



ISTF/3 – IP/10
Agenda Item 3
15/10/13

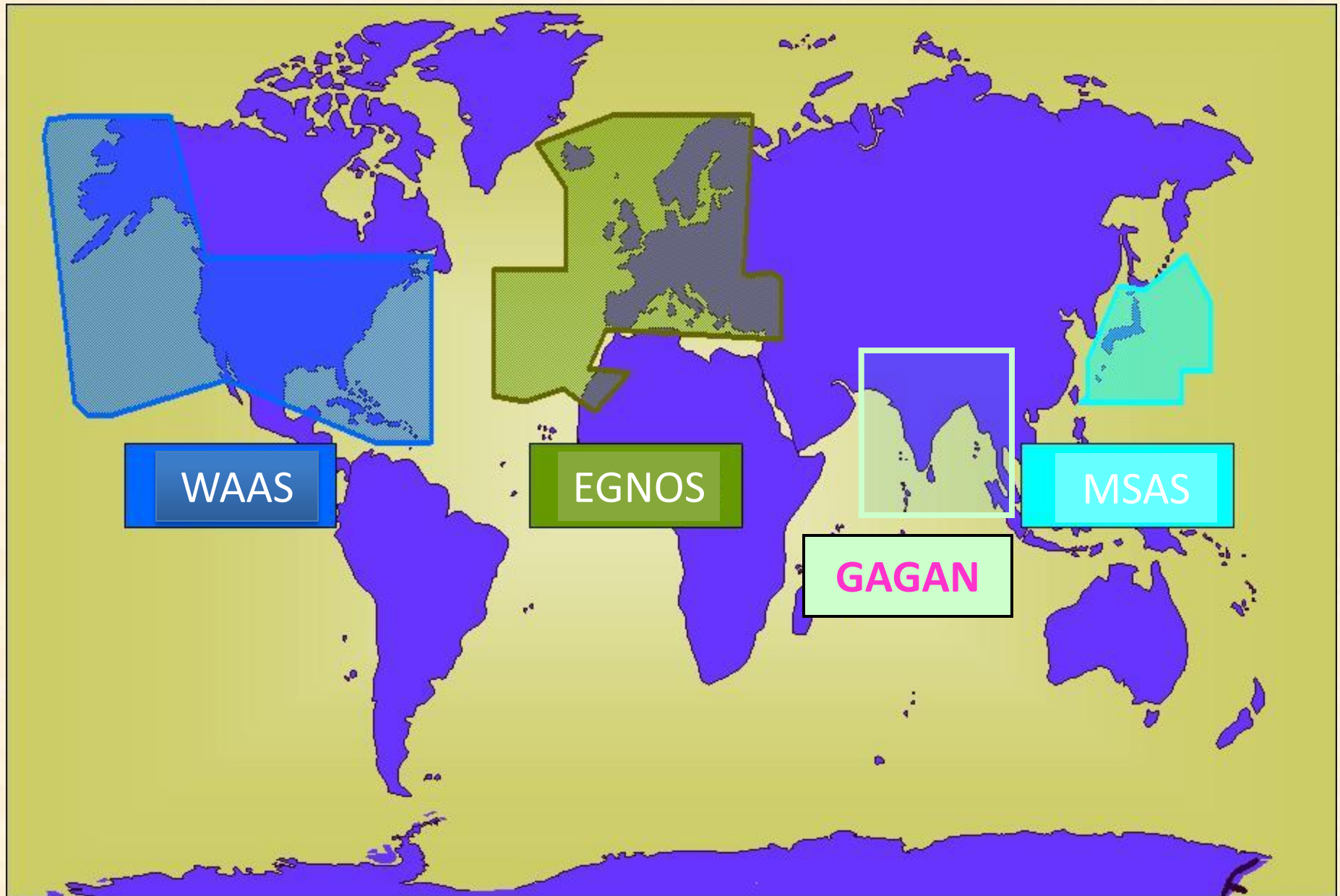
GNSS Status in India

**S. Bhattacharjya
VPS Srinivas
Surendra Sunda
Airports Authority of India,
India**

**15-17 October 2013
ISTF #3
Seoul, Republic of Korea**

➤ Satellite Based Navigation has been accepted by ICAO as Future means of navigation. It has therefore recommended seamless SBAS coverage throughout the globe

SBAS SYSTEMS



GAGAN Objective

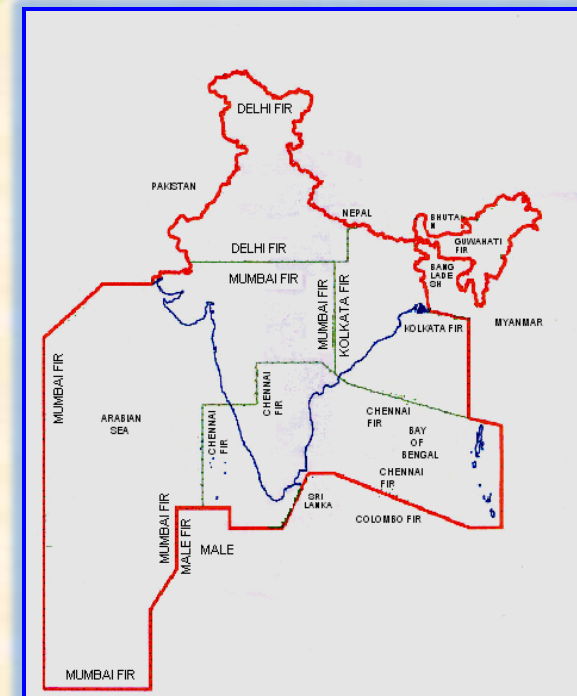
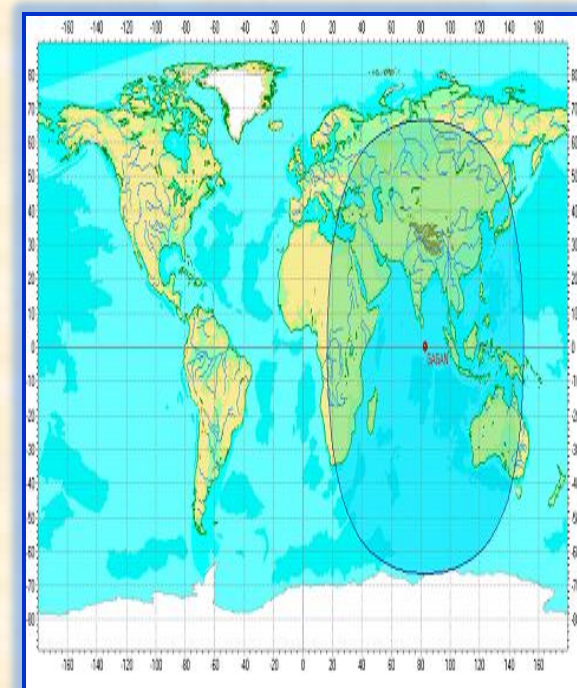
- To provide a certified navigation system for all phases of flight.
- To provide redundancies, Implement Suitable region specific IONO model, Get safety Certification for the system for the Civil Aviation use from Director General of Civil Aviation (DGCA).
- The targeted performance of GAGAN will be a certified RNP 0.1 en route navigation within India FIR and APV1 level of precision approach service over landmass of Indian FIR.
- GAGAN SIS usage and expansion within APAC region for wider harmonization.

GAGAN

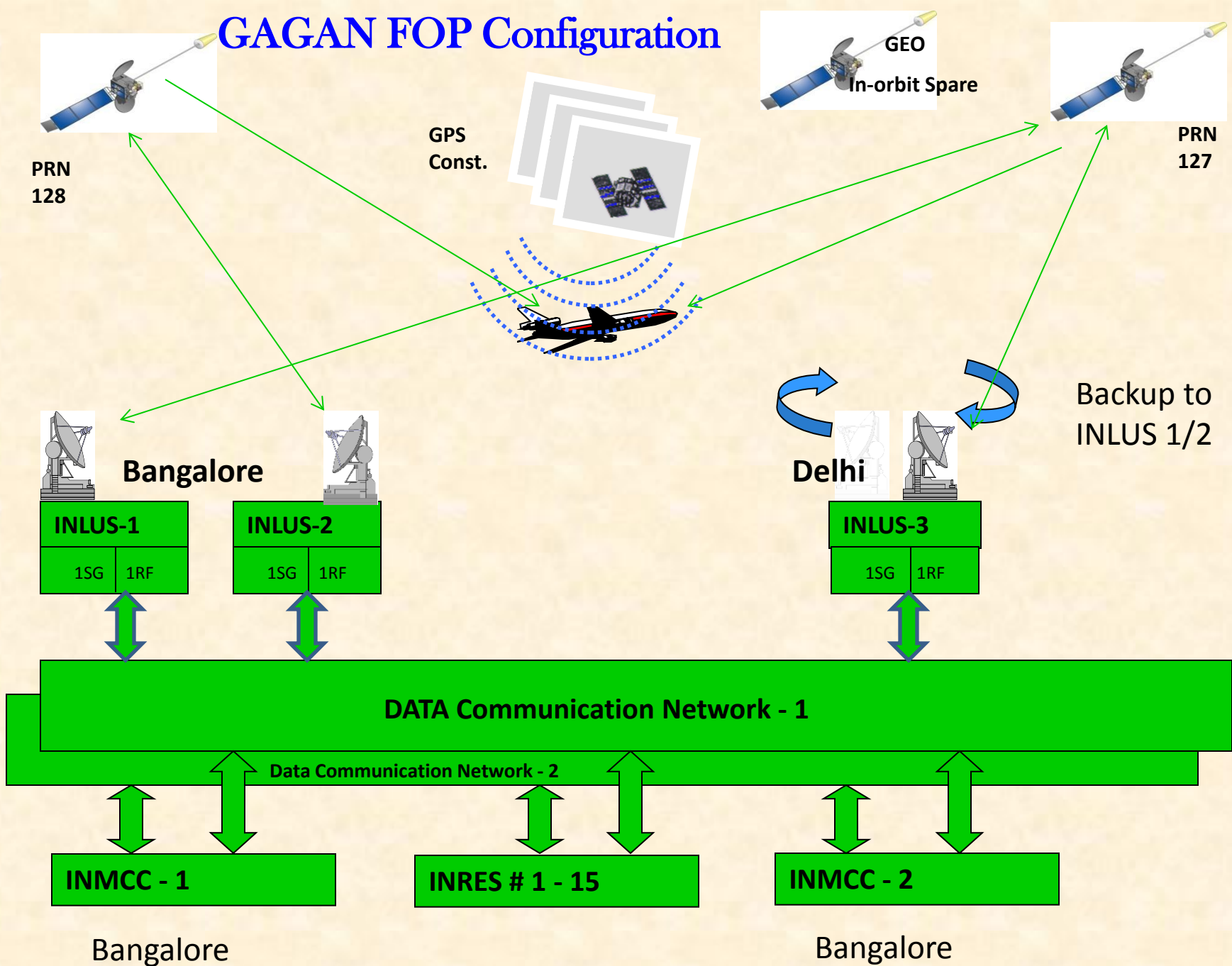
Common coverage of GAGAN GEO satellites
(55°, 83° & 93.5°) is beyond Indian FIR (GSAT-8, GSAT10 & GSAT-15)

GSAT-8 launched on 21-May'11. *Signal-In-Space available*

GSAT 10 launched on 29 Sep'12. *Signal-In-Space available*



GAGAN FOP Configuration



Achievement of GAGAN Objective

Service Level	Parameters	Requirement	Results
RNP 0.1	<ol style="list-style-type: none"> 1. Availability 2. Horizontal Accuracy 3. Vertical Accuracy 4. Time to Alarm 5. Vertical Alert Limit 6. Horizontal Alert Limit 	<p>>99 % over the Indian FIR</p> <p><72 m 95% bound</p> <p>N/A</p> <p>10 s</p> <p>N/A</p> <p>185.2m</p>	<p>>99%</p> <p>0.7m Average</p> <p>1.52m Average</p> <p>6.2S</p> <p>-</p> <p><185 m</p>
APV1/ 1.5	<ol style="list-style-type: none"> 1. Availability 2. Horizontal Accuracy 3. Vertical Accuracy 4. Time to Alarm 5. Vertical Alert Limit 6. Horizontal Alert Limit 	<p>99% over 76% of India</p> <p><7.6 m 95% bound</p> <p><7.6 m 95% bound</p> <p>6.2 s</p> <p>50 m</p> <p>40 m</p>	<p>86.57 %</p> <p>0.7m Average</p> <p>1.51m Average</p> <p>6.2S</p> <p>VPL<50</p> <p>HPL<40</p>

GAGAN RNP 0.1 & APV 1/1.5 Availability & % Availability

#Service: SBAS RNP-0.1

Availability Coverage % at

95% Contour: 100.00

99% Contour: 100.00

100% Contour: 0.00

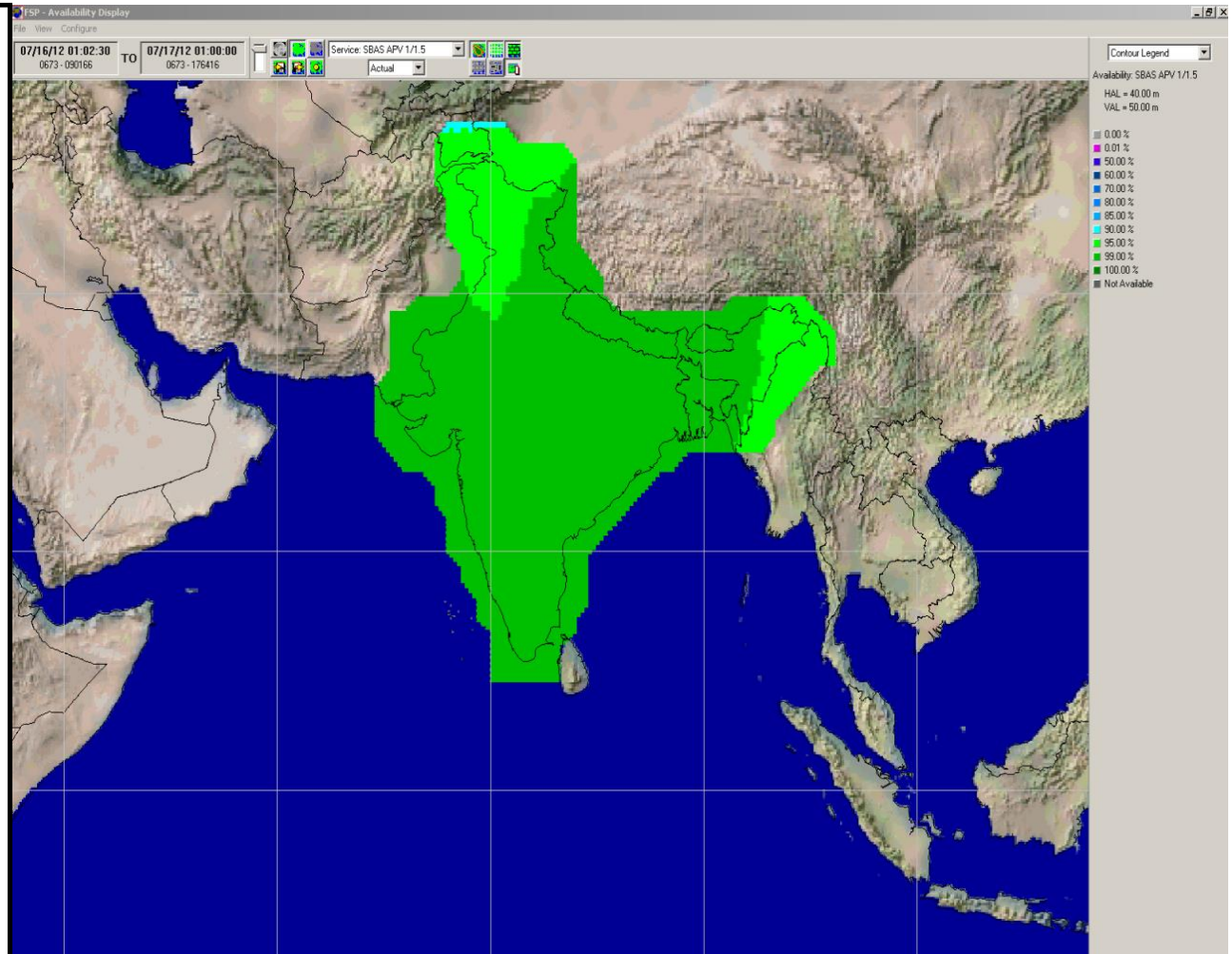
Service: SBAS APV 1/1.5

Availability Coverage % at

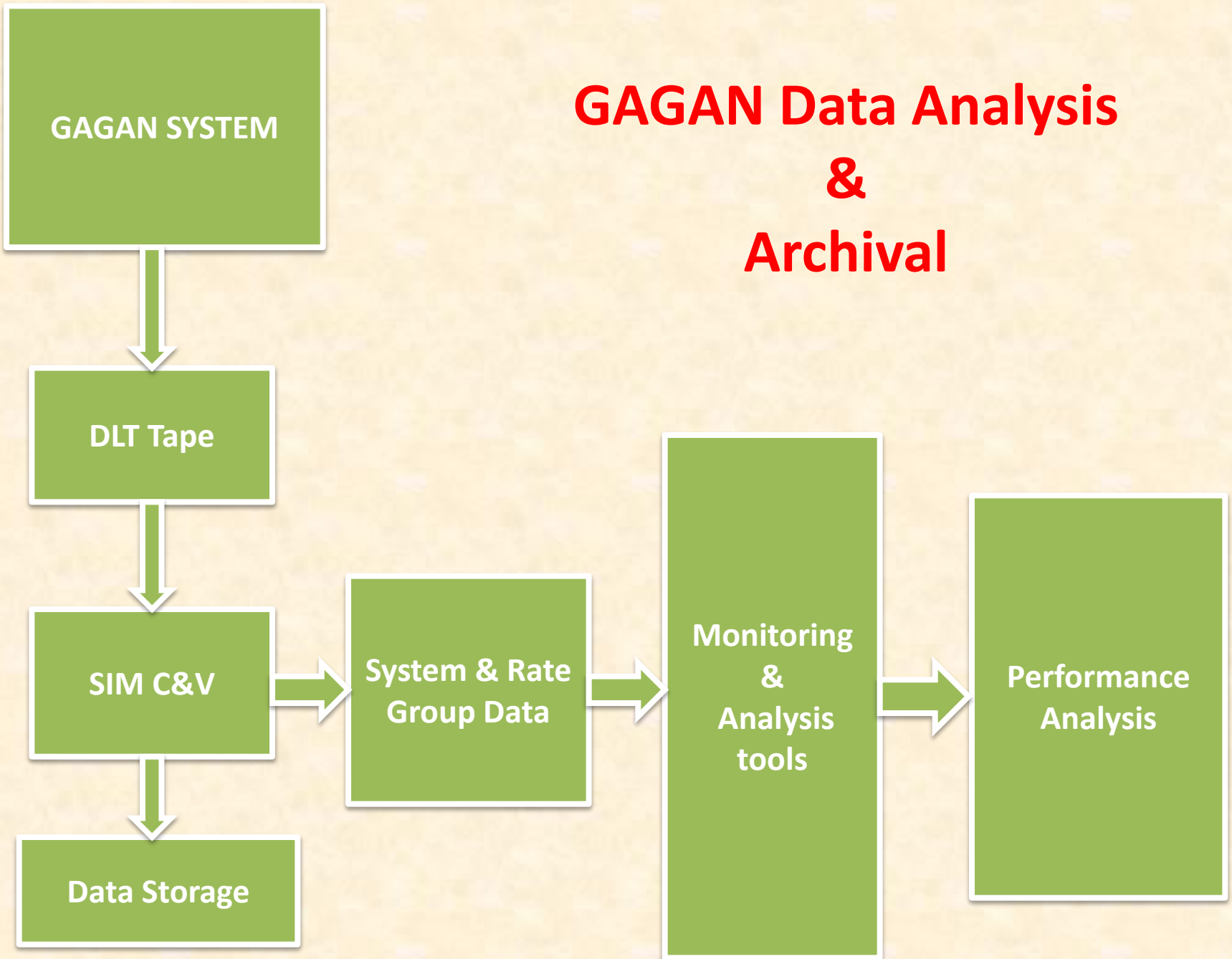
95% Contour: 100.00

99% Contour: 86.57

100% Contour: 0.00



GAGAN Data Analysis & Archival



Present Status

GAGAN is under the process of certification for RNP 0.1

- Stability test successfully completed.
- Operation Test & Evaluation(OT&E) dry run completed.
- OT&E Tools being developed
- Flight trials being undertaken for SIS validation
- Flight Procedures being developed for APV 1
- Hazard records mitigated/accepted for RNP 0.1

Present Status

Ground based augmentation system(GBAS)

- Pilot project being implemented at Chennai airport
- Honeywell SLS 4000 system being installed
- To be completed by June 2014



THANK YOU

for your attention

Redefining Navigation