भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

Separation minima using ATS surveillance systems where VHF voice communications are not available

By

INDIA-Airports Authority of India

INTRODUCTION

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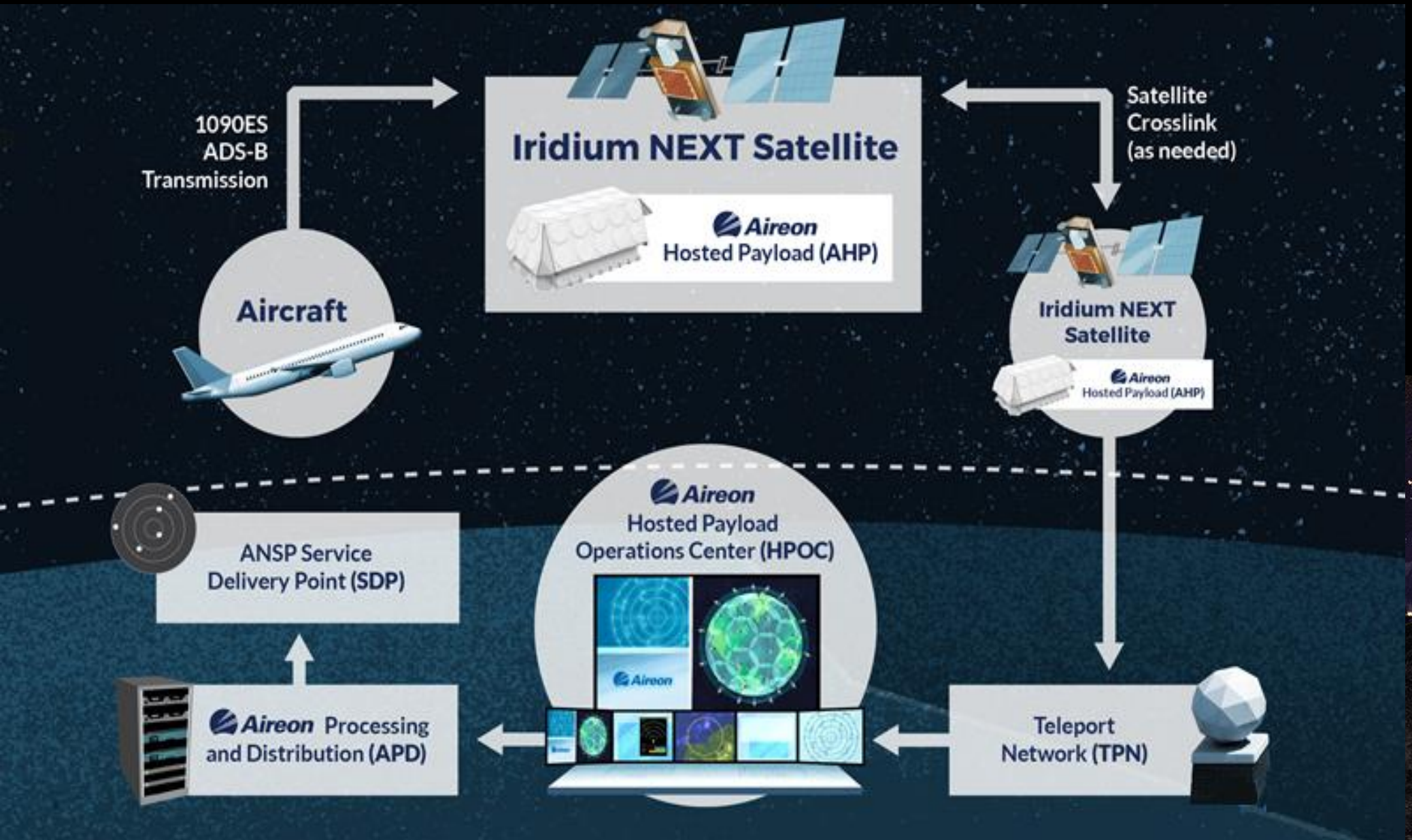
- Surveillance Systems and VHF Voice communication are main enablers for reduction in separation between aircraft
- Surveillance and VHF are predominantly confined to ground based systems.
- Both, surveillance and VHF coverage are subject to line of sight
- It is not possible to provide surveillance and VHF over high seas due to siting issues.
- Oceanic Regions are generally served with procedural Air Traffic Control Services added by ADS-C & CPDLC.
- Technological advancement have paved way for RADAR like surveillance in oceanic and remote regions through satellites.
- Changes in procedures have paved way for surveillance service where VHF is not available.

SPACE BASED ADS-B



SEPARATION MINIMA USING ATS SURVEILLANCE SYSTEMS WHERE VHF VOICE COMMUNICATIONS ARE NOT AVAILABLE

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- Global Coverage through Space Based ADS-B was operational in 2019
- There was no separation standard for surveillance without VHF voice communication
- ICAO introduce a new separation in 9th amendment of PANS-ATM (Doc 4444 Para 8.7.4) in 2020 based on ATS surveillance Systems where VHF Voice communications are not available.
- The ATS surveillance Systems may be RADARs, ADS-B, MLAT or Space Based ADS-B
- The communication system is predominantly CPDLC backed up by HF, SATCOM and limited VHF

REFERENCES & NOTES

- Performance-based Navigation (PBN) Manual (Doc 9613)
- Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869)
- Global Operational Data Link (GOLD) Manual (Doc 10037)
- Guidelines for the Implementation of Separation Minima Using ATS Surveillance Systems Where Very High Frequency (VHF) Voice Communications Are Not Available (Doc 10116)
- Application of the separation minima in 8.7.4.2, 8.7.4.3 and 8.7.4.4 includes elements of both procedural control and ATS surveillance services; refer to Annex 1 — Personnel Licensing for applicable air traffic controller rating requirements.

CONDITIONS FOR THE SEPARATION

Utilizing positioning information derived from an ATS surveillance system provided following conditions are met

- A navigational performance of RNP 4 or RNP 2 shall be prescribed;
- The communication system shall satisfy RCP 240;
- An alternate means of communication shall be available so as to allow the controller to intervene and resolve a conflict within a total time of nine minutes, should the normal means of communication fail; and

Note.— The total time of 9 min. specified in includes the four minutes allocated to RCP 240.

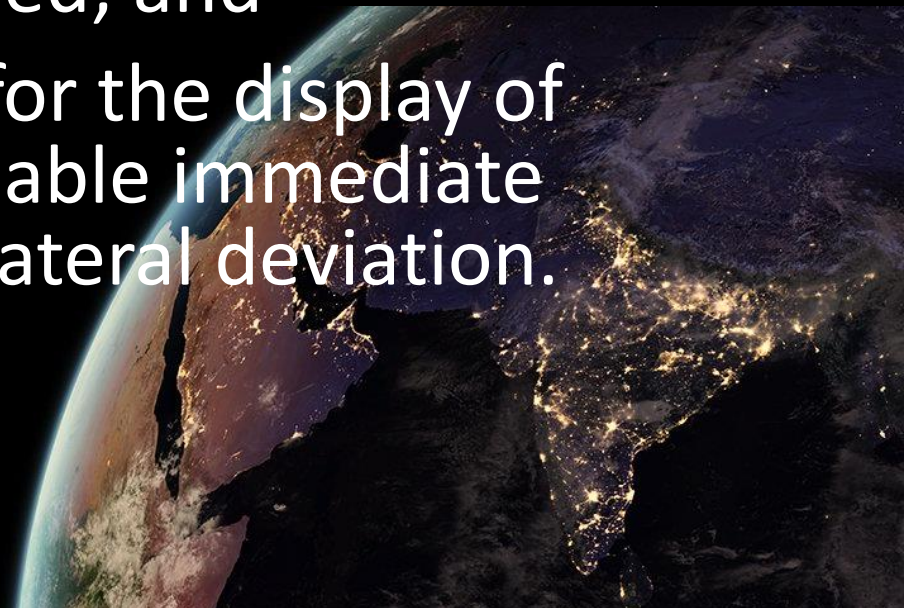
CONDITIONS FOR THE SEPARATION (CONTD..)

- route conformance monitoring shall be ensured by the use of ATS surveillance system lateral deviation alerts with a warning threshold normally set at a maximum 3.0 NM.

  1) Warning thresholds greater than 5.6 km (3.0 NM) may be set, provided the lateral separation minima in 8.7.4.2 a) and 8.7.4.3 are increased by 1.9 km (1.0 NM) for each 1.9 km (1.0 NM) that the warning threshold is increased; and

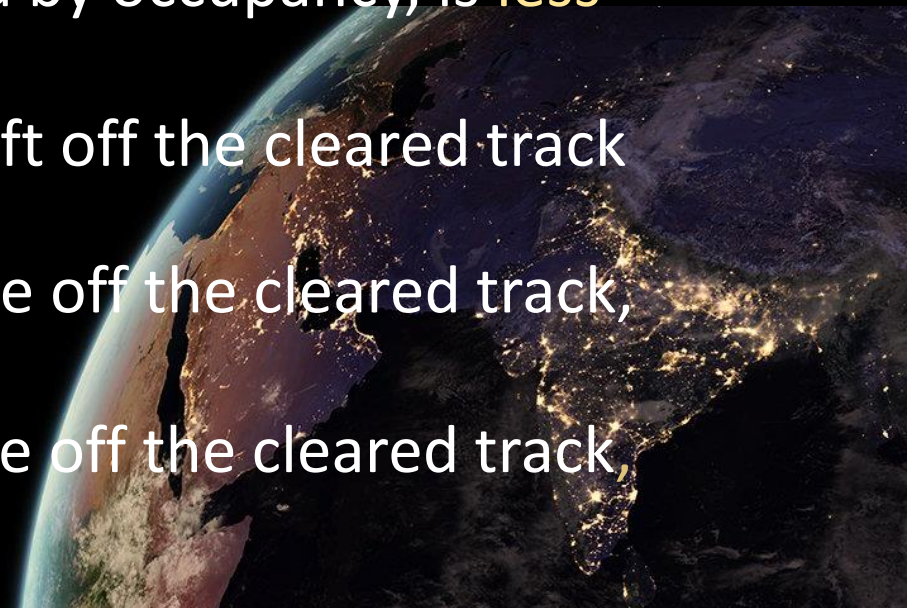
  2) ATS surveillance systems shall provide for the display of alerts in a clear and distinct manner to enable immediate action by the controller in the event of a lateral deviation.

- **Vectoring is not permitted**



SEPARATION MINIMA (LATERAL SEPARATION BETWEEN ATS ROUTES)

- a) 35.2 km (19.0 NM) lateral spacing between parallel or non-intersecting tracks;
- b) 35.2 km (19.0 NM) lateral separation of aircraft operating on intersecting tracks applied in accordance with 5.4.2.1.5 a) and b);
- if so prescribed by the appropriate ATS authority, it can be reduced, but not below 27.8 km (15.0 NM), provided either:
- a) the density of traffic in the airspace, as measured by occupancy, is less than 0.6; or
- b) the proportion of total flight time spent by aircraft off the cleared track does not exceed the following:
  1) for aircraft deviating 13.0 km (7.0 NM) or more off the cleared track, 3 × 10-5 per flight hour; and
  2) for aircraft deviating 20.4 km (11.0 NM) or more off the cleared track, 1 × 10-5 per flight hour.

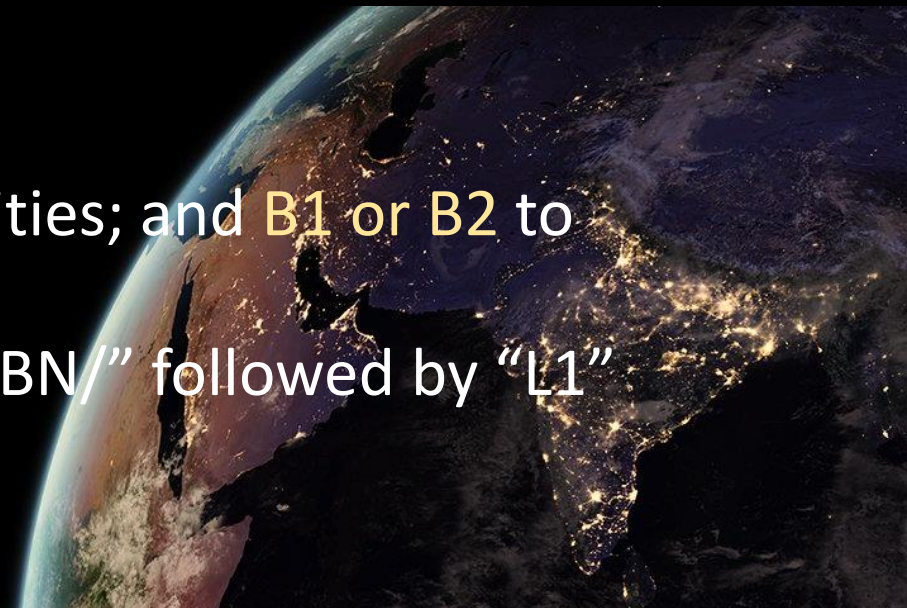


SEPARATION MINIMA (LONGITUDINAL SEPARATION BETWEEN ELIGIBLE AIRCRAFT)

- 31.5 km (17.0 NM) longitudinal separation of aircraft operating on same tracks or crossing tracks applied in accordance with 5.4.2.9.5 provided that the relative angle between the tracks is less than 90 degrees; and
- Opposite direction aircraft on reciprocal tracks may be cleared to climb or descend to or through the levels occupied by another aircraft, provided that surveillance position reports have been received from both aircraft demonstrating the aircraft have passed each other by 9.3 km (5.0 NM).
- may be reduced to 26 km (14 NM), provided that the relative angle
- between the tracks is less than 45 degrees.

FPL REQUIREMENT

- Field 10 (Equipment) of the standard ICAO flight plan to identify an aircraft's data link and navigation capabilities.
- The operator should insert the following items into the ICAO flight plan (as per the 2012 flight plan format) for FANS 1/A or equivalent aircraft:
- Field 10a (Radio communication, navigation and approach aid equipment and capabilities);
  - insert "J5" to indicate CPDLC FANS1/A SATCOM (Inmarsat) or "J7" to indicate CPDLC FANS1/A SATCOM (Iridium) data link equipment;
  - insert "P2" to indicate RCP 240 approval;
- Field 10b (Surveillance equipment and capabilities);
  - insert "D1" to indicate ADS with FANS1/A capabilities; and B1 or B2 to indicate ADS-B.
- Field 18 (Other Information); insert the characters "PBN/" followed by "L1" for RNP 4 and SUR/RSP 180 PBN/RNP2

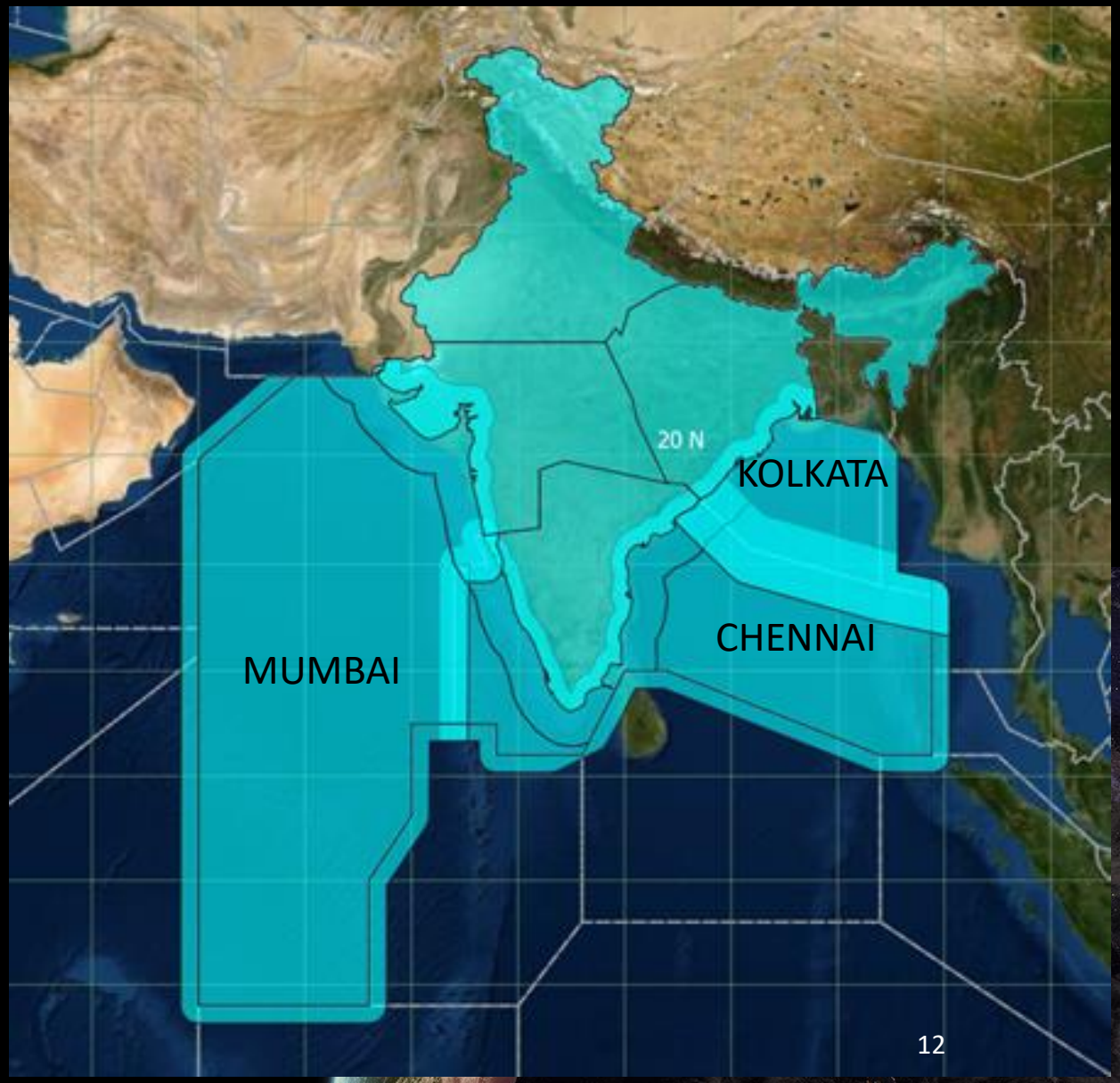


IMPLEMENT STRATEGIES

- Assess the need for separation
- Asses ATM System Capabilities
- Assess the fleet equipage
- Assess the benefits
- Draw a road map
- Consult Stake holders
- Consult neighboring FIRs/ACCs
- Carry out safety risk assessment to identify hazards and their mitigation.
- Consult regulator for approval if necessary
- Prepare SOPs/LoAs
- Start Controller s' Training
- Promulgate NOTAM
- Start Trial Operation
- Analyse results of trial and modify operation if required
- Carry out commission level safety assessment
- Implement on permanent basis.

S ADS-B COVERAGE & USE IN INDIAN ATS AIRSPACE

- In Mumbai, Chennai, Kolkata Oceanic airspace.
- Used **for situational awareness** within Oceanic Airspace.
- Great help during Wx Deviations.
- Helped reducing LHDs
- 10min separation on crossing tracks.
- TRIAL OPS OF 20NM LONGITUDINAL SEPARATION BASED ON S ADS-B & CPDLC

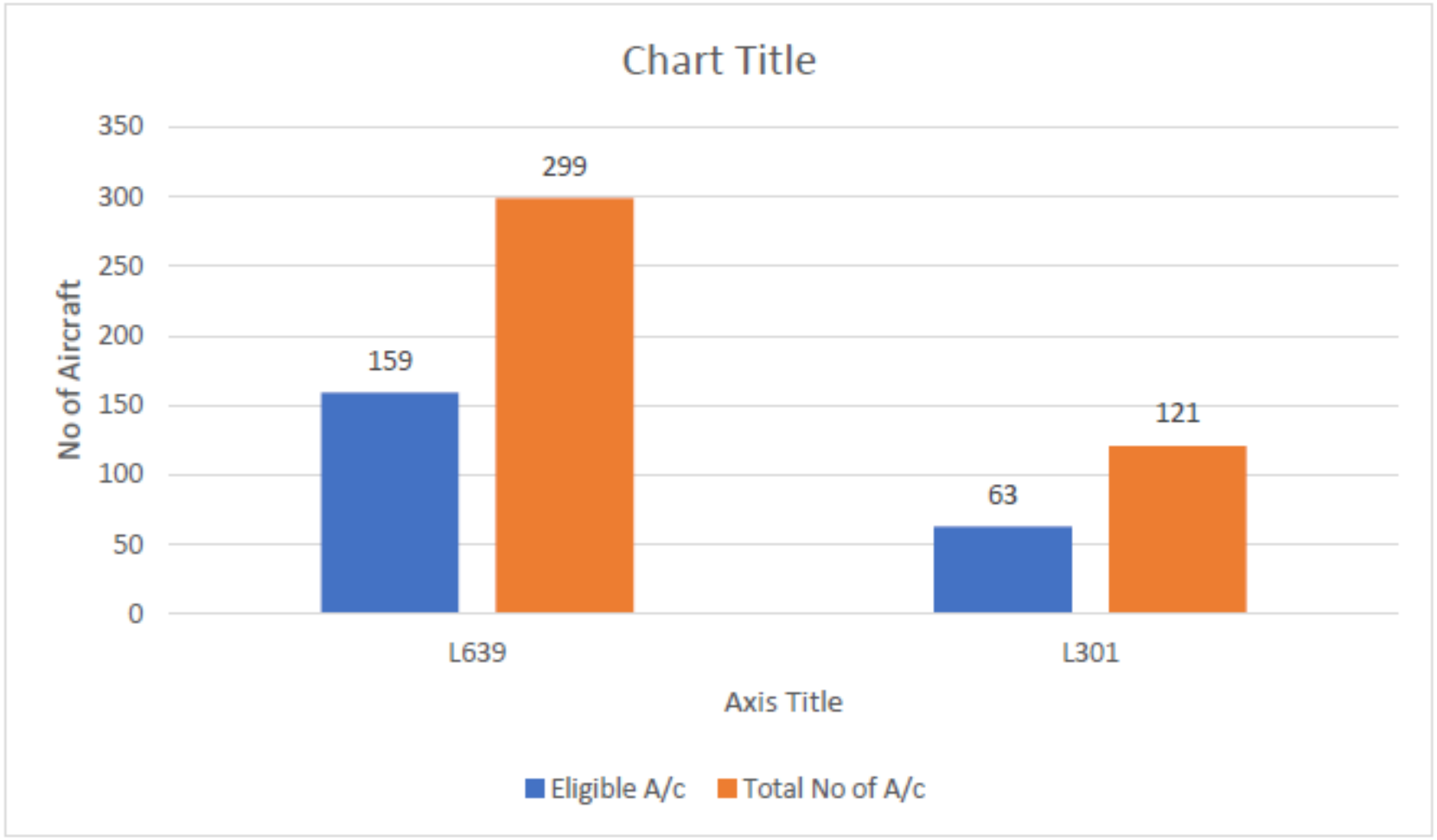


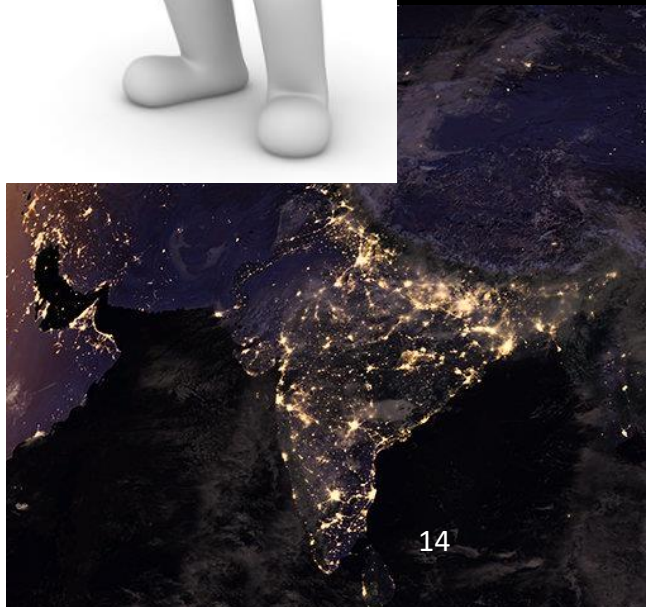
POTENTIAL BENEFITS

- Capacity Enhancement
- Better allocation of Optimum Flight Levels.
- Fuel Saving
- Reduction in Carbon Footprint towards LTAG.

LESSON LEARNT: FLEET CAPABILITY

Eligible No of Aircraft for application of 20 Nm Separation Minima

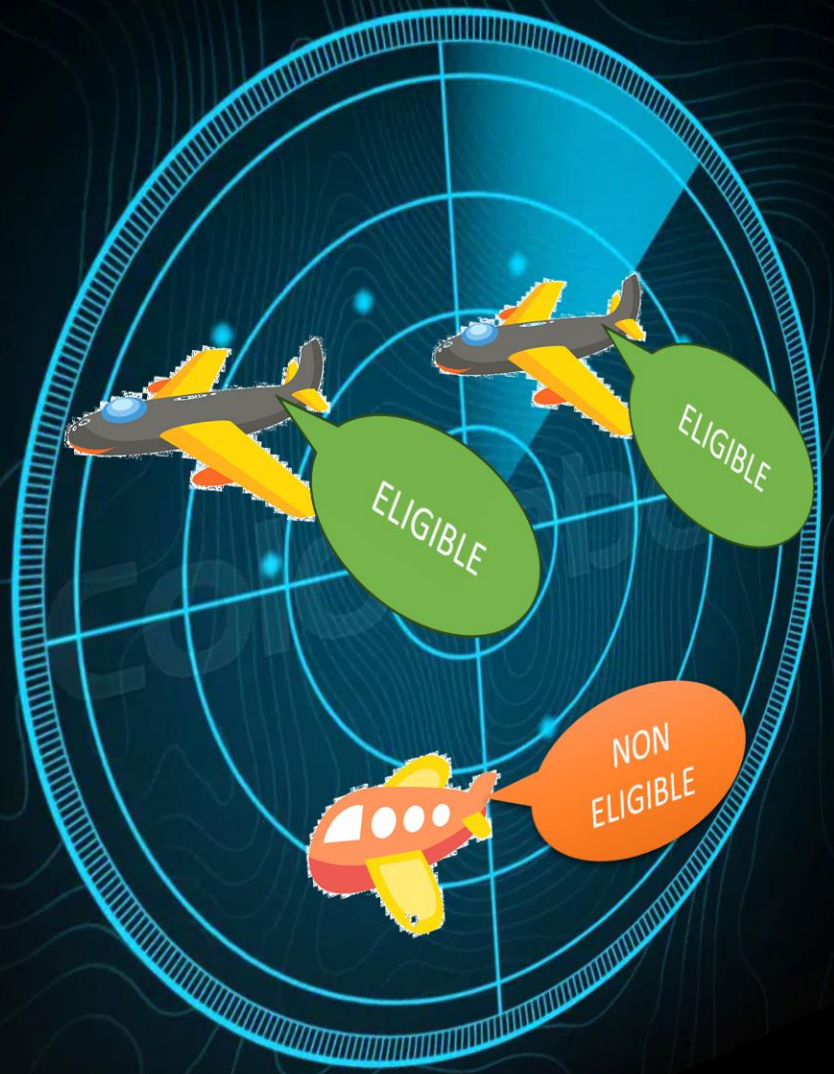




LESSON LEARNT: SOLUTION

PROBLEM: SORTING ELIGIBLE AIRCRAFT

SOLUTION: INDICATION OF ELIGIBILITY IN ATM AUTOMATION SYSTEM



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THANK YOU

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