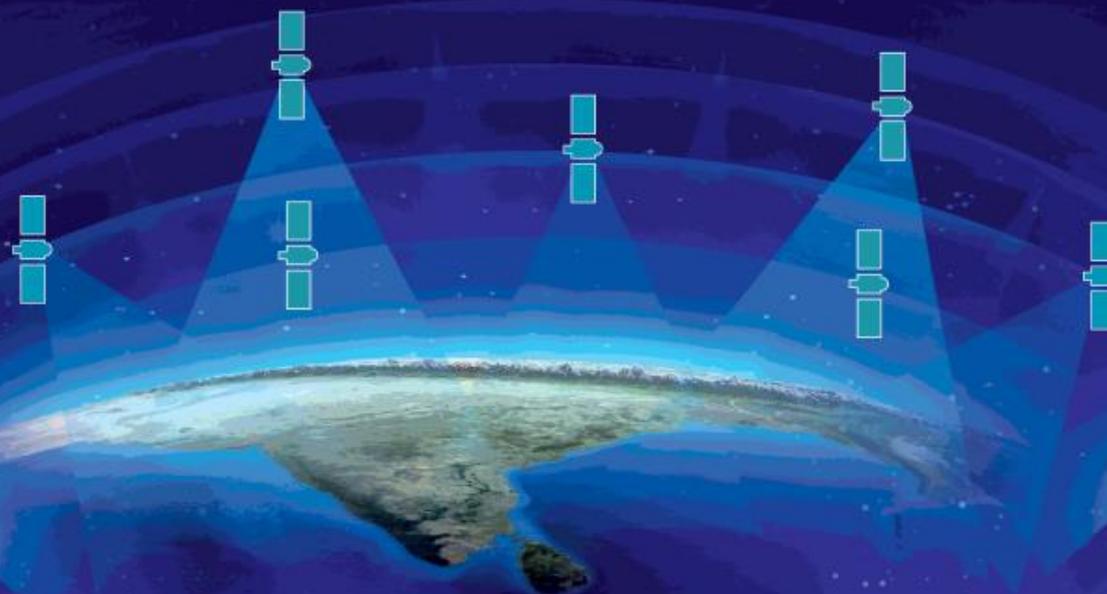




NavIC

Navigation with Indian Constellation



Presentation to
57th STSC
Vienna, Austria

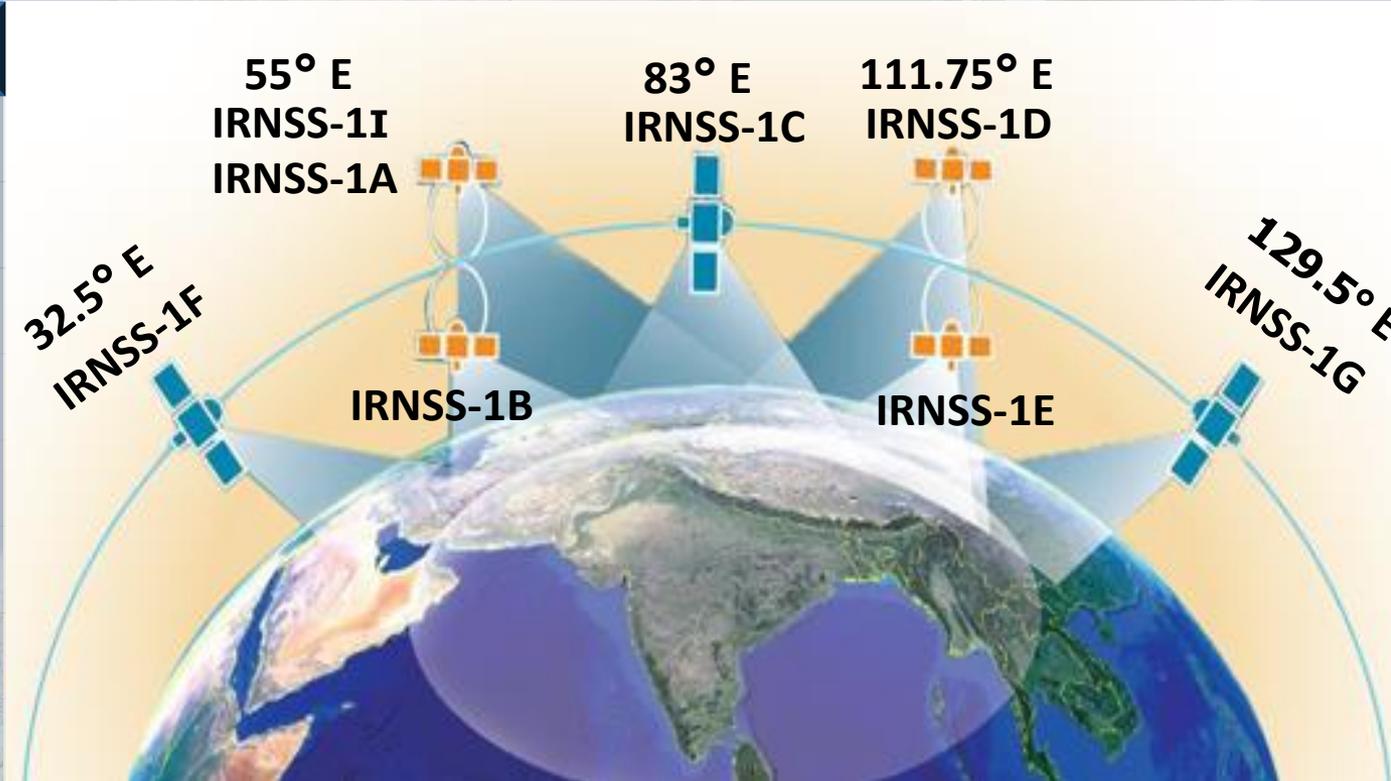
Navigation with Indian Constellation - NavIC

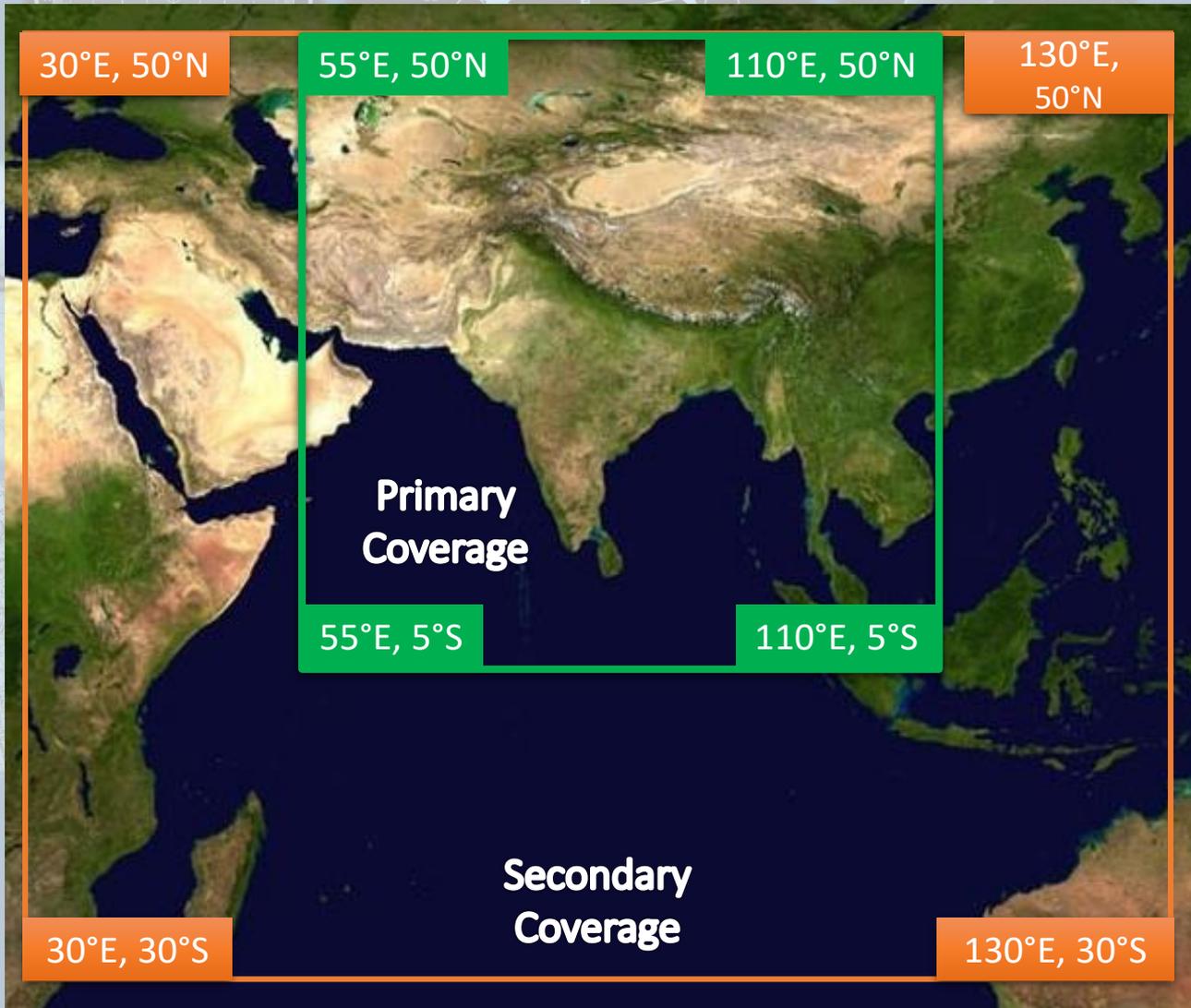
- NavIC is the Indian Regional Navigation Satellite System (IRNSS) developed and operated by ISRO.
- Provides Navigation signals in L5 and S bands.
- Provides two types of services – Standard Positioning Service (SPS) and Restricted Service (RS) with encryption.
- Coverage over India and 1500 km around mainland.
- Provides position accuracy better than 20 m and time accuracy better than 50 ns.
- Upcoming L1 signal in NavIC Constellation:
 - Forthcoming satellites will also broadcast L1 signal

- ✓ Constellation completed
- ✓ Standard Positioning and Restricted Services
- ✓ L5 & S-band

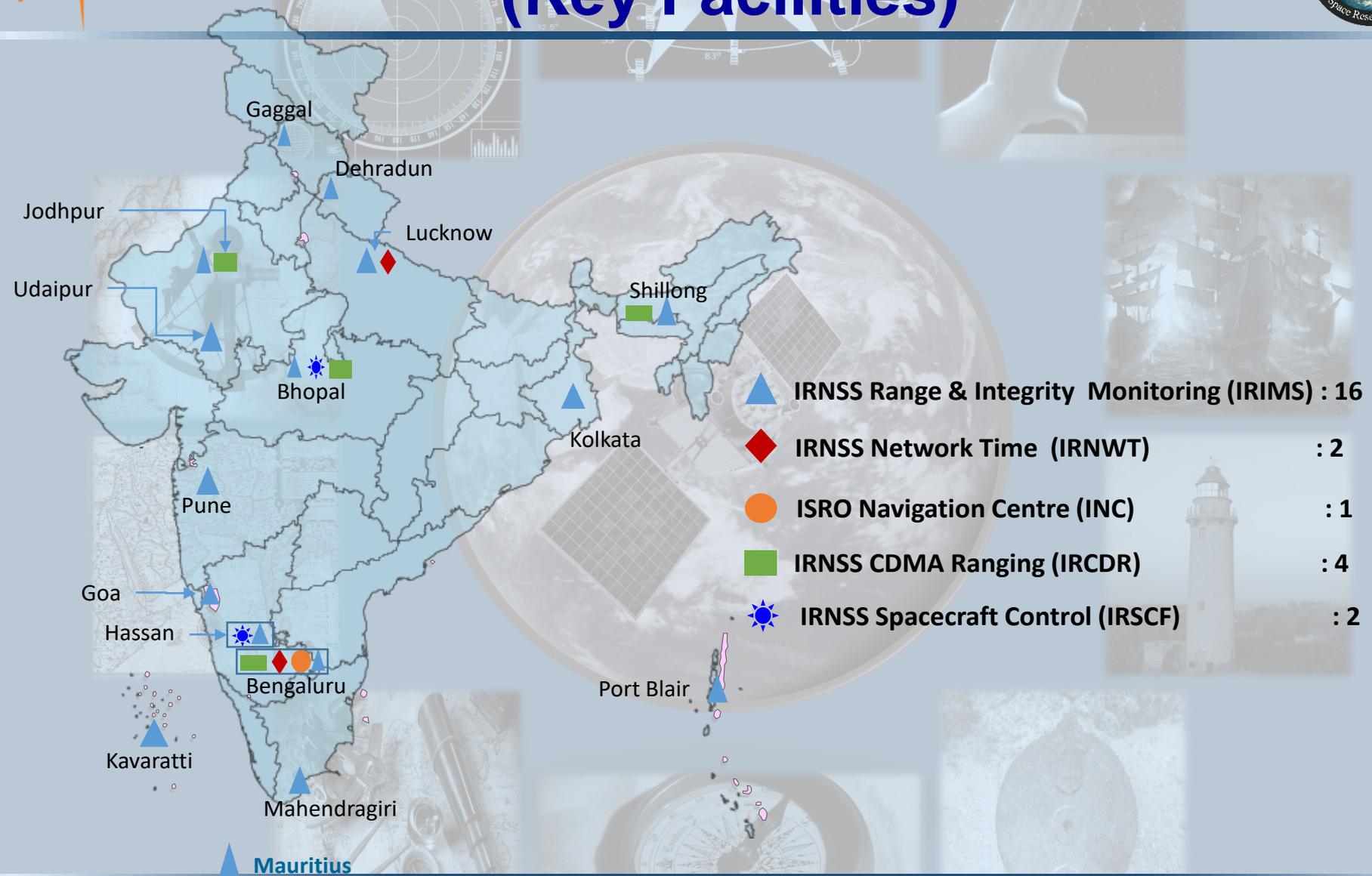
- ✓ Position Accuracy : < 20 m
- ✓ Time Accuracy : < 50 ns

Spacecraft	Launch Date
IRNSS-1A	01 Jul 2013
IRNSS-1B	04 Apr 2014
IRNSS-1C	16 Oct 2014
IRNSS-1D	28 Mar 2015
IRNSS-1E	20 Jan 2016
IRNSS-1F	10 Mar 2016
IRNSS-1G	28 Apr 2016
IRNSS-1I	12 Apr 2018





NavIC Ground Segment (Key Facilities)

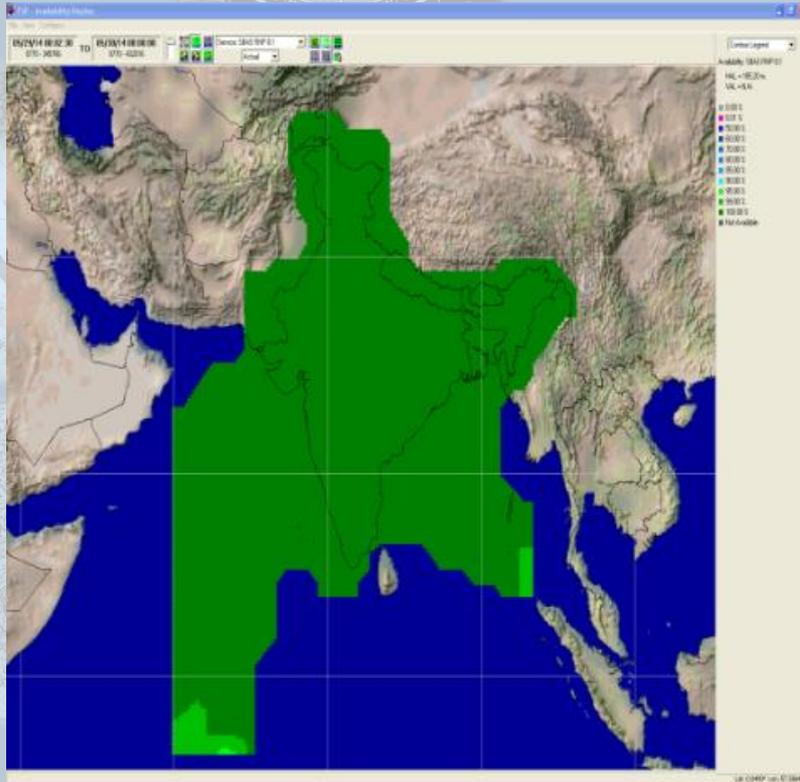


GPS Aided Geo-Augmented Navigation (GAGAN - SBAS)

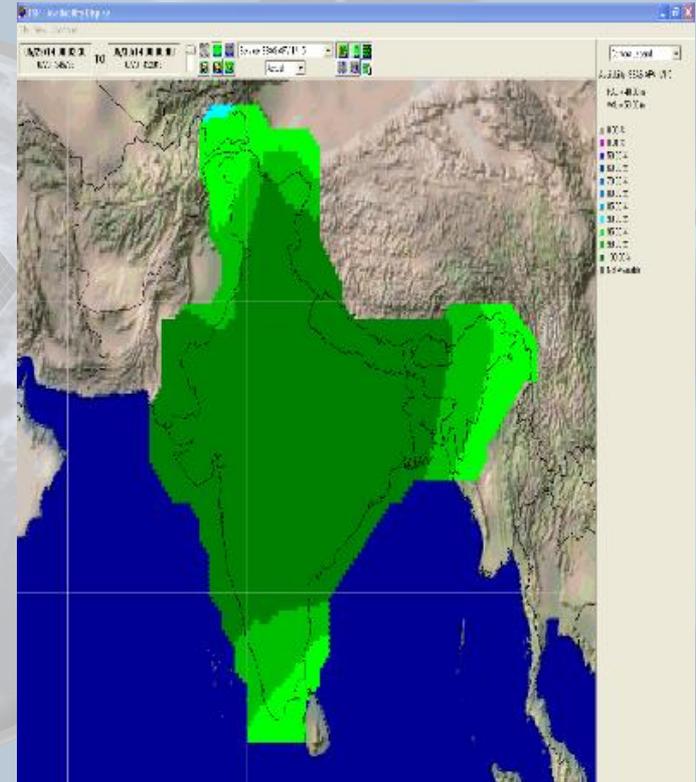


- Indian Satellite Based Augmentation System (SBAS) developed and implemented jointly by ISRO & AAI.
- Provide satellite based Air Navigation Services for civil aviation operations over the Indian Airspace as per ICAO specifications.
- Augments GPS signals and enhances the key navigation parameters of Accuracy, Integrity, Continuity and Availability
- GAGAN System certified by DGCA for
 - ✓ RNP 0.1 Services on 30-12-2013
 - ✓ APV-I Services on 21-04-2015
- Directorate General of Civil Aviation (DGCA) Mandate on GAGAN:
 - All the aircraft being imported for registration “on or after 30.06.2020” shall be required to be suitably equipped with GAGAN equipment.

GAGAN Service Area

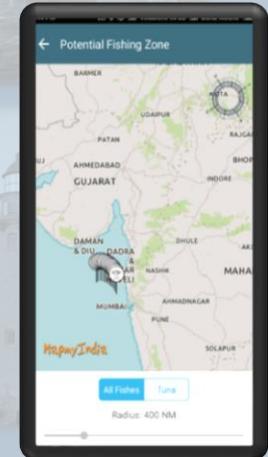
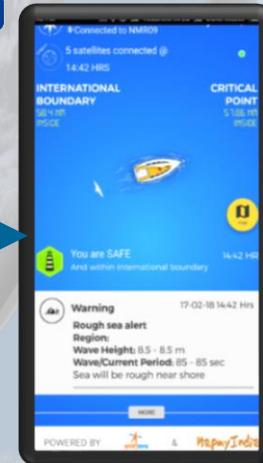
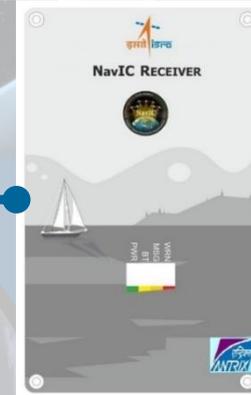
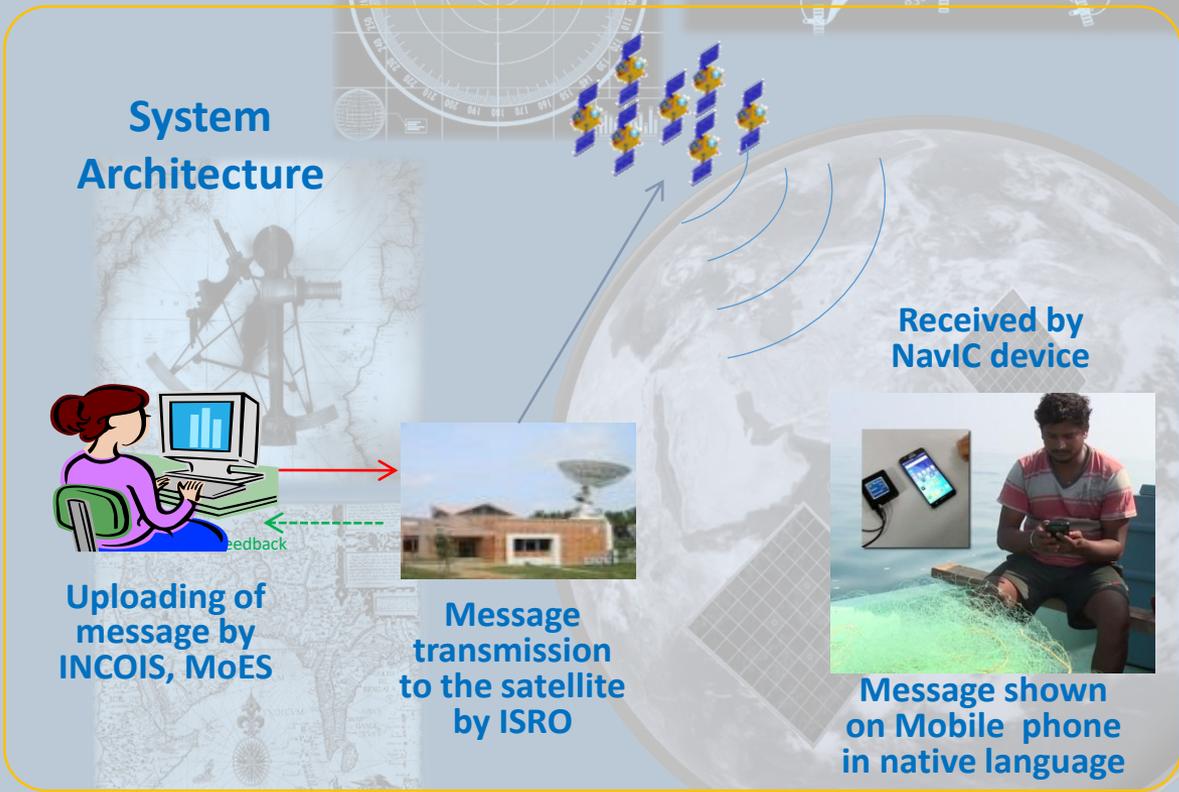


En Route Region



Precision Approach Area

NavIC Messaging Services



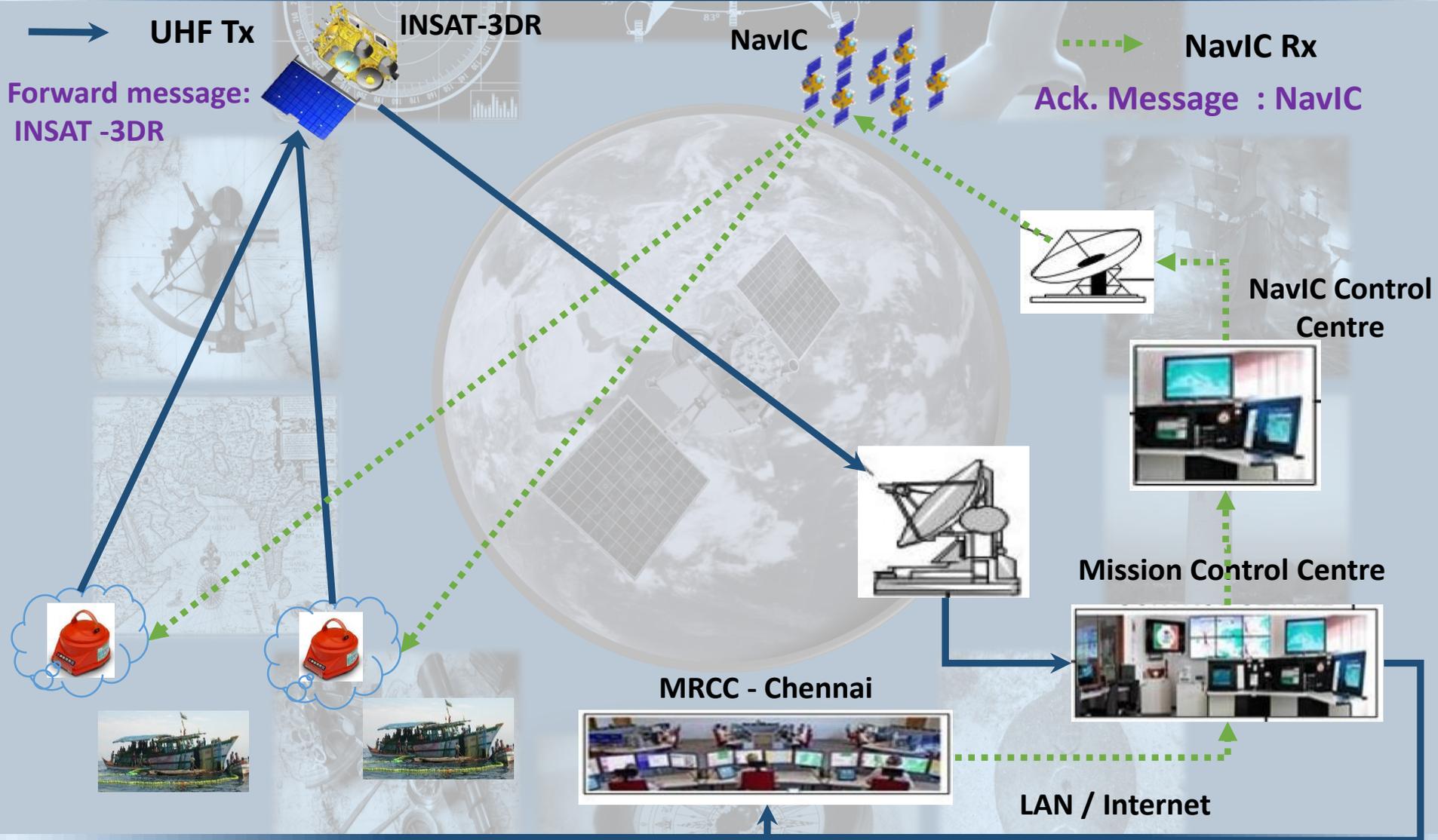
Services:

Alerts : Alert messages on Cyclone, High Waves & Tsunami.

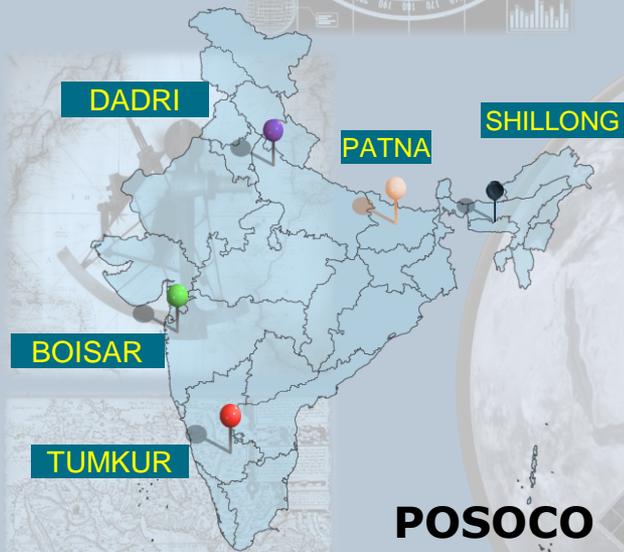
Geo-fencing : Warning message on approach of International boundaries.

PFZ : Information on Potential Fishing Zones (PFZ) where the better yield of fish available.

Second Gen Distress Alert Transmitter (DAT-SG)



Power-Grid Synchronisation



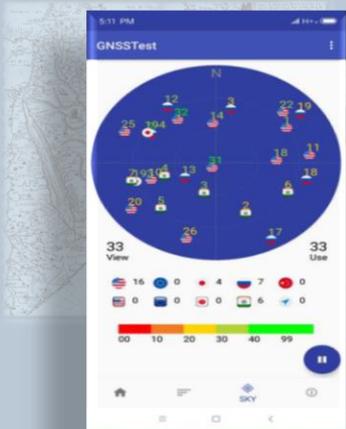
- NavIC timing receivers installed at five locations
- Used for time-stamping of phasor measurements
- NavIC timing seen to exactly match with existing references



NavIC timing performance

Mobiles

- ❖ **Mobiles provide compact form-factor and convenient interface for societal applications**
- ❖ **New initiatives:**
 - ✓ **Major chipset manufacturers (Broadcom, Qualcomm, Mediatek, etc.) have announced NavIC incorporation in new releases**
 - ✓ **Mobile handset manufacturers (Xiaomi and Realme) have announced NavIC incorporation in upcoming releases**
 - ✓ **3GPP has accepted NavIC as work-item for assisted GNSS specification in Release-16 (4G)**



Handsets

Qualcomm Announces Support for India's NavIC Satellite Navigation System in Commercial Chipset Platforms

— NavIC Support in Select Upcoming Mobile, Automotive and IoT Platforms is Poised to Deliver Superior Location-Based Services to India's Industries and Technology Ecosystem —

OCT 14, 2019 | NEW DELHI | [Read more](#)

Qualcomm Technologies, Inc., a wholly owned subsidiary of Qualcomm Incorporated, in collaboration with the Indian Space Research Organization (ISRO), today announced support for India's Regional Navigation Satellite System (IRNSS). Navigation with Indian Constellation (NavIC), in select chipset platforms across the Company's upcoming portfolio. The initiative will help accelerate the adoption of NavIC and enhance the production capabilities of mobile, automotive and the Internet of Things (IoT) solutions in the region – with

Mobile chip manufacturers

TSDSI enables Inclusion of Work Item on "Support for NavIC Navigation Satellite System for LTE" in 3GPP

September 24, 2019 | Vanshika | 552 | [Leave A Comment](#)

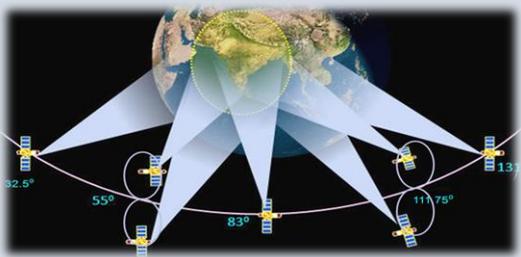
ISRO has introduced NavIC with seven IRNSS satellites as an autonomous regional navigation system with the objective of offering Positioning, Navigation and Timing services to the users in its service area. Currently in India we use GPS (controlled by USA) in our mobile devices. Russia has introduced GLONASS and China has introduced BeiDou as the navigation systems using their own satellite constellations. These have been made part of the 3GPP Specifications. NavIC from ISRO is a regional navigation system that is better suited for Indian requirements.

For the widespread use of NavIC it is necessary that the services become available on mobile devices. World over mobile devices follow standards created by 3GPP. Therefore, it was imperative to include NavIC system

Assisted-GNSS

- India, under guidance from UNOOSA, hosted 14th meeting of International Committee on GNSS (ICG) from December 8-13 in Bengaluru
- 258 delegates participated from government, inter-governmental and non-governmental organisations
- Major outcomes:
 - Inclusion of New Zealand as member of ICG
 - Updation of terms of reference
 - System updates





Navigation with Indian Constellation

NavIC

Indian Space Research Organisation

इसरो ISRO

इसरो ISRO

The central graphic features a circular arrangement of satellites around a globe. The text "Navigation with Indian Constellation" is written in a semi-circle at the top, "NavIC" is in the center, and "Indian Space Research Organisation" is at the bottom. The ISRO logo is repeated on the left and right sides.

