

# GAGAN & IRNSS

Presentation

to

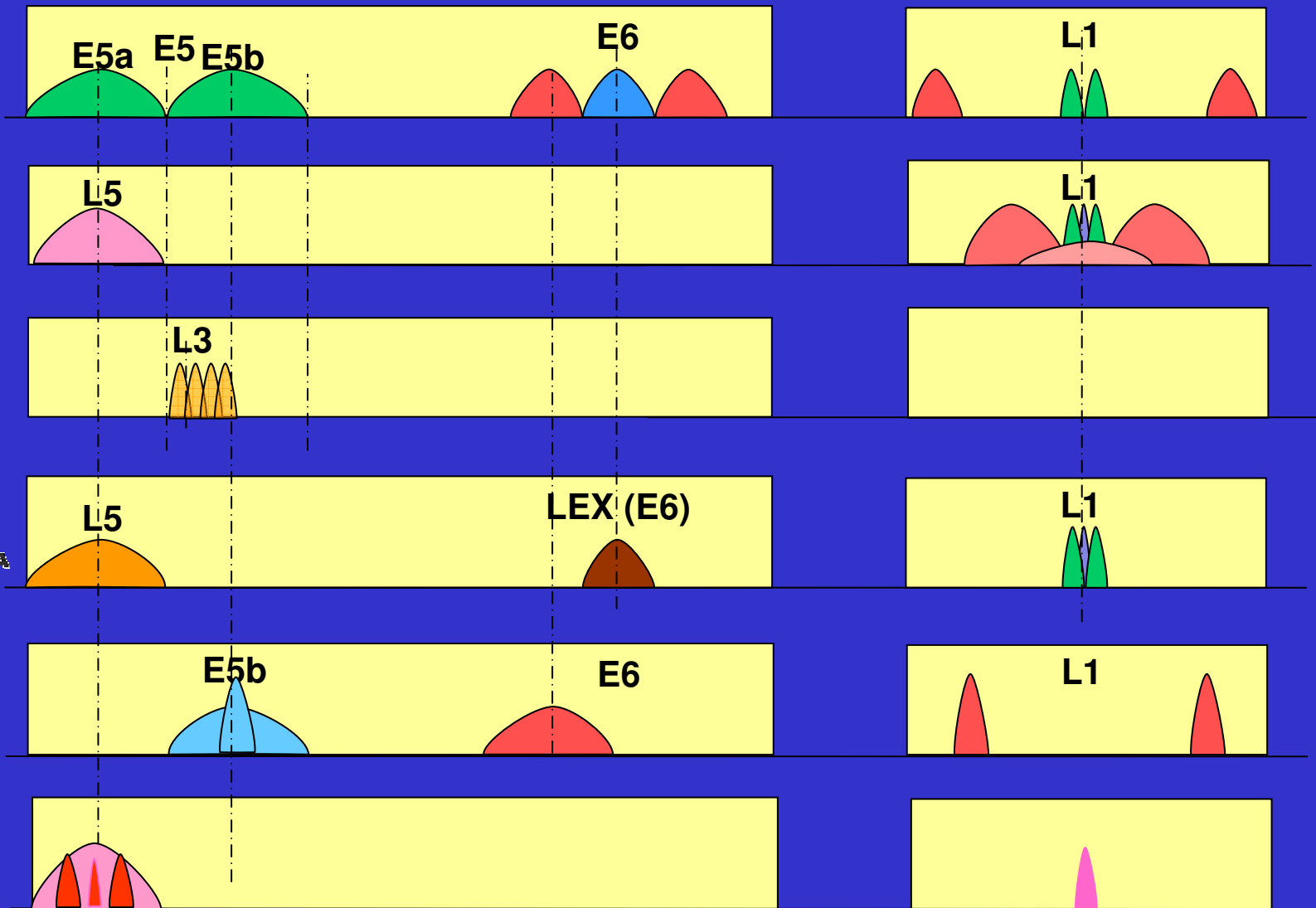
ICG-3

8-12, December 2008

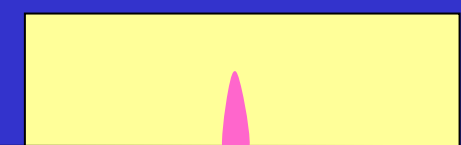
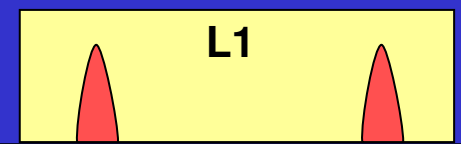
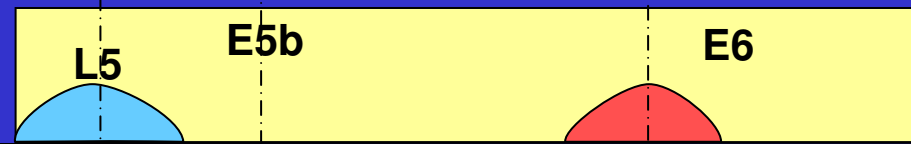
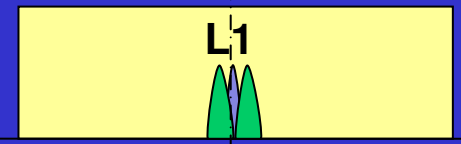
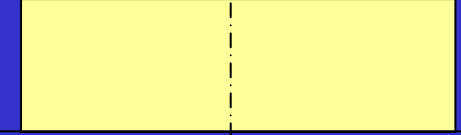
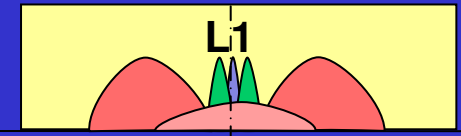
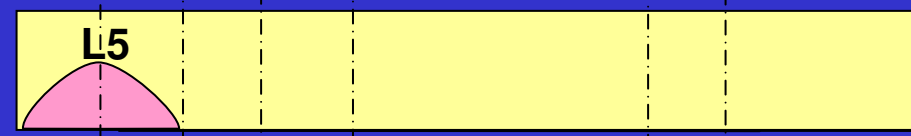
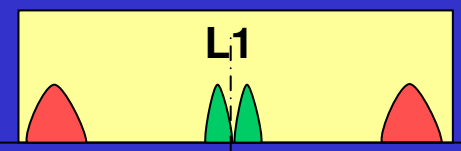
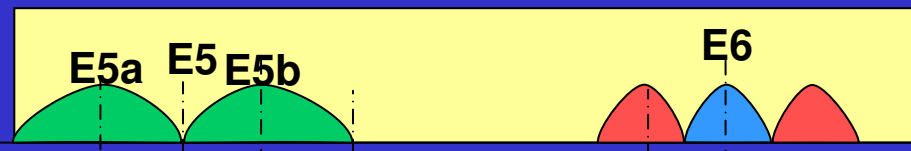
Dr. S.V.Kibe

ISRO HQ, Bangalore, India

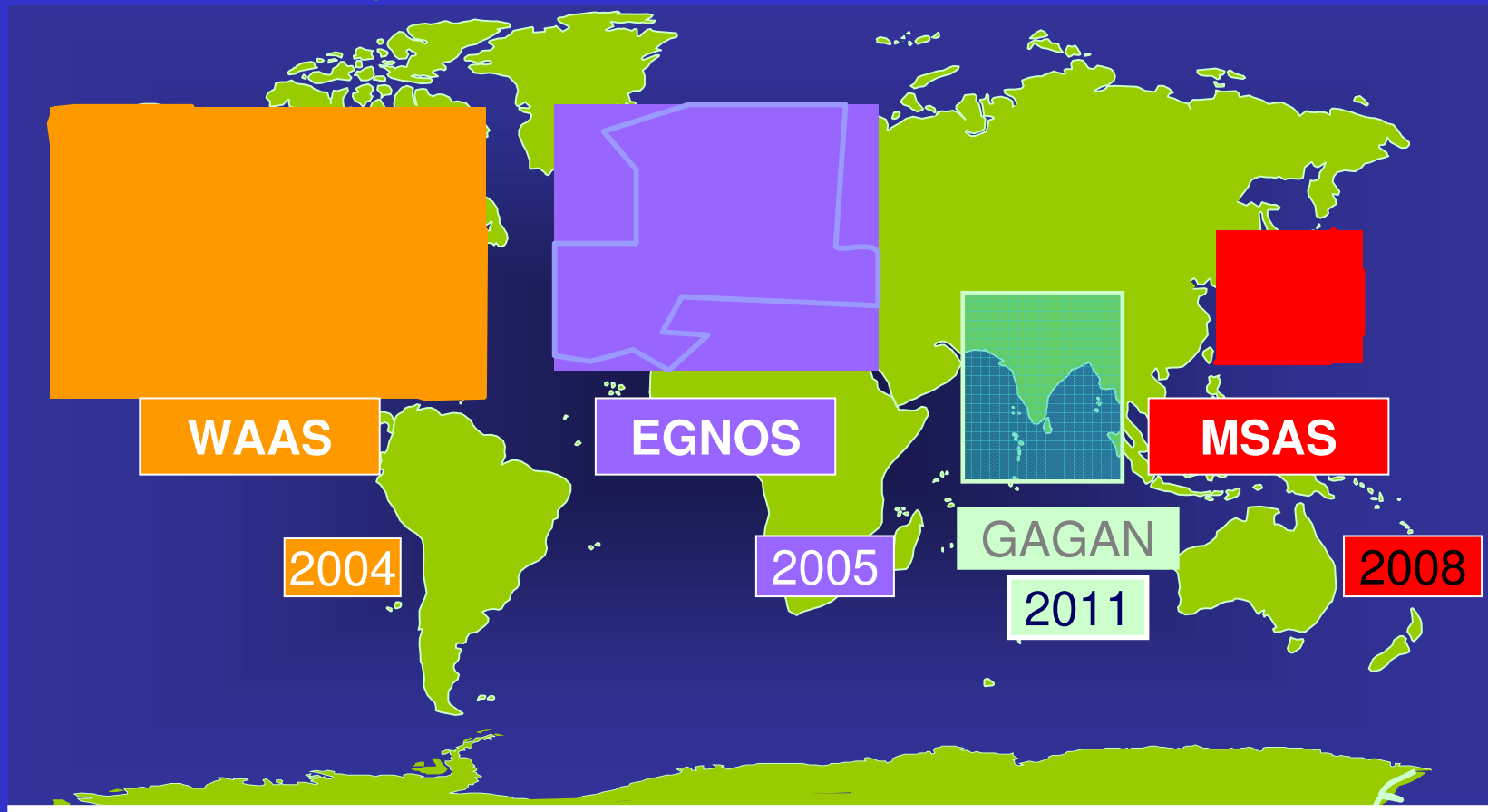
# Compatibility & interoperability with other GNSS



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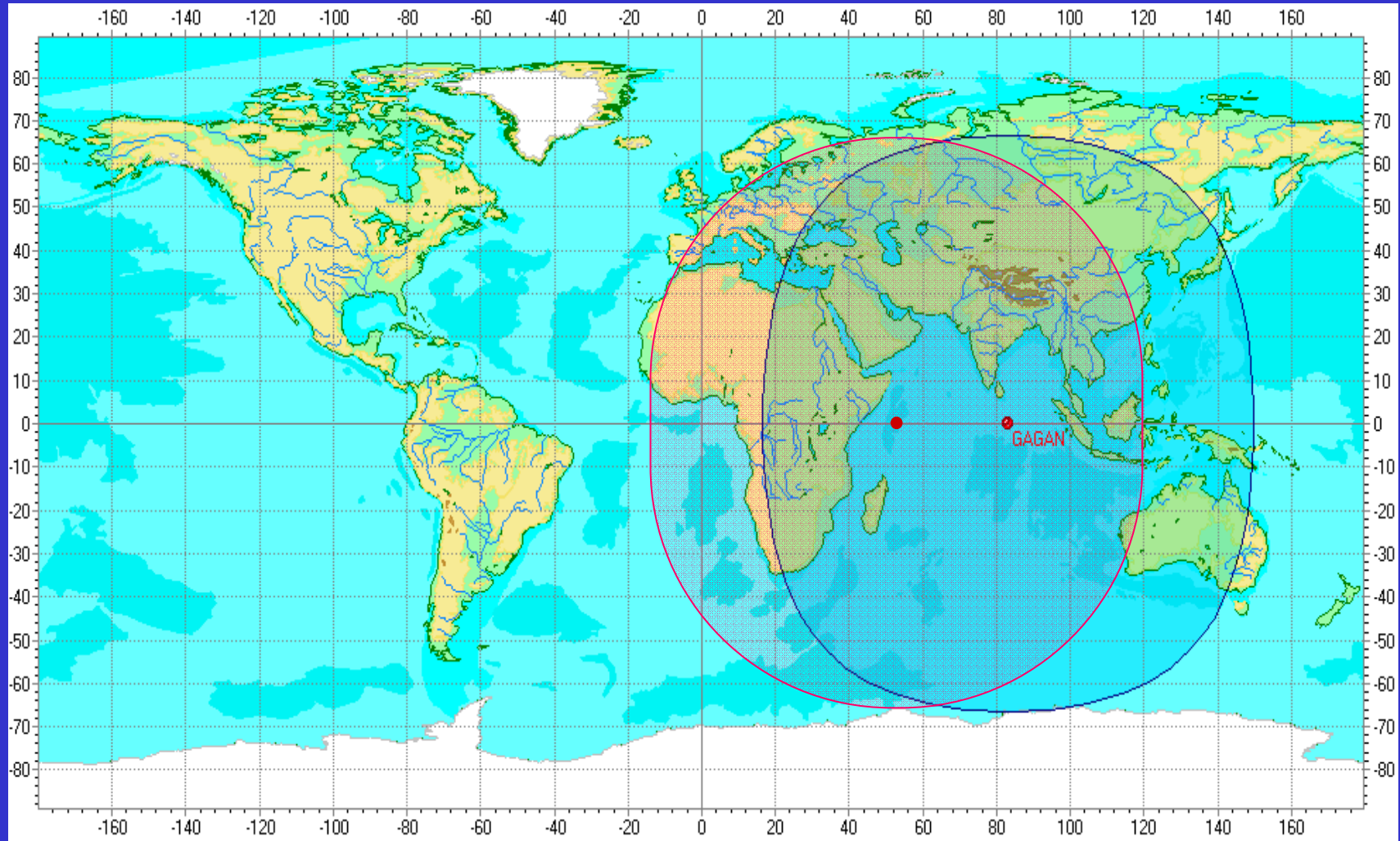
# GPS Augmentation systems in the World



## **GAGAN SPACE SEGMENT AVAILABILITY**

- GAGAN FOP approved by the Indian Govt.
- The Department of Space has planned GAGAN L1 & L5 frequency payloads on GSAT-4, GSAT-8 & GSAT-9 satellites. The present schedules for these satellites are
  1. GSAT-4 Launch by mid 2009 on-board GSLV
  2. GSAT-8 Launch by last quarter of 2009
  3. GSAT-9 to be launched by second half of 2010. GSAT-9 is planned to be an in-orbit spare.

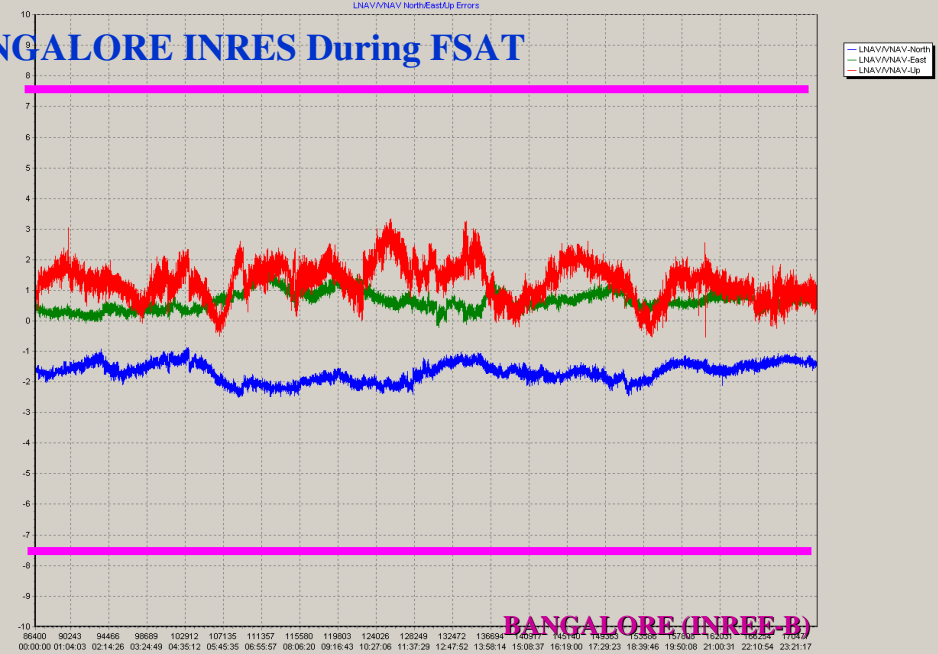
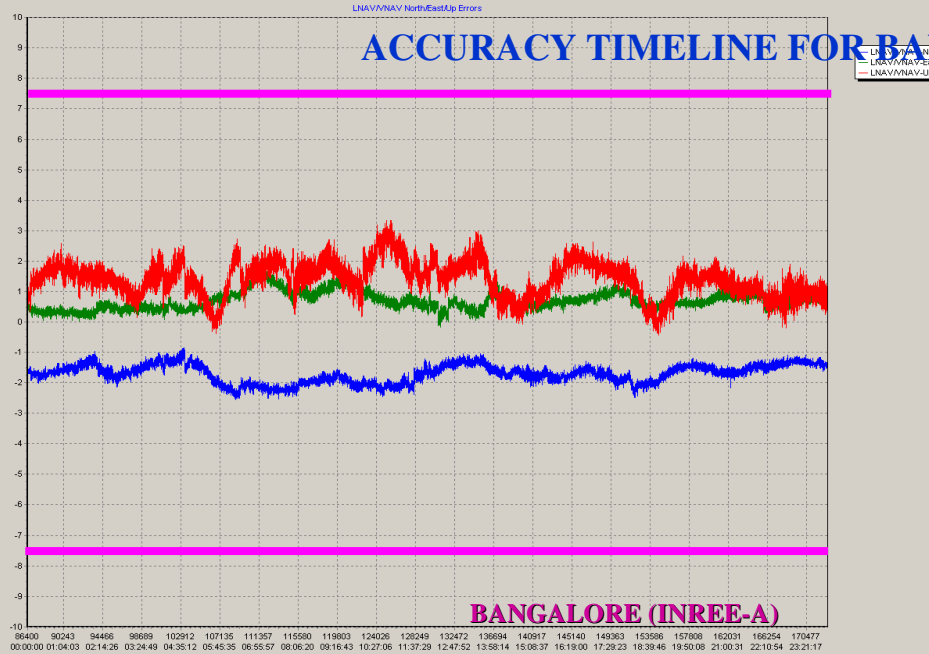
# COVERAGE FROM 82 & 55 Deg.E



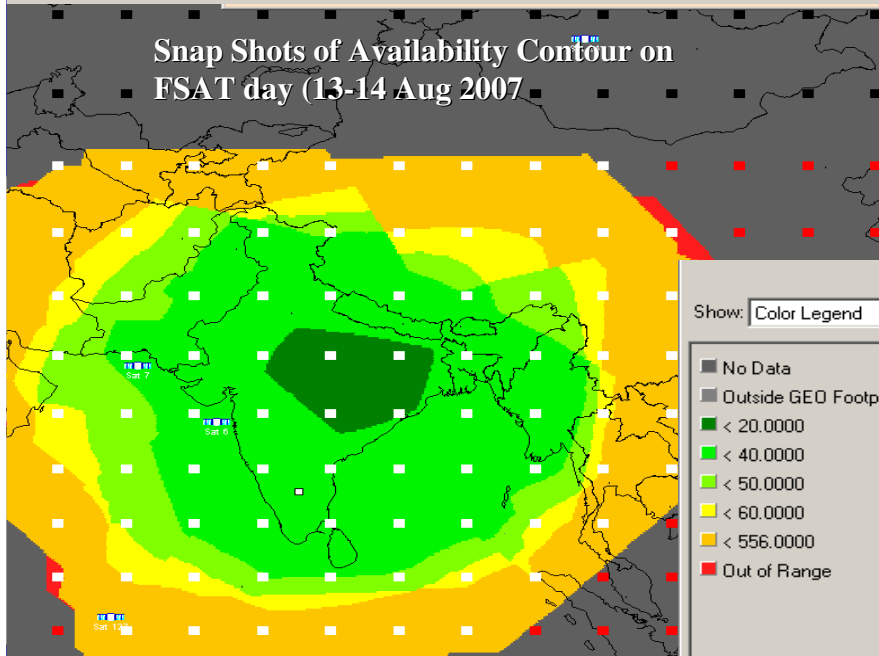


# FSAT RESULTS

## ACCURACY TIMELINE FOR BANGALORE INRES During FSAT

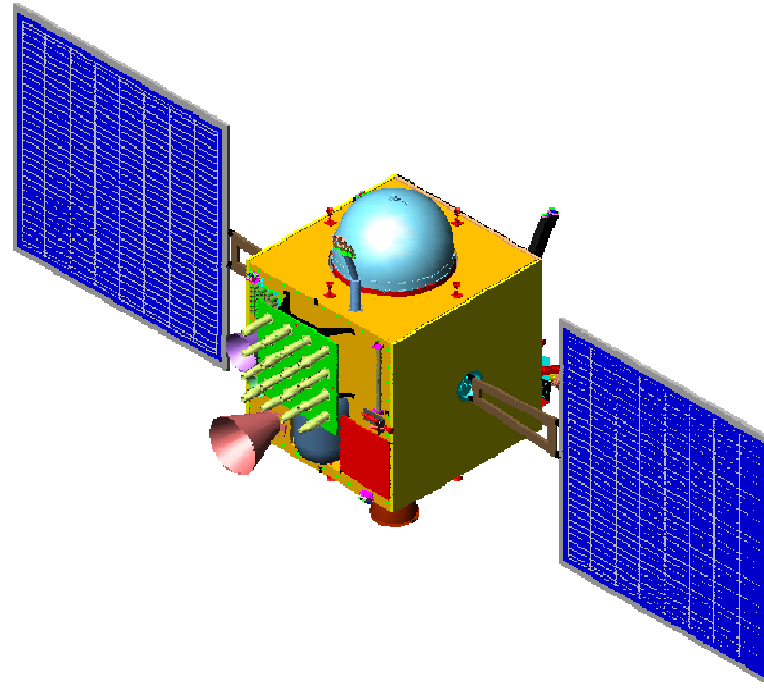


## Snap Shots of Availability Contour on FSAT day (13-14 Aug 2007)



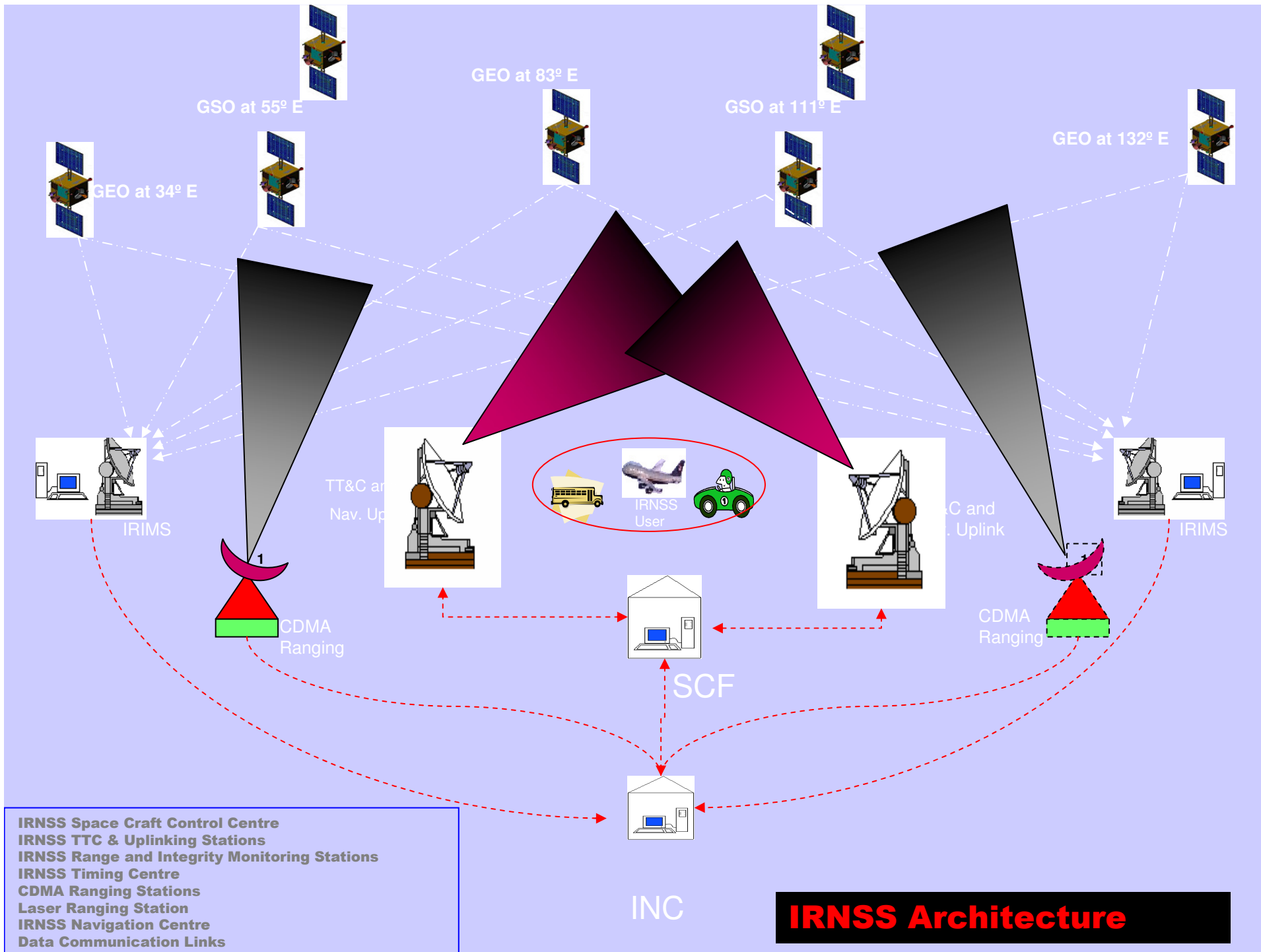
## SBAS Rx Performance During FSAT





## ***IRNSS - An Overview***





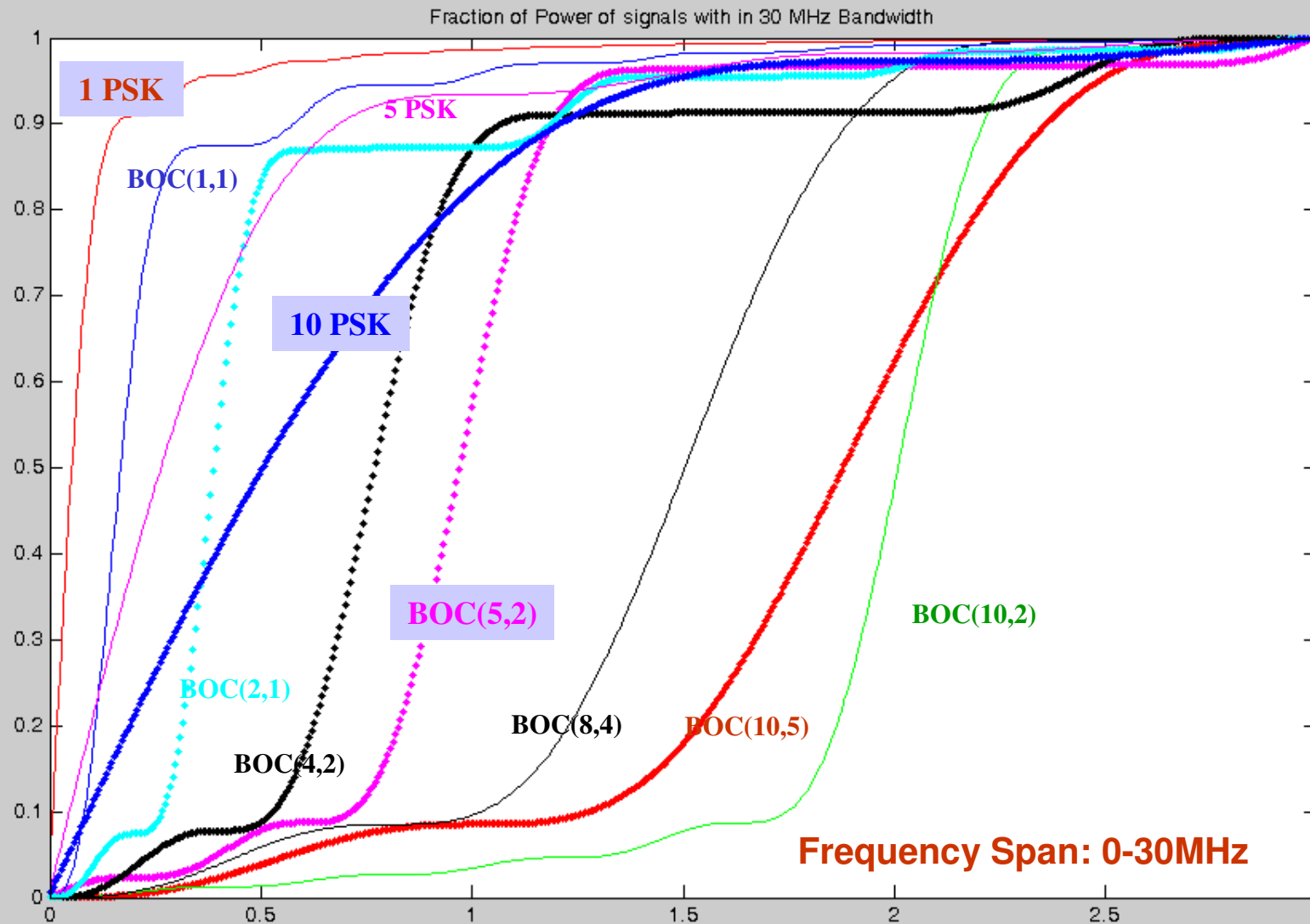
- IRNSS Space Craft Control Centre
- IRNSS TTC & Uplinking Stations
- IRNSS Range and Integrity Monitoring Stations
- IRNSS Timing Centre
- CDMA Ranging Stations
- Laser Ranging Station
- IRNSS Navigation Centre
- Data Communication Links

**IRNSS Architecture**

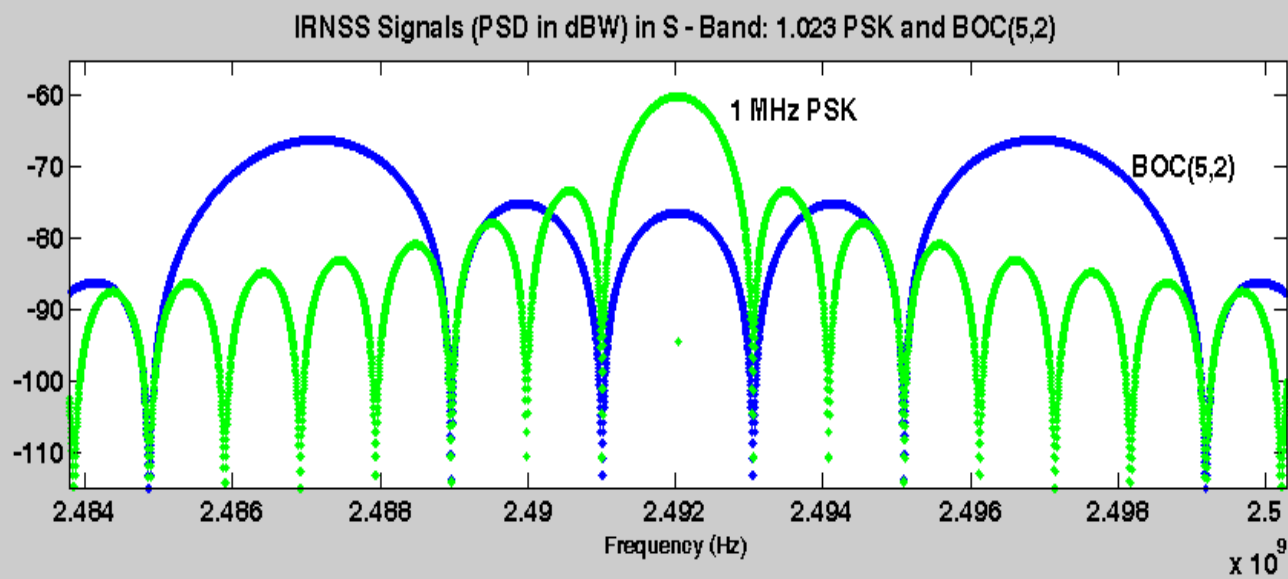
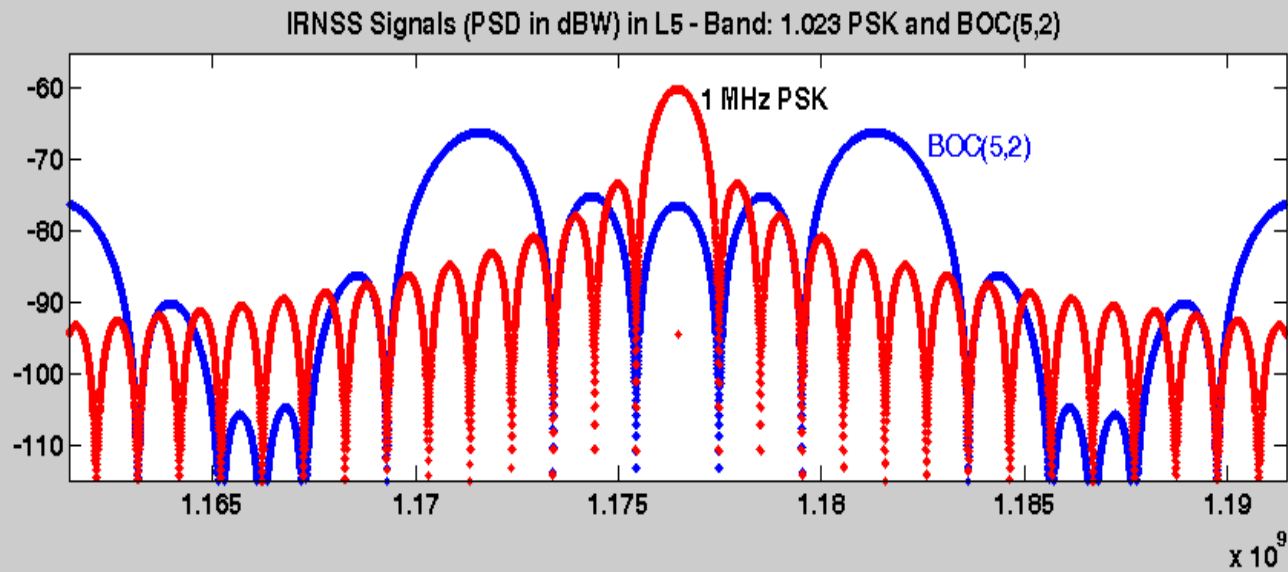
# IRNSS SERVICES & CENTRE FREQUENCIES

Service Type	Signals	Frequency Band
Standard Positioning Service	1 MHz BPSK	L5 (1176.45 MHz) S (2492.08 MHz)
Restricted Services	BOC(5,2)	L5 (1176.45 MHz) S (2492.08 MHz)

# Navigation Signals – Fraction of power within Bandwidth



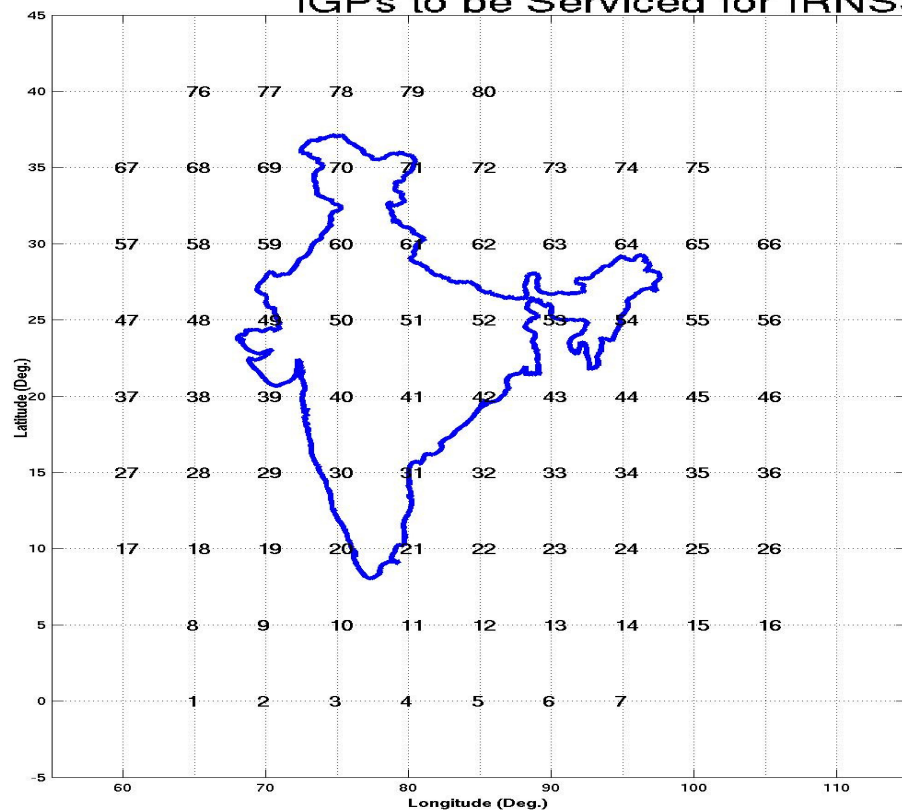
Dark Red:boc(10,5), Green:boc(10,2), Black:boc(8,4), Dark Magenta:boc(5,2), Dark Black:boc(4,2), Blue:boc(1,1), Dark Cyan:boc(2,1), Red:PSK 1M, Magenta:5 PSK, Dark Blue:10 PSK



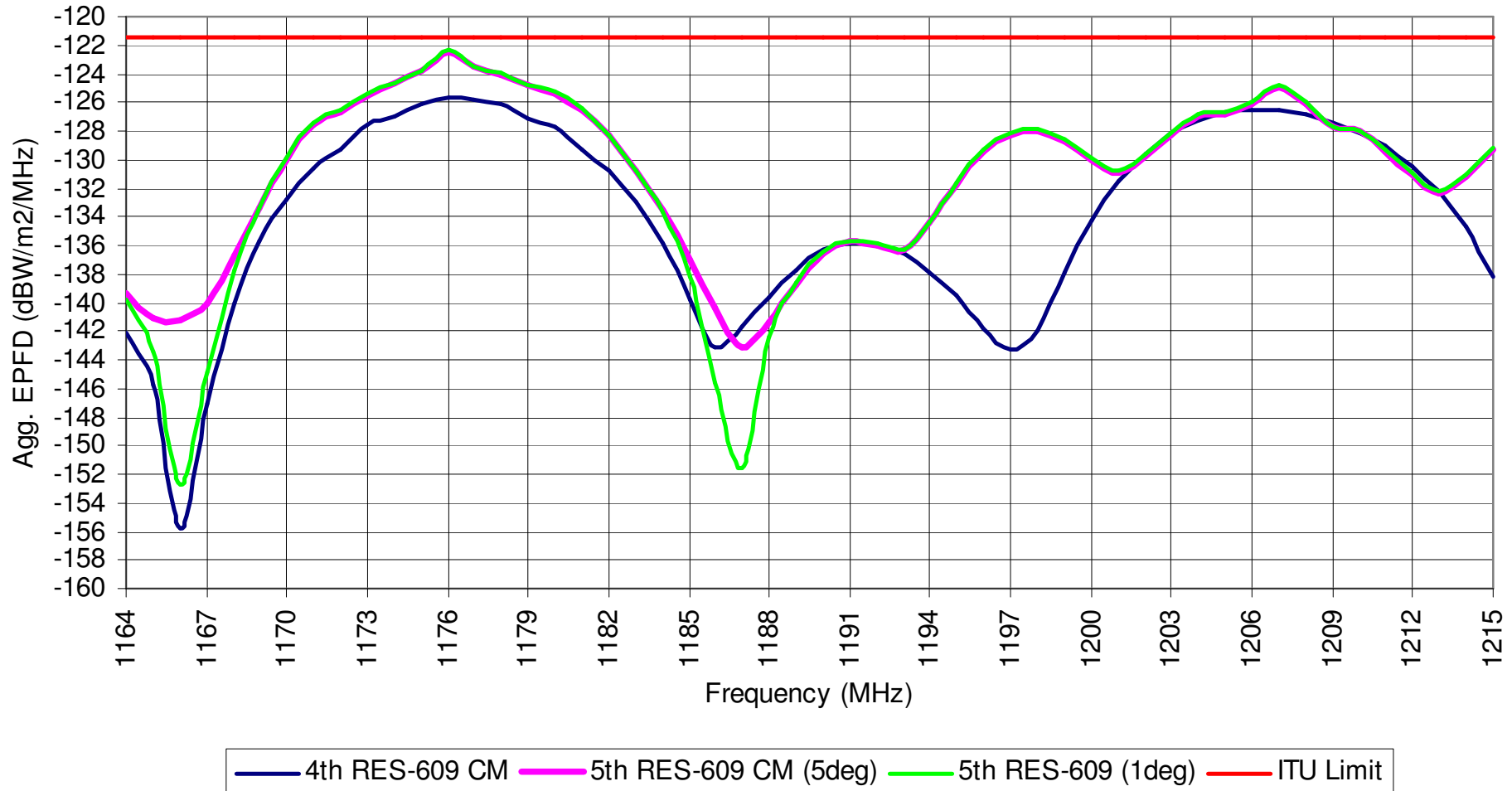
# Data structure

- *Data structure for SPS and RS is the same and will include a grid model.* The clock, ephemeris, almanac data for 7 IRNSS satellites is planned to be (?) transmitted with the same accuracy as in legacy GPS, GLONASS & Galileo.
- Since the number of satellites in IRNSS are 7 as against 30 for GPS, the field available for extra satellites is used up for inserting a 80 grid points ionospheric model for the benefit of single frequency user.
- Being discussed at present, Data structure similar to augmentation, L2C/L5 systems and L1C is being further studied ( 33 bit ephemerides, message type structure, reduced almanac, new coding etc).

### IGPs to be Serviced for IRNSS



## Aggregate EPFD values computed during 4th & 5th RES-609 Consultaion Meetings



4<sup>th</sup> RES-609: -125.68dBW/m<sup>2</sup>/MHz,    5<sup>th</sup> RES-609(5deg): -122.46 dBW/m<sup>2</sup>/MHz,    5<sup>th</sup> RES-609(1deg): -122.34 dBW/m<sup>2</sup>/MHz



Thank-you