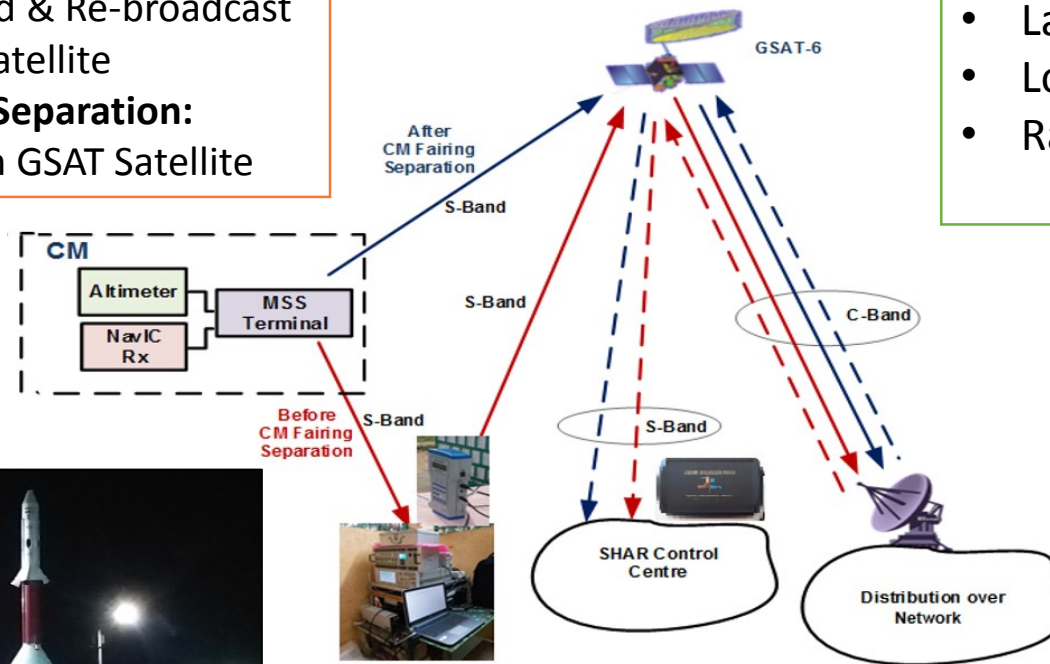
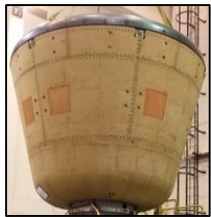
- Direct to Ground & Re-broadcast through GSAT Satellite

After CM Fairing Separation:

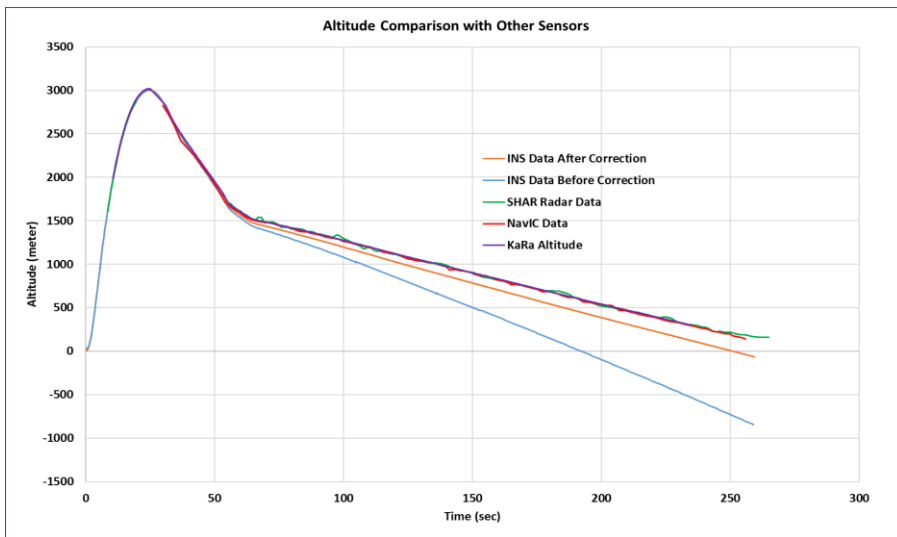
- Directly through GSAT Satellite

Splash Point Co-ordinates

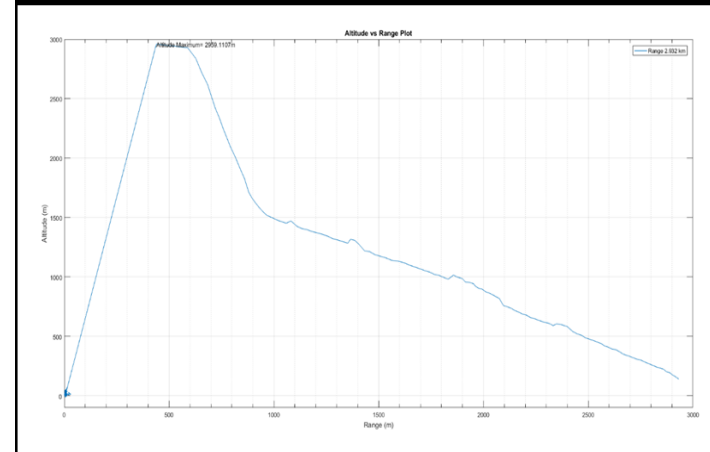
- Latitude 13.69145
- Longitude 80.25948
- Range 2932m



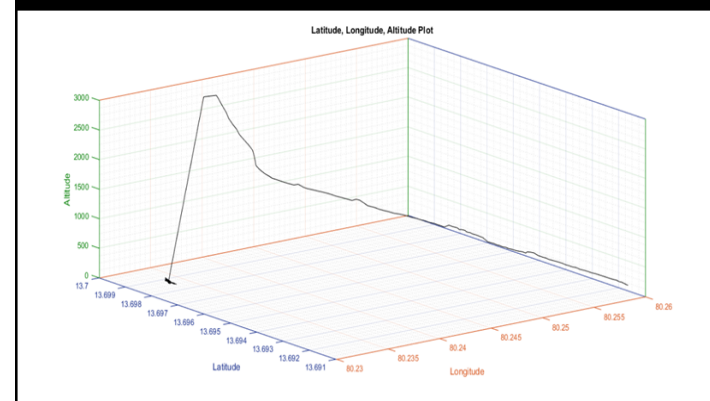
PAD ABORT TEST BY ISRO



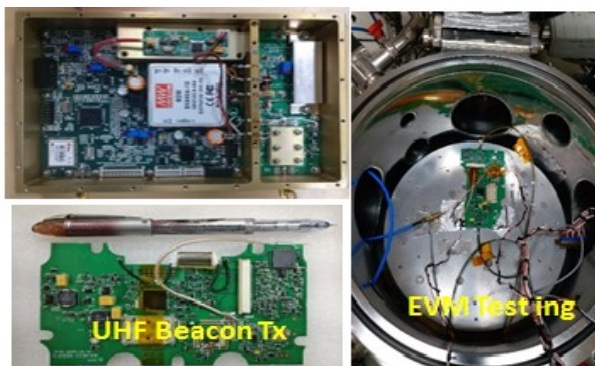
Altitude Vs Range: Based on NavIC data



CM Trajectory Based on NavIC data



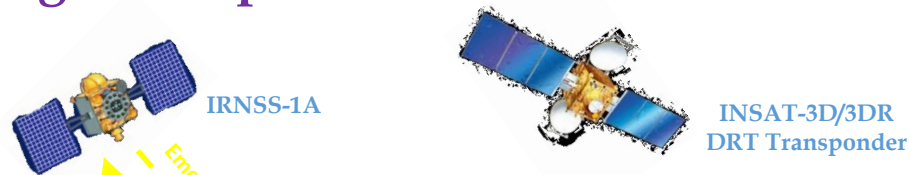
A UHF transmitter with NavIC is being developed compatible to Search & Rescue system of COSPAS-SARSAT for Recovery operations during Manned mission.



SAGARMITRA : A unique network to support emergency messaging by Fishermen while fishing at Deep Sea



Distress Alert Transmitter-Second Generation (DAT-SG)
(UHF Transmitter with Built-in NavIC Rx)



How an indigenous device and Indian satellites helped Indian Coast Guard in saving 7 lives at sea

The Indian Coast Guard (ICG) rescued a distressed fishing vessel 'RSN-TWO' and its seven crew members, on Thursday.

INDIAN SPACE RESEARCH ORGANISATION	
Solefit Features	
Modulation	BFSSQPSK
Data Rate	300bps
Ant. Gain	±0.3dB
Phase Difference	±3 deg.
Waveform	MSK with rate 1/2
Output Power	5 W (EIRP ± 1.0E)
Power supply	2xV Primary Lithium Battery
Technology Deliverables	
• Schematics, Gerber	
• Hex code for firmware	
• Limited Support for Development	
Present Platform Details	
Microcontroller	MCU 430C
Frequency	UHF
NavIC	Sky Trac

Technologies

Distress Alerts

- Medical
- Man Overboard
- Fire
- Boat Sink
- Terrorist Attack
- All OK

Achievements

- ✓ An Operational System Saving Lives of Fishermen.
- Conceptualized and Implemented by: Space Applications Centre, ISRO, Ahmedabad

- ✓ Distress Alert Msg. by Fishermen with Ack.
- ✓ Supports Weather, PFZ , Emer. Msg Broadcast

NavIC for Safety of Life Application



SAGARMITRA

Web based Network Management System for Distress Alert Transmitter

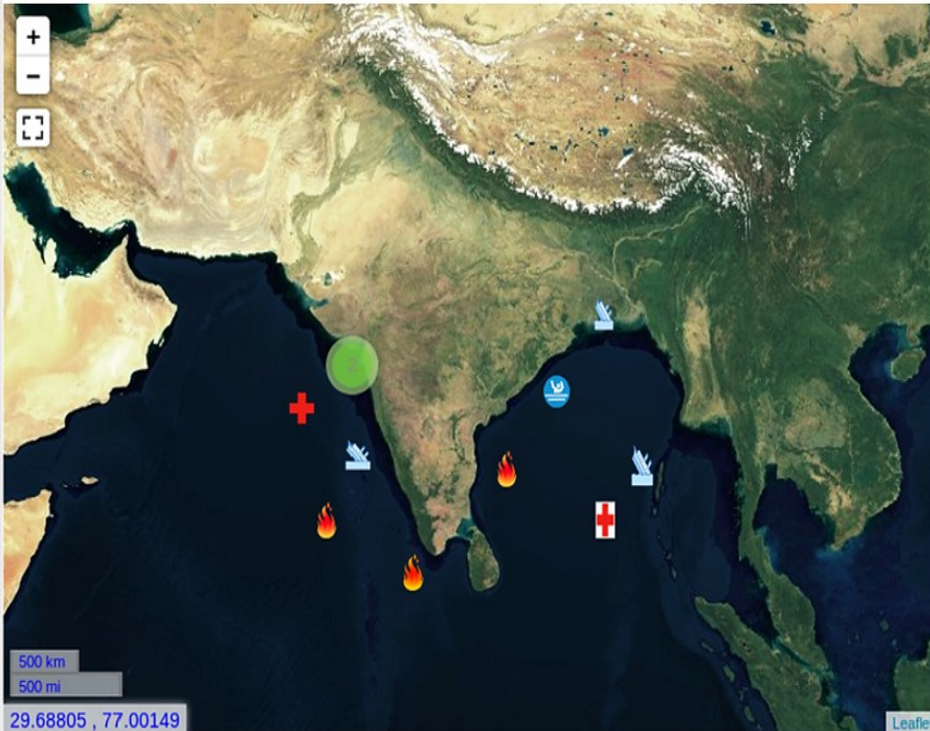
A- A+ 🔔 16 👤 admin

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Map View

- 🏠 Dashboard
- 📄 Terminal Info
- ✉️ Send Message
- 📝 Registration
- 📊 Current Activity
- 📅 Log View
- 📡 Nodal_MRCC
- 🐟 Fisheries MMD
- 📡 System Status
- 📍 Track
- 📡 Ethernet Port Info
- 📡 SMS Gateway

📍

Active Alerts Map



☰ Active Terminal Alerts Information
Latest
Prev

Terminal Id	Alert Type, Location & Status	System Time	Ack Status
1-144 #41	Medical 12.967587 N, 77.637265 E Good	2020-05-19 12:31:21.8531	Acknowledge
1-0-15 #38	Fire 12.967528 N, 77.637463 E Good	2020-03-06 17:28:06.429765	Acknowledge
1-0-15 #31	Fire 12.967598 N, 77.637397 E Good	2020-02-28 17:36:41.055873	Acknowledge
1-1-5 #35	Boat Sink 23.02305 N, 72.514927 E Good	2020-02-28 16:55:40.014864	Acknowledge
1-1-4 #32	Boat Sink 23.02294 N, 72.51474 E Good	2020-02-28 15:04:46.169898	Acknowledge
1:1:4	Man Overboard	2020-02-28 13:51:47.217659	Acknowledge

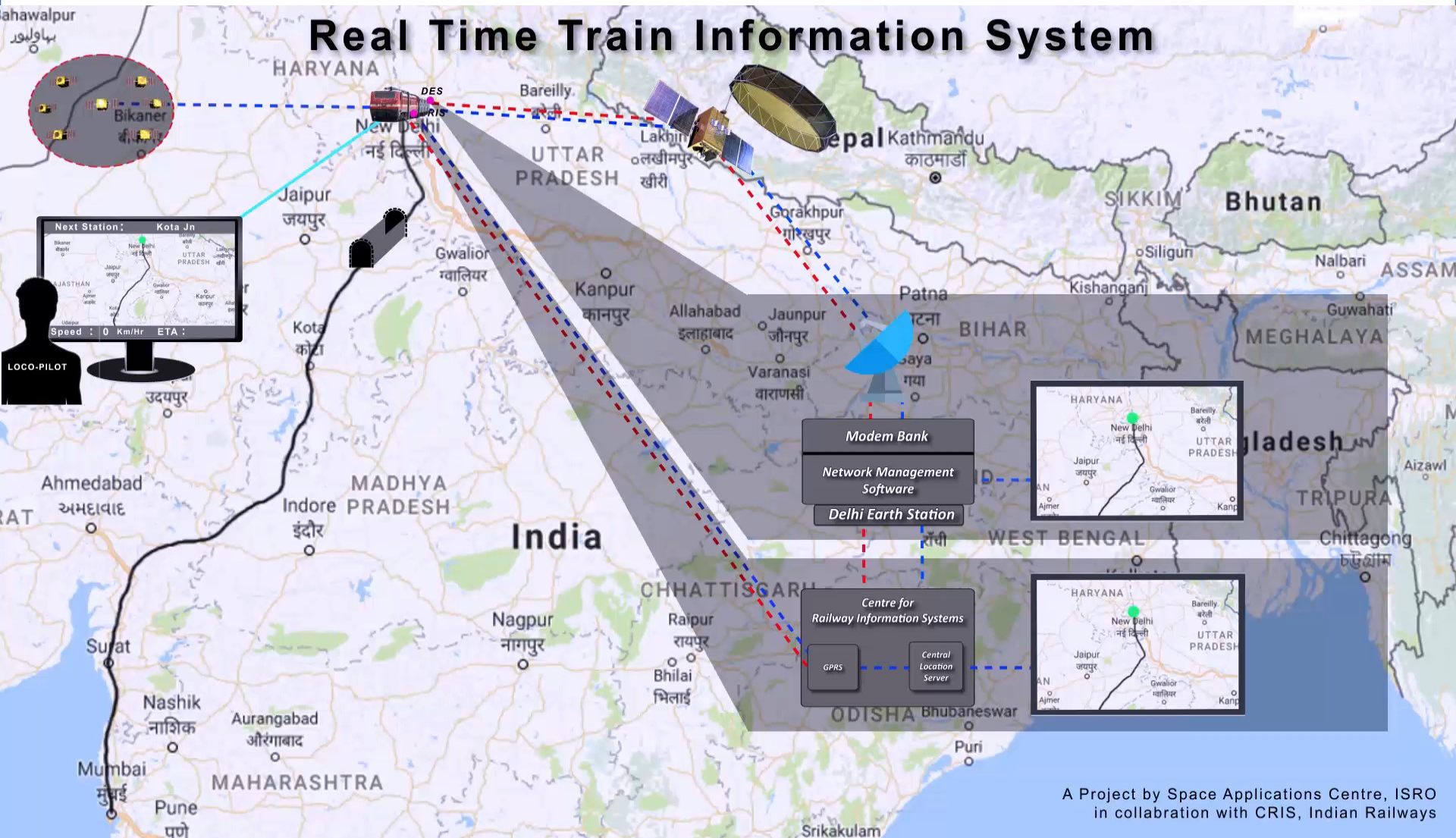
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Some successful development of NAVCOM solution for Land-mobile assets includes:

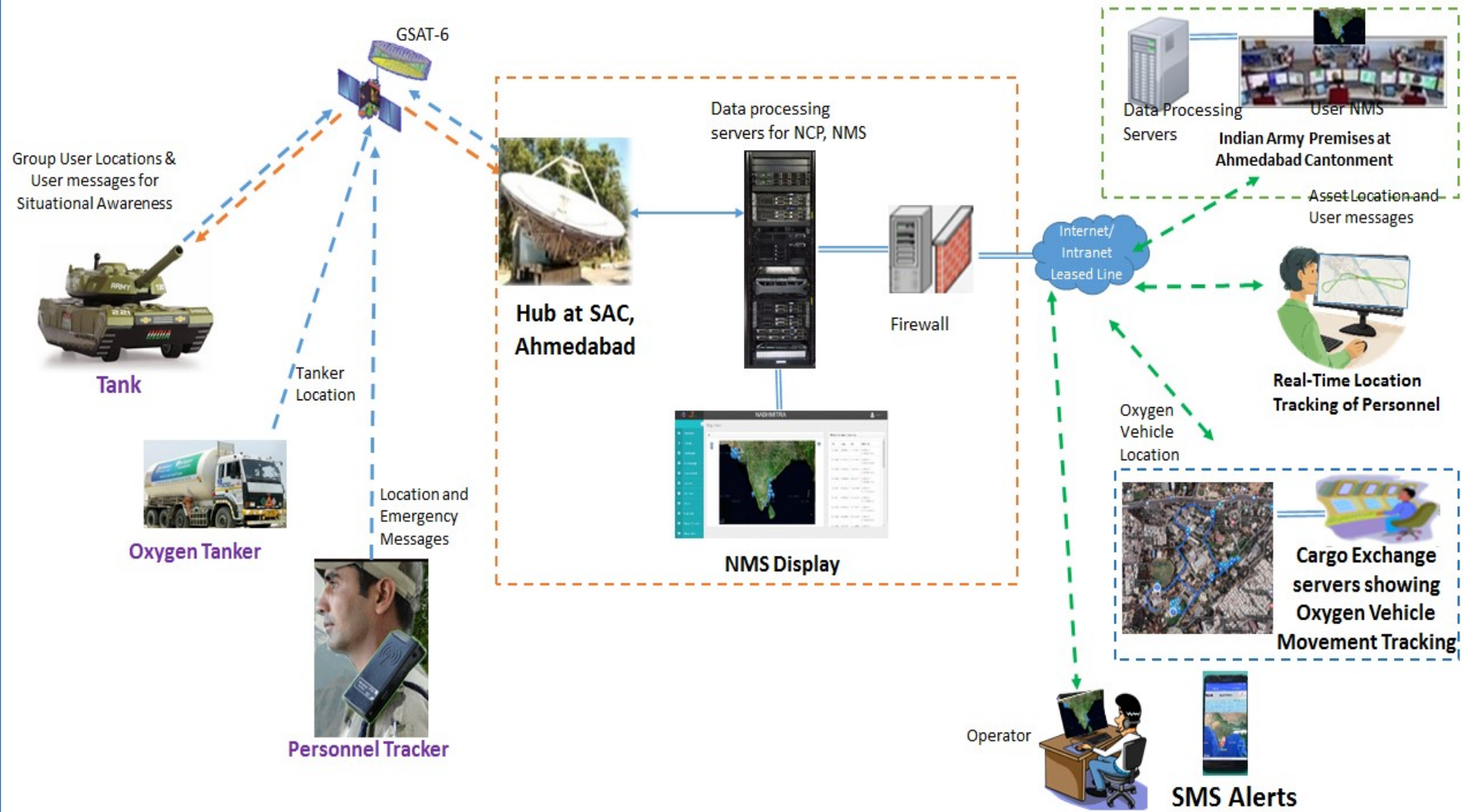
- NavIC based Real-time Train Tracking Information System for Indian Railways***
- NavIC with SATCOM was developed for Oxygen Tanker Tracking System to manage demand supply chain needs during Covid times***
- NavIC based Personnel Tracking System was developed for special user group and efforts are on to convert the solution as wearable device***
- NAVCOM solution is also being used to track, monitor and disseminate NavIC enabled position and other information to generate situational awareness***



A Project by Space Applications Centre, ISRO
in collaboration with CRIS, Indian Railways

2700 Locomotives are being tracked using indigenous NAVCOM solutions and 6000 more are getting added in the network in second phase of national roll-out.

NavIC based Tracking System for Land-mobile Assets

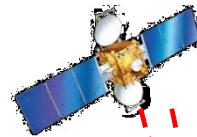


Personnel Tracker

NavIC based Personnel Tracking Terminal



Location and
Emergency Messages



GSAT
Satellite



Salient Features:

- ❖ NavIC + GPS + GAGAN based positioning
- ❖ Real-Time periodic position reporting (TDMA)
- ❖ Battery operation for long duration operation



Siachen Glacier

