

# NavIC (IRNSS) and SSV Activities

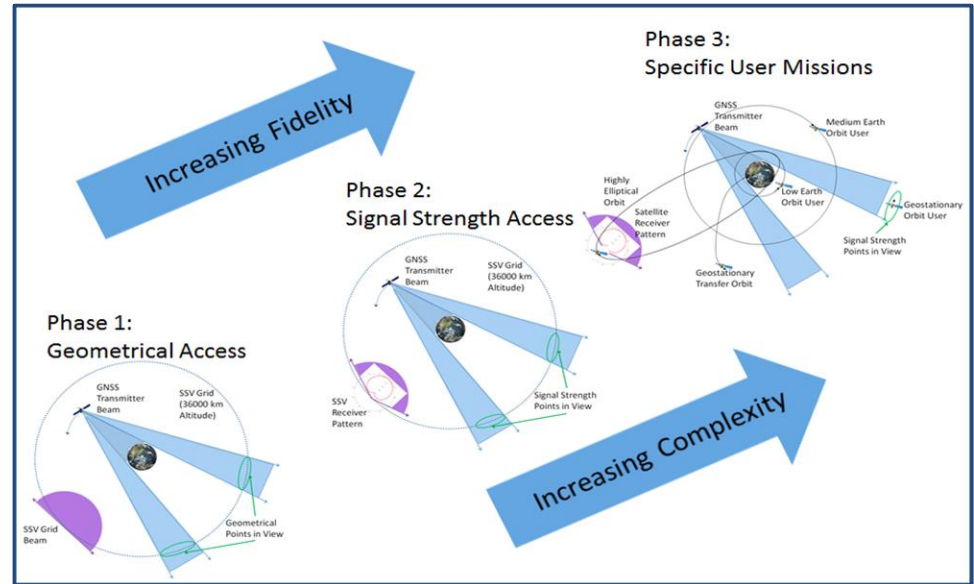
*Presentation at ICG-13 WG-B*

*R Ramasubramanian  
Programme Director  
Satellite Navigation Programme  
URSC / ISRO  
Bengaluru, India*

# GNSS SSV (Introduction)

The GNSS Space Service Volume (SSV) is defined as

“the region of space extending from 3000 Km to 36,000 km, or even beyond where terrestrial GNSS performance standards may not be applicable”



The SSV defines GNSS system performance

- Received Power
- Signal Availability
- Pseudo range Accuracy

# NavIC (IRNSS) parameters

## NavIC (IRNSS) Orbital Parameters(Typical)

### Satellite Parameters

Frequency band: L5 / S

Transmit EIRP:

32 dBW / 35 dBW (peak)

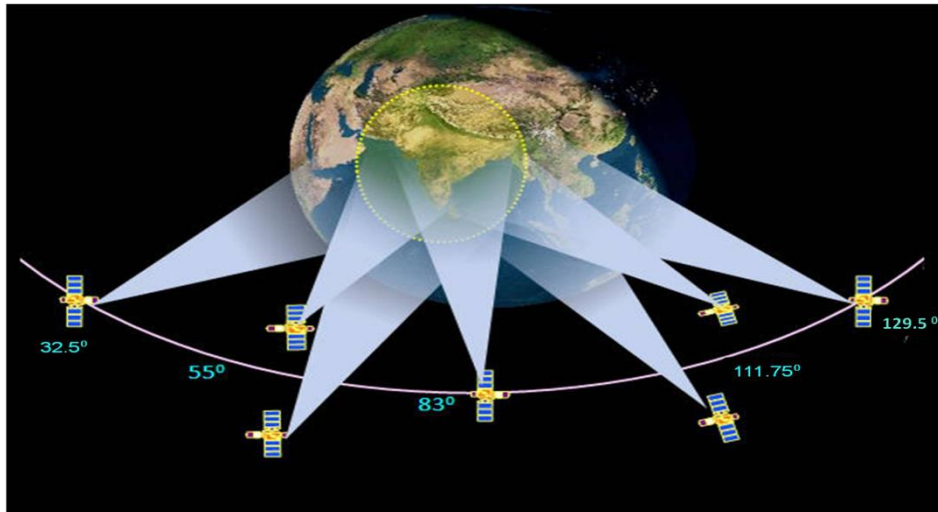
Off boresight angle :  $16^\circ$

Minimum received power at GEO SSV  
over limb of earth:

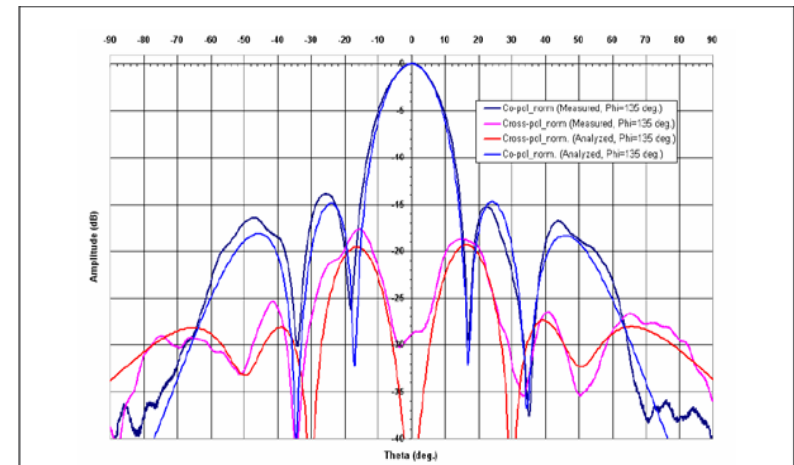
-184.54dBw (for L5)

S/C	Semi-major axis (m)	Eccentricity	Inclination ( $^\circ$ )	Right ascension ( $^\circ$ )	Argument of perigee ( $^\circ$ )	Mean anomaly ( $^\circ$ )
1	42164200	0.002	29	125	0	211
2	42164200	0.002	29	310	0	32
3	42164200	0.002	0	270	0	98
4	42164200	0.002	29	310	0	88
5	42164200	0.002	29	125	0	267
6	42164200	0.002	0	270	0	42
7	42164200	0.002	0	270	0	139

NavIC (IRNSS) constellation

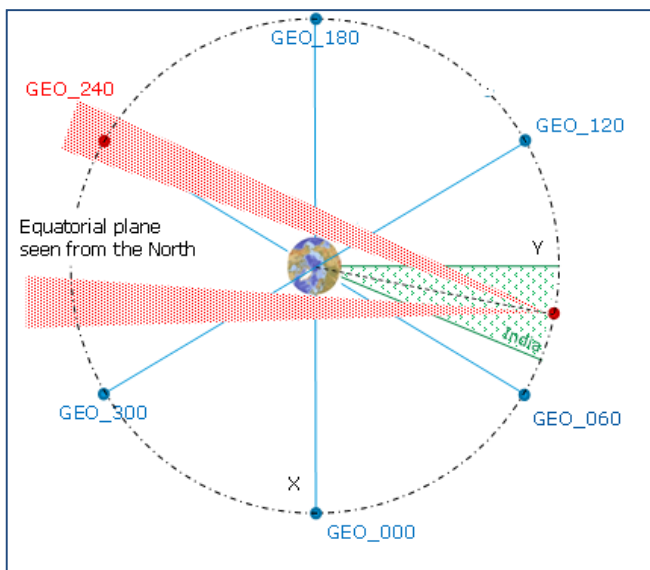


*Mean anomaly and RAAN are epoch dependent*



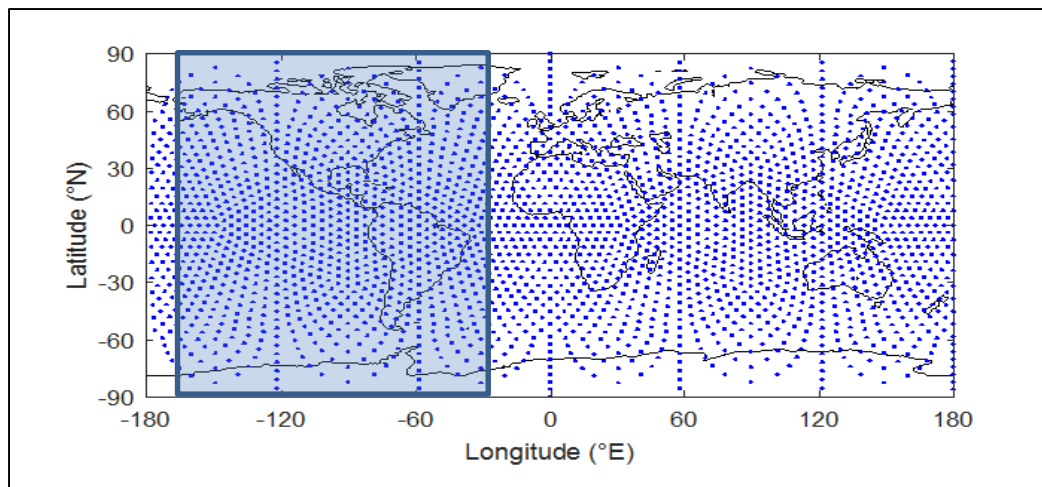
Antenna pattern

# Analysis Results

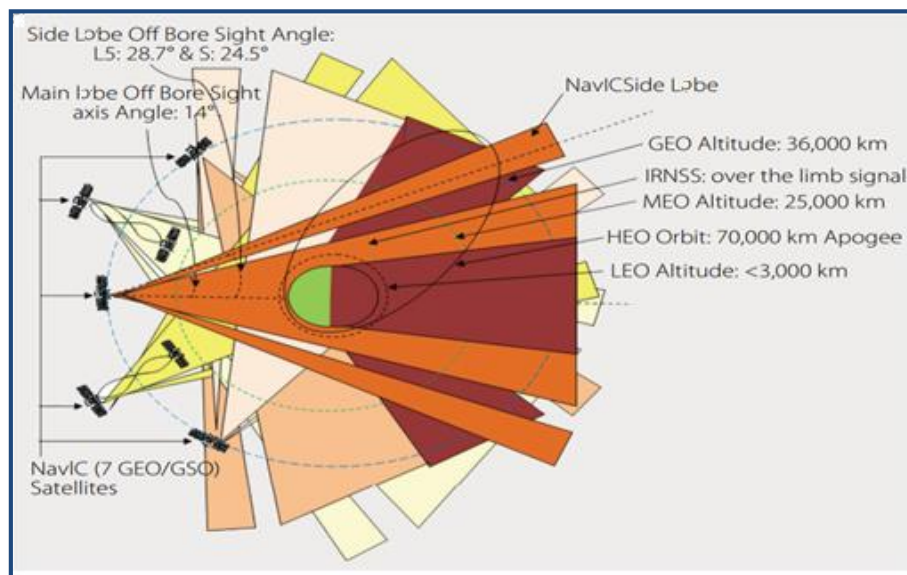


e.g. NavIC (IRNSS) Satellite at 83°E and its projection over the limb of earth

ICG booklet “The Interoperable GNSS Space Service Volume” to be released. Details of NavIC (satellite parameters and simulation results) details are available in page numbers 52-54 and 85.

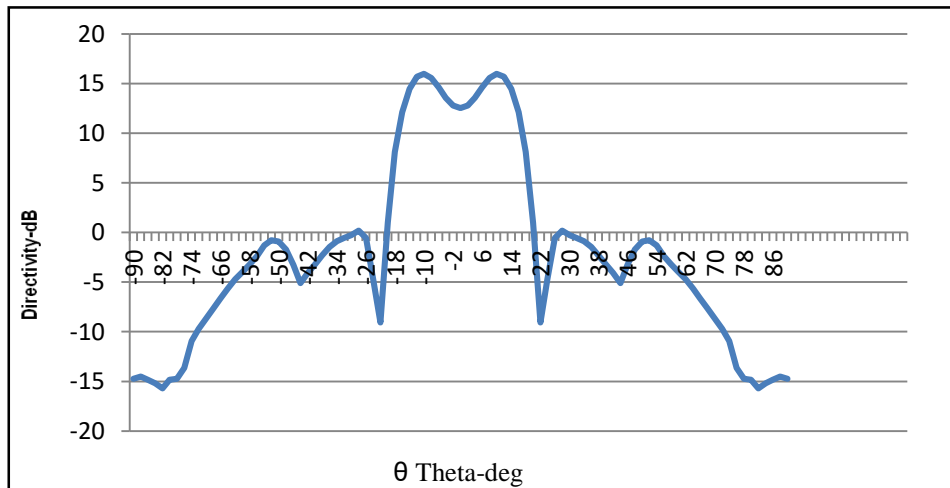
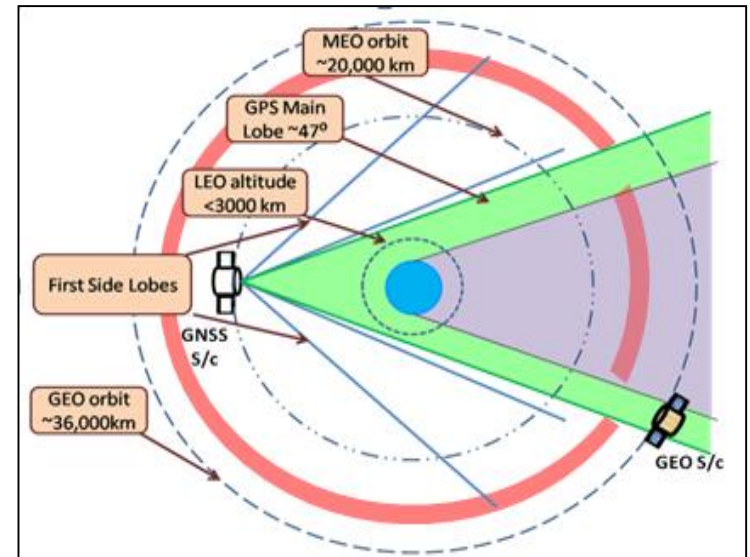


NavIC (IRNSS) satellites available for GEO satellites between longitude 190°E to 330°E longitude

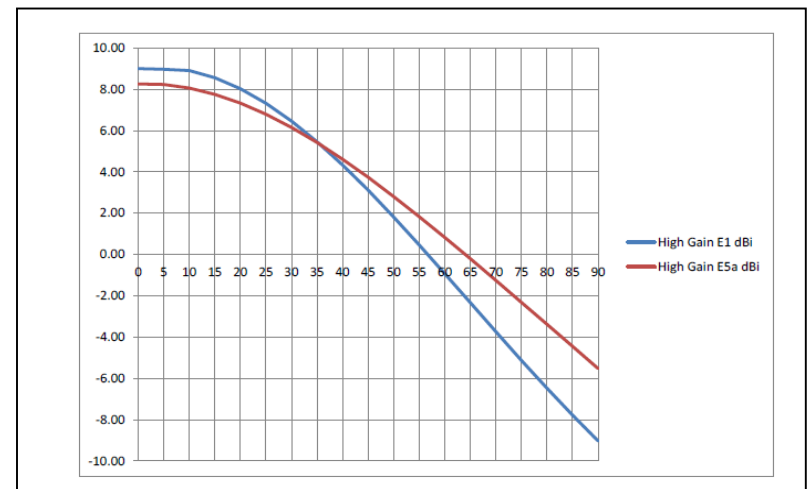


# GPS (L1) Signal availability analysis

- GEO Satellite at 83°E longitude has been taken for analysis
- GPS satellites visible conditions for GEO
  - Main lobe of GPS satellites antenna
  - Main lobe and 1<sup>st</sup> side lobe of GPS satellites antenna



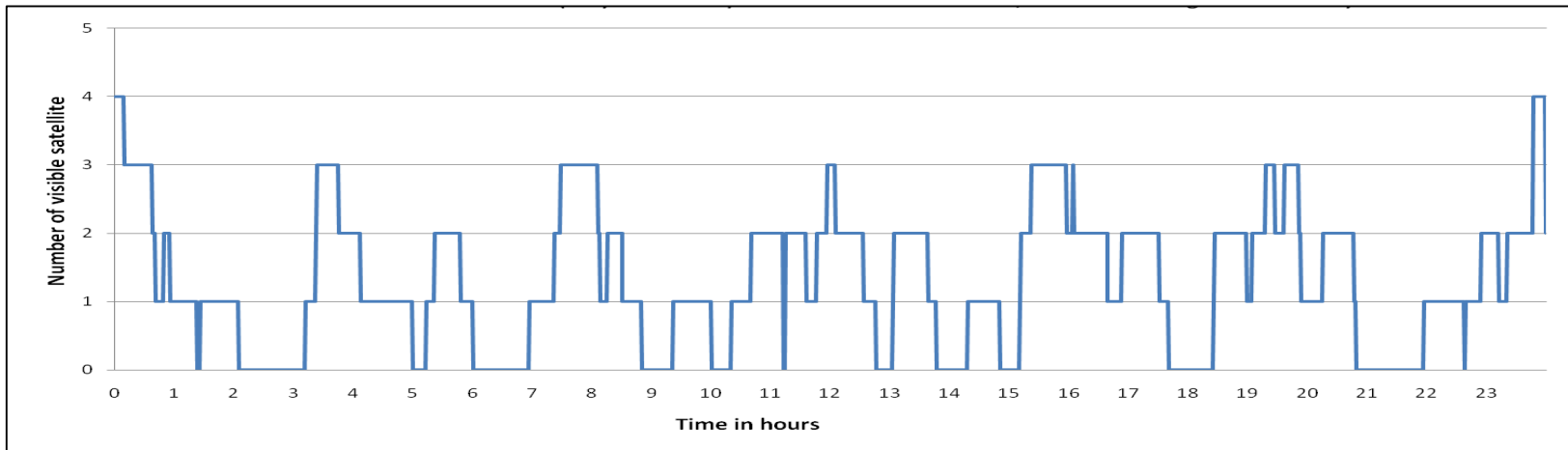
Transmit antenna



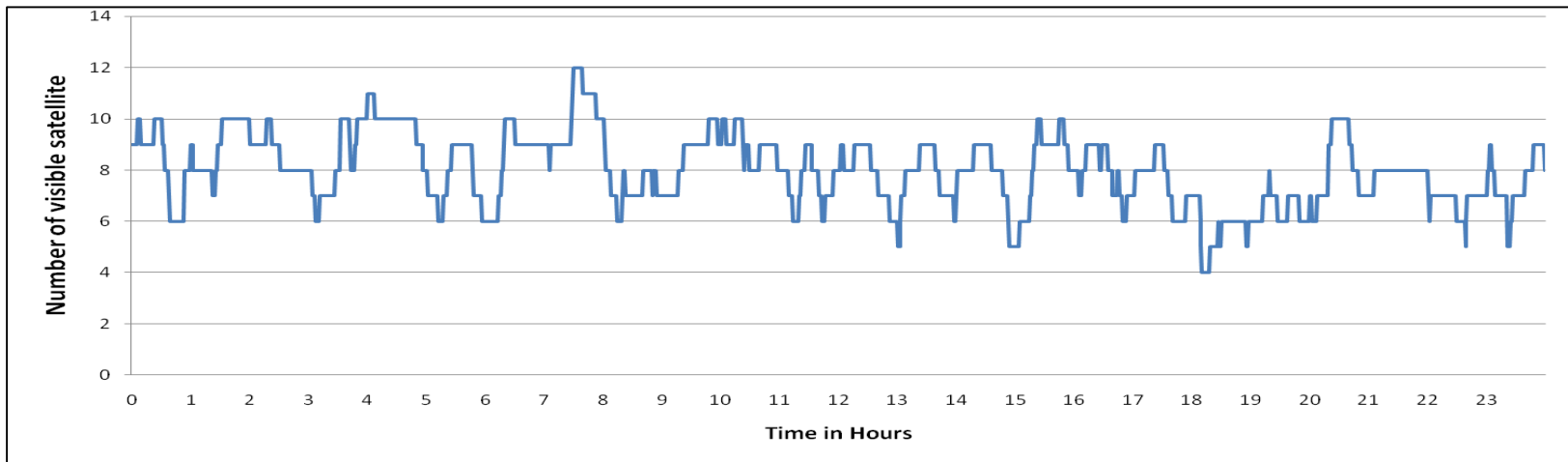
Receive antenna

# GPS (L1) Signal availability analysis

## GPS L1 Main lobe



(GPS L1 Main lobe + 1<sup>st</sup> Side lobe) &  $C/N_0 > 25$  dB-Hz



*Thank you  
for  
your attention*