

# Satcom Solutions





# Wireless Communication Semiconductors and Solutions Company



Chipsets and Systems for 5G Broadcast, 5G Broadband and Sat-com

Based on Saankhya's patented Software defined Radio (SDR) semiconductor technology

India's first fabless semiconductor company with world's first production SDR



Over \$20 M Investment in technology

Growing at 50% Year on Year



500 man years of experience from "Antennae to Bits", from systems to chips

ISRO's technology partner for all S band MSS terminals



**65+ international** patents; SEP pool of about 5 patents covering next gen "6G" RAN and convergence; 2 chips designed with first pass success and 1 in volume production; Field deployed indigenous Rural Broadband and Sat-com systems; Recognised as "India's Growth Champion – 2020" by Economic Times;



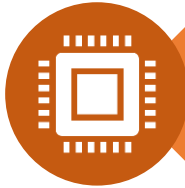
Founded in 2007; Headquartered at Bengaluru, India 190+ employees (Full Time & Contract) Global Customer footprint across all geographies



# End to End Satcom Solutions



Strategic MSS Technology Partner of ISRO



Based on indigenously developed patented award-winning Software Defined Radio (SDR) Chipsets



Capable of communication with satellites in LEO/MEO/GEO orbits



Communication in L-Band and S-Band frequencies



Configured to support open air interfaces and standard & non-standard waveforms

# Major Market Focus

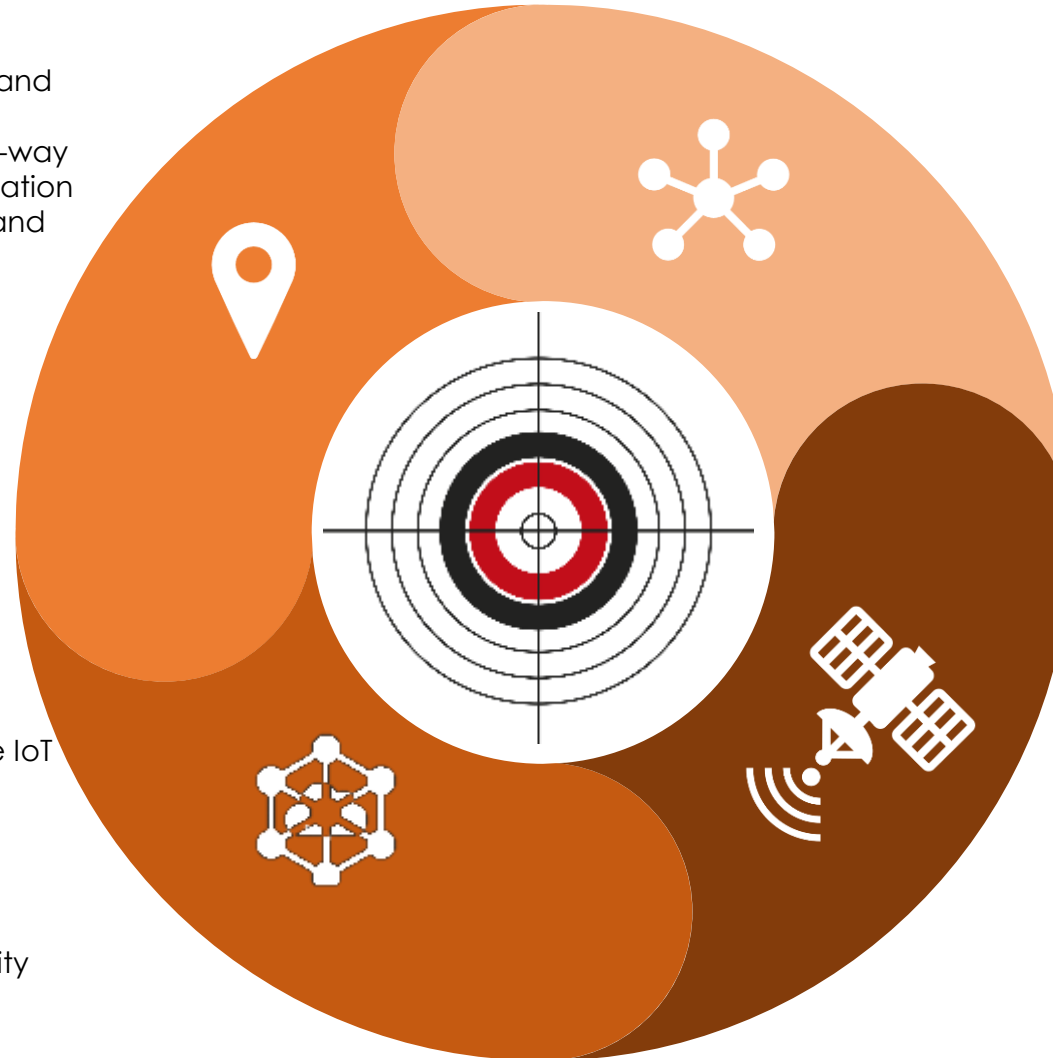


## ASSET TRACKING

- Real time location tracking of fixed and mobile assets
- MSS terminals installed in assets for 2-way communication with the central location
- Asset tracking solutions for railways and fishing boats

## SATELLITE IOT

- 2-Way Satellite IoT Modem for remote IoT sensors
- Remote monitoring, control and configuration
- Low Power, Small Form Factor IoT Solutions
- Used for Agri IoT sensors, Energy & Utility Sensors, Smart Grid Monitoring etc.



## HUBSIDE EQUIPMENT

- Modulators and Demodulators installed in central location
- Compact design
- Multichannel, supporting multiple waveforms
- Modular system, customized to application requirement
- Hubside and User-side NMS

## REMOTE COMMUNICATION

- Receive Only Terminals for communication in remote locations
- Sat phones developed for defence and strategic purpose
- Receive only Terminals for Tele-Education, Tele-Medicine and Infotainment in remote areas

# Our Products



NAVRAIL  
S-Band Locomotive  
Tracking Terminal



NAVDOOT  
S-Band Vessel Tracking  
Terminal



NAVSETU  
Sat-IoT Modem



TARANG  
L-Band Multichannel Burst  
Demodulator



GYANDOOT  
L-Band Satellite Receive  
Only Terminal



LEHAR  
S-Band Broadcast  
Receiver



SAMRAT  
Android Based  
Sat-Phone





# Asset Tracking





# 2-Way Communication and Tracking on High Seas



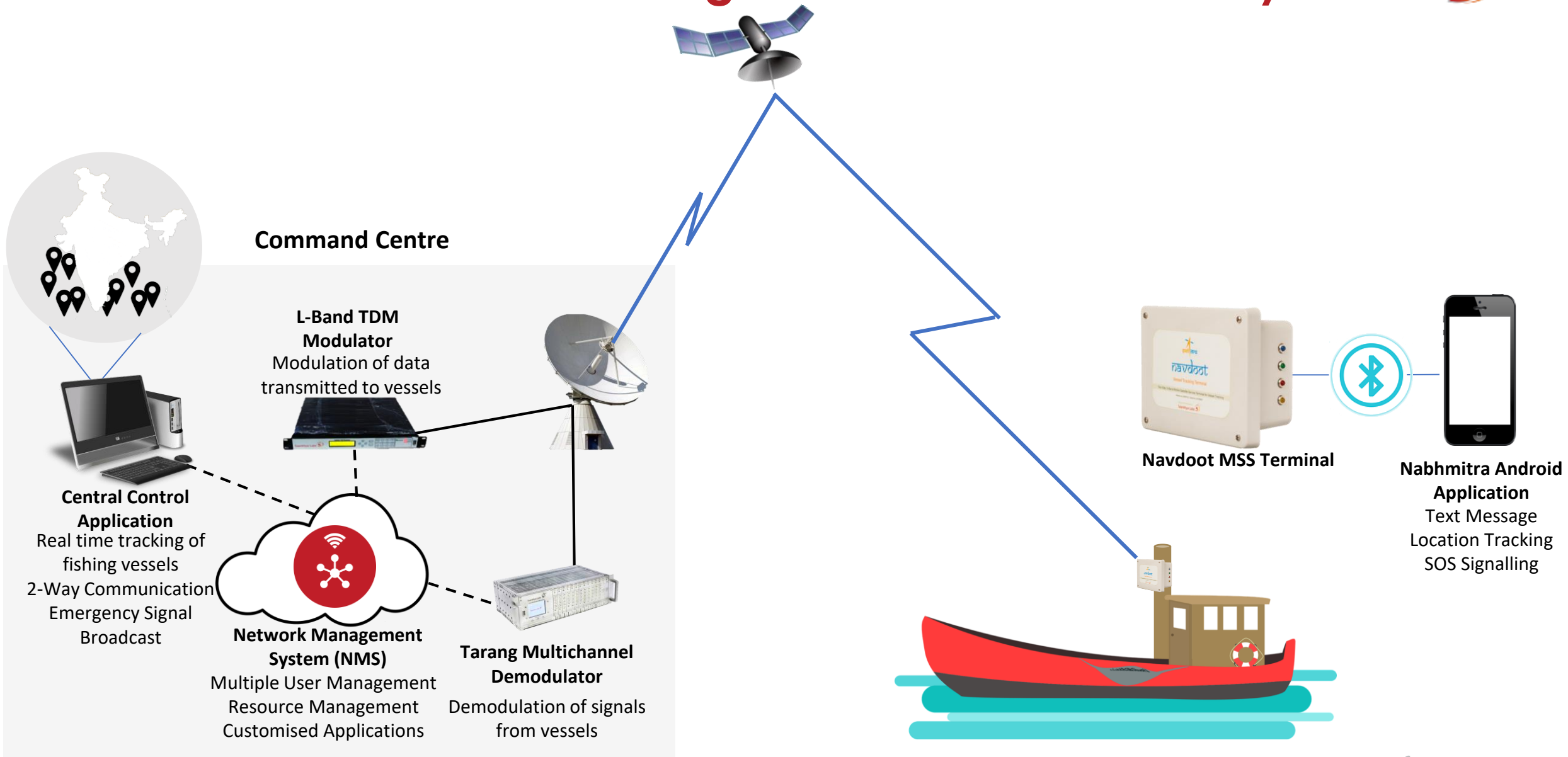
Boat Speed – 3 knots

Location – 13° 2" N; 80° 33" E

Message – *Catch found, returning to shore*



# Satellite Based Vessel Tracking and Communication System





# NAVDOOT S-Band Vessel Tracking Terminal



NAVDOOT is a Two-way MSS terminal for tracking and communication with fishing vessels in deep sea.



Communication via ISRO's S-Band GSAT Satellite



In Built Back up Battery



Easy Control, Configuration and Interaction via Android APK



Emergency Messaging Capability using Android APK

## Forward Channel

Frequency Band	2560-2590 MHz
Forward Link	Continuous TDM
Data Link	9.6/16/32 IESS Waveform

## Return Channel

Frequency Band	2670-2690 MHz
Return Link	TDMA Burst of 250ms/500ms/1s
Data Link	9.6/16/32 kbps Burst Modulation Scheme
Transmit Power	+33dBm EIRP

## Form Factor

Dimensions	203 mm x 156 mm x 105 mm
Interface	Bluetooth for control/configuration
Casing	IP 67 compliant

# Navrail Locomotive Tracking System



**Train Speed** – 68 km/hr

**Last Station** – Ratlam Junction

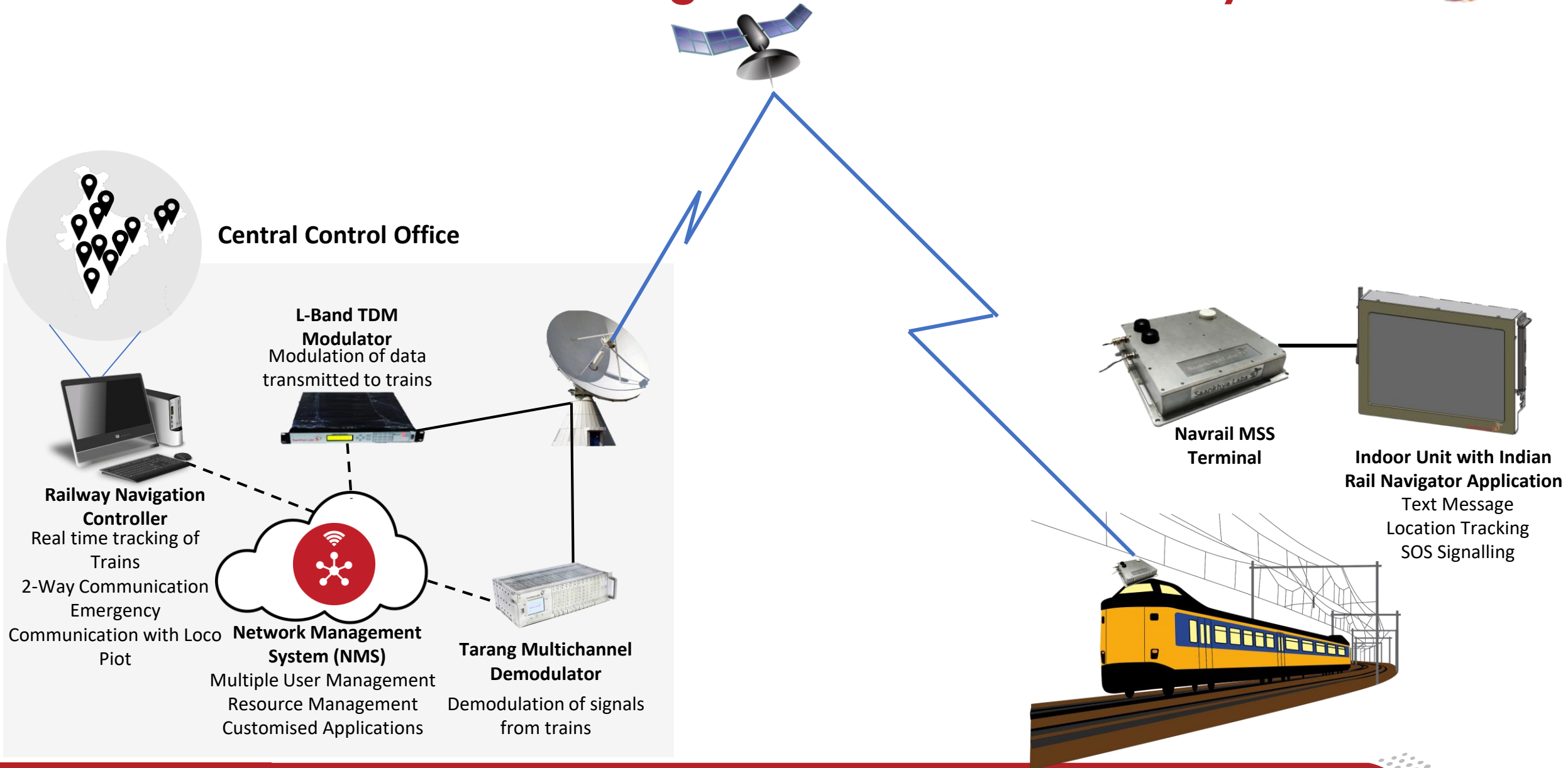
**Location** – 23° 21'' N; 75° 4'' E

**Message** – *Track Clear, Maintaining Speed*

**Engine Health** - Good



# Satellite Based Loco Tracking and Communication System





# NAVRAIL S-Band Locomotive Tracking Terminal



NAVRAIL is a Two-way MSS terminal for tracking and communication of locomotives, especially designed for the Real-time Train Information System (RTIS) of Indian Railways,



Communication via ISRO's S-Band GSAT Satellite



Reports Geo-Location at Pre-determined intervals



Inter-operates with Saankhya's Hub-side equipment



Configurable data rates & OTA software update

## Forward Channel

Frequency Band	2560-2590 MHz
Data Rate	32 kbps scalable to 512 kbps

## Return Channel

Frequency Band	2670-2690 MHz
Channel Spacing	10 kHz
Data Rate	1.2/2.4/4.8/9.6 kbps in Burst Transmission
Transmit Power	+36dBm EIRP

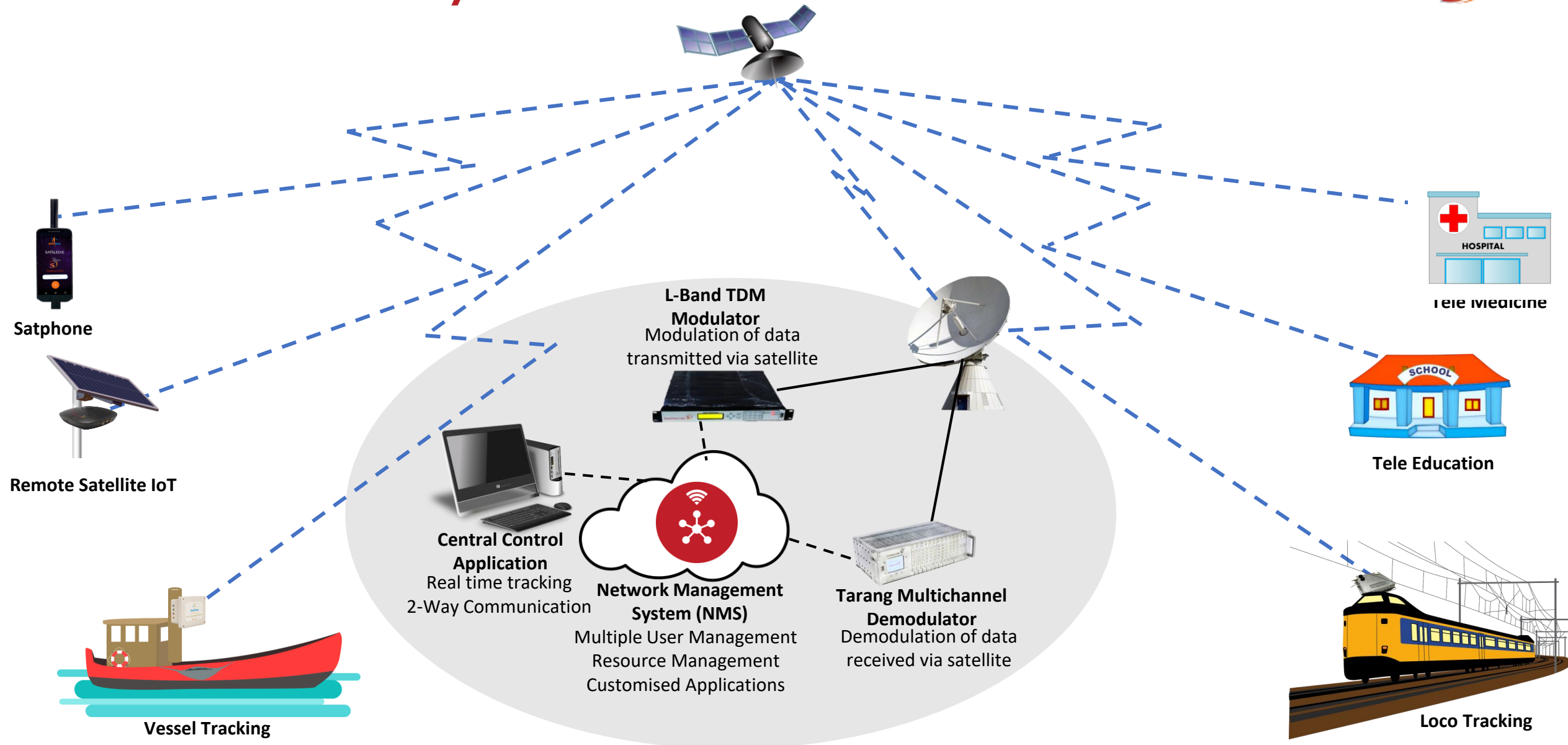
## Form Factor

Dimensions	300 mm x 320 mm x 95 mm
Interface	Ethernet
Casing	IP 67 compliant

# Hubside Equipment



# Hubside Control System for Satcom Solutions





# TARANG L-Band Multichannel Burst Demodulator



TARANG is an SDR based, L-Band Multi-Channel Burst Demodulator for MSS network.



48 Channel Burst Demodulator,  
3RU 19" Rack Mountable



Supports variety of waveforms  
by software change



Efficient Closed Loop  
SATCOM Communication



Dual Redundant Power  
Supply

## Input Frequency

Frequency Range	950-2150 MHz
Frequency Tuning Step	1 kHz
Frequency Acquisition Range	$\pm 5$ kHz

## Input Parameters

I/P Level Range	-45 to -70 dBm
I/P Impedance	50 $\Omega$
I/P Return Loss	>18 dB
I/P Spectrum Selection	Normal, Inverted

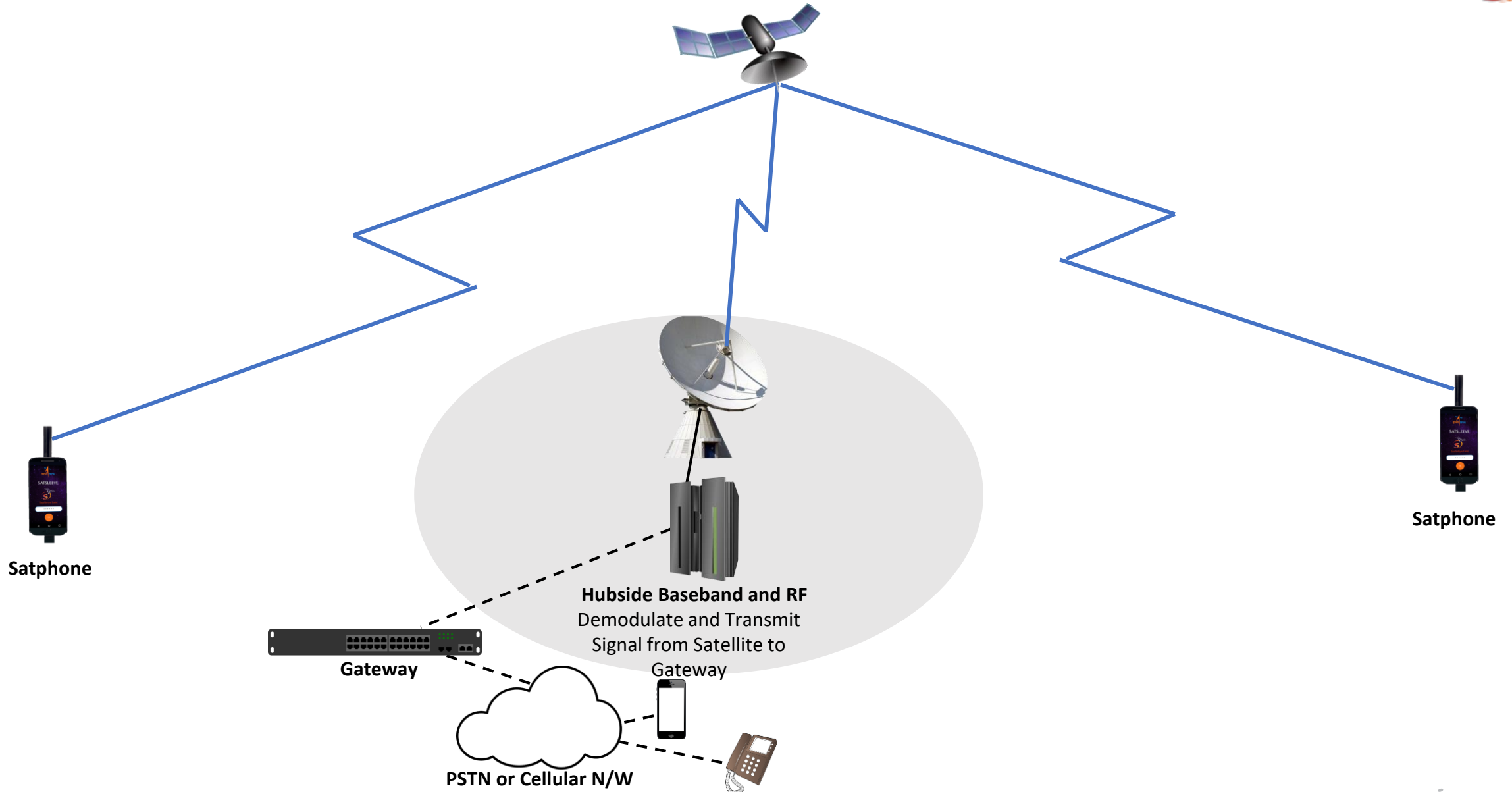
## Coding

Data rate	Selectable 1200bps, 2400bps, 2700bps & 4800bps
Modulation	BPSK, QPSK
FEC	Viterbi, Rate 1/2

# Remote Communication



# Satellite Based Communication in Remote Areas





# SAMRAT Android Based Sat-Phone



SAMRAT is a Two-way, S-Band Satellite Mobile Radio Terminal device, that can augment Android smart phone into a satellite phone.



SatSleeve to fit a 5.5" COTS Android phone



Supports Voice, Data, Short Messaging & Geolocation



Android App for Configuration and Control



Integrated High Capacity Battery

## Forward Channel

Frequency Band	2560-2590 MHz
Channel Spacing	10 kHz
Data Rate	2.7 kbps scalable up to 512 kbps

## Return Channel

Frequency Band	2670-2690 MHz
Channel Spacing	10 kHz
Data Rate	2.7 kbps
Transmit Power	+30 dBm EIRP

## Coding

SCPC-DAMA TDM	2.7 kbps
Modulation	QPSK with FEC rate 1/2
Coding	Convolution Coding IESS 308

# LEHAR S-Band Broadcast Receiver

LEHAR is a very compact S-band satellite broadcast receiver, capable of receiving satellite signals and demodulating them to provide digital data over USB to a host system such as Smartphone, Tablet/PC.



Portable handheld S-band DVB-S Broadcast receiver with integrated patch antenna



USB Powered & operates with any USB/OTG or a PC / Laptop / Mobile devices



Android and Windows Applications



Supports reception of Audio, Video and Data

## Communications

Frequency Band	2560-2590 MHz
Symbol Rate	144 Kbps - 5.5 Mbps
Waveform	DVB-S/IESS-308 Compatible

## Form Factor

Dimensions	105 mm x 74 mm x 12 mm
Weight	95 g

## Power Supply

Power Supply	USB Powered
Low Power Consumption	~ 2W

# GYANDOOT L-Band Satellite Receive Only Terminal



GYANDOOT is a highly versatile L-Band Satellite receiver. It securely delivers digital audio, video, graphics and data content over the EDUSAT network.



Communication via ISRO's L-Band EDUSAT Satellite Network



Low power, high performance & small form factor device



USB powered, optionally provides power to LNB via 12V AC-DC power adapter



Supports variety of waveforms through firmware upgrades

## Reception

Frequency Band	950 - 2150 MHz
Acquisition Range	$\pm 30$ kHz
Bandwidth	1Mbps to 5.5 Mbps
Data Rate	144 Kbps to 5.5 Mbps
Input Dynamic Range	0 dBm to -40 dBm

## Modulation and Coding

Single Carrier	DVB-S
Modulation Scheme	BPSK,QPSK

## Form Factor

Dimensions	105 mm x 70 mm x 25 mm
Weight	150 gm



# Satellite IoT





# Navsetu Sat-IoT Modem



Solar Temperature – 42°C

Solar Voltage – 10 V

Battery Voltage – 10 V

Solar Elevation – 20°

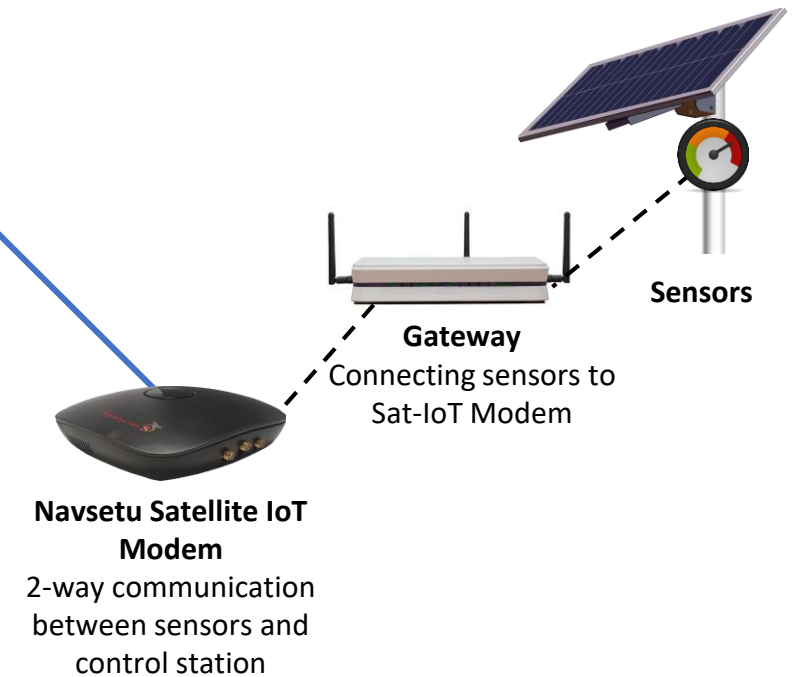
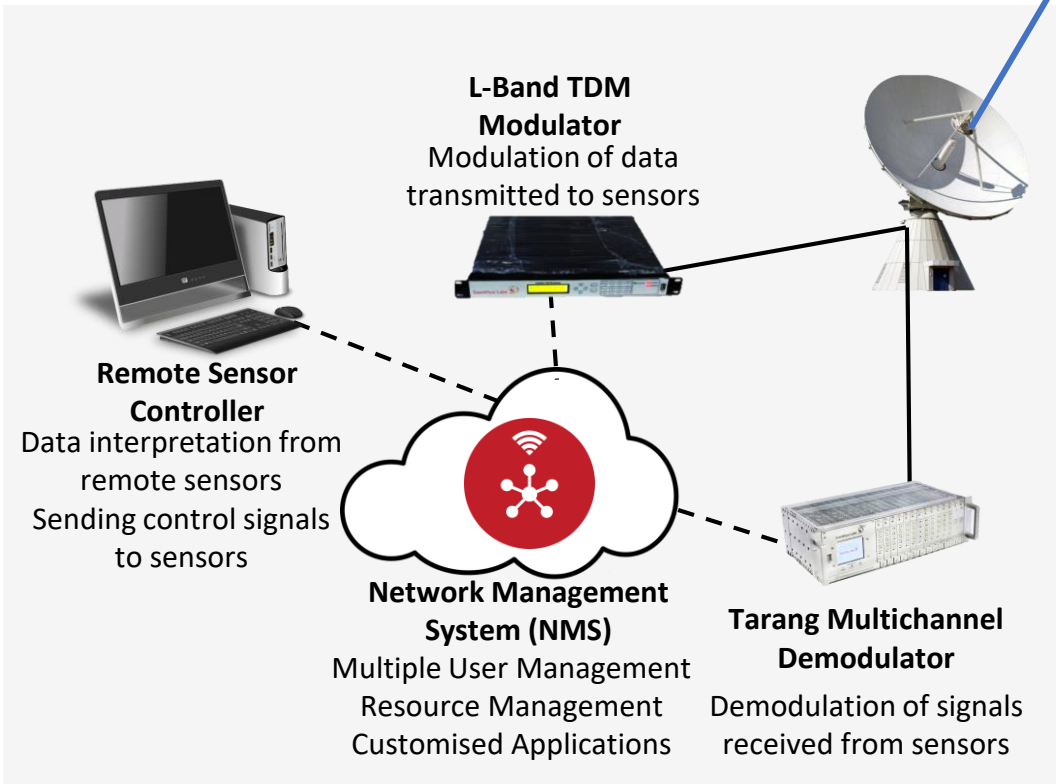




# Satellite Based Remote IoT Solution



## Central Control Station





# NAVSETU Sat-IoT Modem



NAVSETU is a high throughput 2-Way Satellite IoT Modem suitable for LEO/MEO/GEO satellites.



Connect remote IoT gateways via satellite link



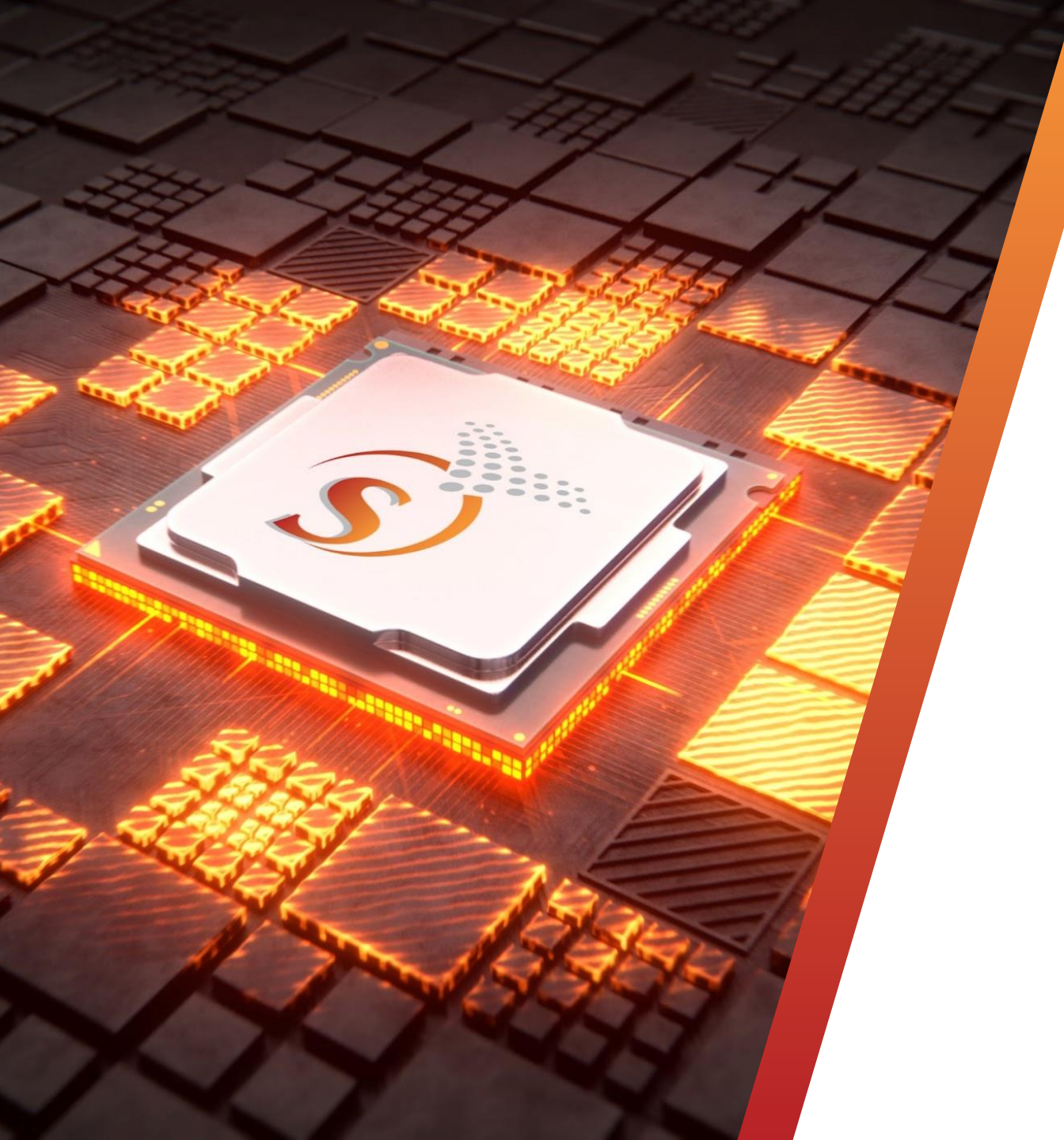
Control and configuration for remote IoT sensors



2-way communication capability



Supports Voice, Data, Messages & Geolocation



# Thank you

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