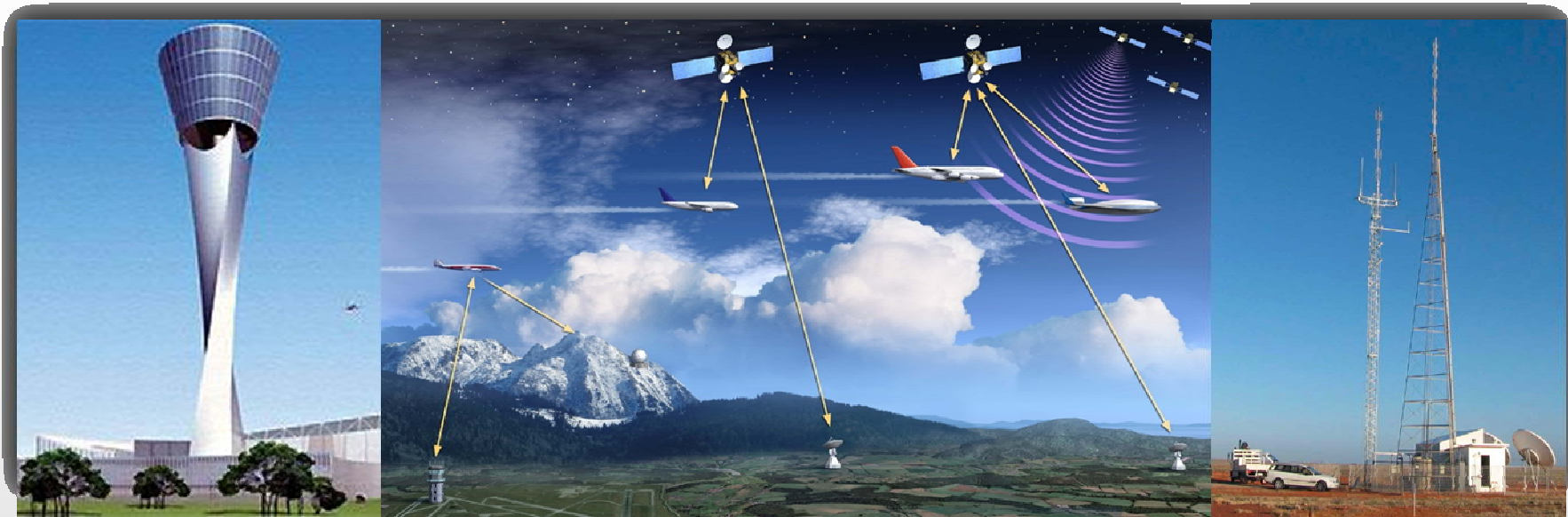




# ADS-B IMPLEMENTATION IN INDIA



**SITF / 12 | 15<sup>TH</sup> TO 18<sup>TH</sup> APRIL 2013 | KOLKATA, INDIA**

*S GHOSH, GM (CNS), KOLKATA*



# ADS-B IMPLEMENTATION IN INDIA



- In line with ICAO Global Plan Initiatives and Aviation System Block Upgrade (ASBU) India has taken a lead in:
  - Installing ADS-B ground stations to provide surveillance redundancy where Radar coverage exists,
  - Filling surveillance gaps where surveillances coverage is not possible due to high terrain and remote areas,
  - Sharing ADS - B data with the neighboring countries,



## ADS-B IN INDIA – CURRENT & PLANNED



- ADS-B ground stations installed at 14 airports in redundant configuration:
  - Amritsar, Jaipur, Varanasi, Ahmedabad, Nagpur, Calicut, Lucknow, Cochin, Coimbatore, Mangalore, Port Blair, Trivandrum, Agartala and Guwahati,
  
- ADS-B ground stations to be installed at
  - Srinagar, Jaisalmer, Dibrugarh, Patna, Bhubaneswar, Trichy, Vijayawada, Jamnagar/ Kandla, Paykong, Agathi, Aurangabad, Behrampur, Belgaum, Kargil, Pantnagar and Ranchi.



## ADS-B IN INDIA – PURPOSE OF USE



- As stand-by to Radar systems to provide supplementary surveillance coverage at:
  - Amritsar, Varanasi, Ahmedabad, Nagpur, Cochin, Mangalore, Trivandrum, and Guwahati.
  
- To fill the surveillance gaps in areas due to non-availability of radars at:
  - Jaipur, Lucknow, Srinagar, Jaisalmer, Agartala, Dibrugrah, Bhubneshwar, Patna, Trichy.



# ADS-B IN INDIA INTEGRATION EFFORTS



- ADS-B data locally integrated with ATM automation systems installed at (under test)
  - Nagpur, Ahmedabad, Mangalore, Trivandrum, Guwahati, Varanasi, Cochin and Amritsar airports,
- ATM automation systems at Calicut, Coimbatore, Lucknow, Jaipur, Agartala, Patna, Bhubaneswar, Vijayawada and Trichy are being upgraded to process additional surveillance data of ADS-B,
- ATM automation system installed at Amritsar and Delhi to receive ADS-B (2<sup>nd</sup> phase) data from Srinagar and Jaisalmer to enhance surveillance coverage



# ADS-B IN INDIA INTEGRATION EFFORTS



- Data from ADS-B ground station at Port Blair will provide surveillance coverage over Bay of Bengal up till the FIR boundary of Chennai / Kuala-Lumpur and Kolkata / Yangaon, and:
  - has been integrated at Chennai,
  - to be integrated at Kolkata
- Surveillance sensors integrated in Chennai FIR enabling seamless upper airspace harmonization with lower limit as FL260.
- Surveillance sensors to be integrated for Delhi and Mumbai ATC centers.



# ADS-B IN INDIA - CHALLENGES



- Some issues regarding integrating ADS-B data with ATM automation systems are:
  - Existing ATM automation systems correlate ADS-B targets with SSR codes,
  - Aircrafts compliant with DO260 and DO260A are not broadcasting mode 3/A code,
  - Desirable that ADS-B targets be correlated with 24 bit codes,
  - Existing ATM automation systems should have capability of processing DO 260A and 260 B replies also,



# ADS-B IN INDIA - CHALLENGES



➤ Some other issues are:

- ATM automation systems should be capable of receiving both geometric and barometric altitude from an ADS-B equipped aircraft,
- In absence of barometric altitude automation system should display geometric altitude with warning and / or different coloured symbol,
- Geometric altitude is useful for RVSM monitoring, and also as an indicator of correct QNH setting in the aircraft.





## ADS-B IN INDIA – DISPLAY ON ASD



- ATM automation system should differentiate between surveillance targets from different type of sensors through different symbols and colours,
- ATM automation system display ADS-B targets with NUC value  $> 5$ , and above,
- Required to display ADS-B tracks of NUC  $< 5$  with a different colour for situational awareness,



## SUGGESTIONS FOR SYSTEM UPGRADE

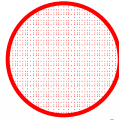


- ATM automation system should have the capability of selecting different versions of ASTERIX-21 to take full advantage of future upgrades,
- ATM automation system should have capability to display emergency status broadcast by aircraft through ADS-B reports,
- ATM automation system should be capable of extending tools for ADS-B targets similar to that provided for Radar targets like RBL, minimum separation tool, warning alert etc.

# Total Radar Coverage

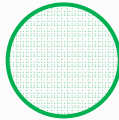
## S-Band ASR/MSSR

1. Delhi
2. Mumbai
3. Chennai (Replacement)
4. Kolkata (Replacement)
5. Ahmedabad (Replacement)
6. Hyderabad (HIAL)
7. Guwahati
8. Trivandrum (Replacement)
9. Bangalore (BIAL)



## New S-Band ASR/MSSR

1. Cochin
2. Amritsar
3. Delhi
4. Mumbai



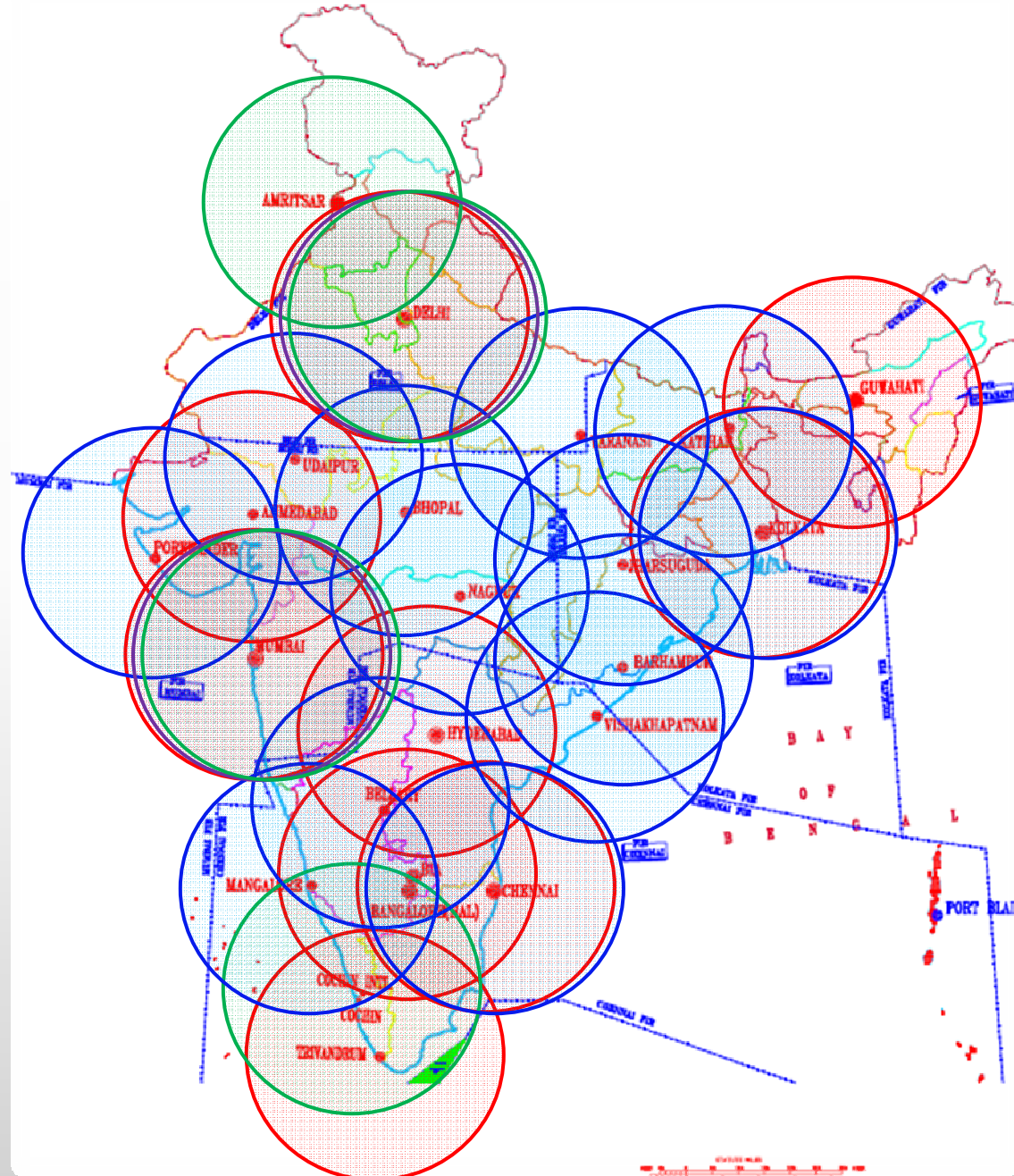
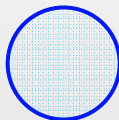
## L-Band ARSR/MSSR

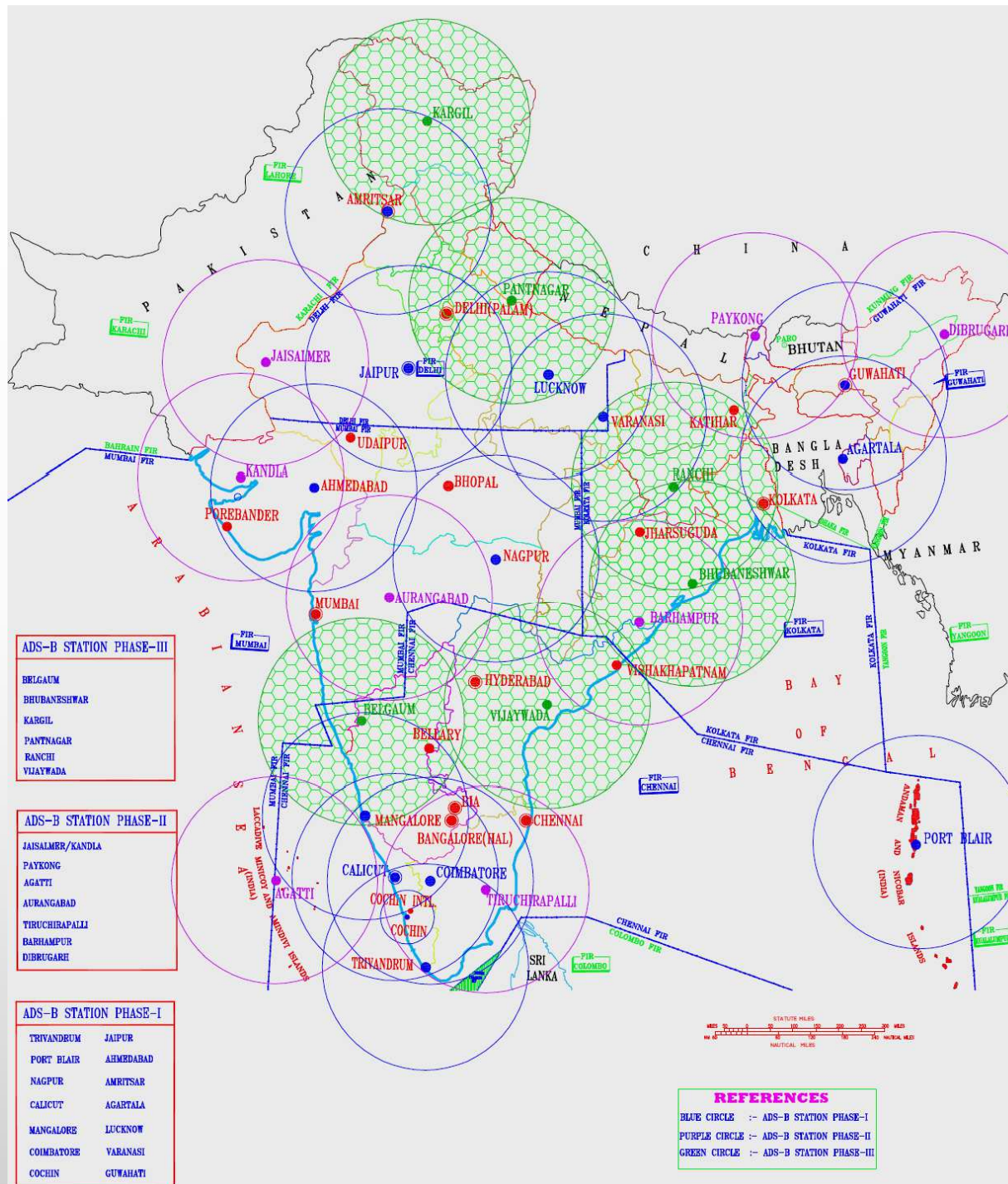
1. Delhi
2. Mumbai



## MSSR only

1. Varanasi
2. Nagpur
3. Mangalore
4. Behrampur
5. Chennai
6. Kolkata
7. Porbandar
8. Bhopal
9. Bellary
10. Vizag
11. Jharsuguda
12. Katihar
13. Udaipur







**Thanks for Kind Attention !**