*International Civil Aviation Organization*

**The Fourth Meeting of the South Asia, Indian Ocean and Southeast Asia ATM Coordination Group (SAIOSEACG/4)**

Bangkok, Thailand, 18 – 21 March 2025

**Agenda Item 4: Implementation of CNS-ATM Systems**

# TRIAL OPERATION ON APPLICATION OF 20NM LONGITUDINAL SEPARATION USING SPACE-BASED ADS-B AND CPDLC

(Presented by INDIA/AIRPORTS AUTHORITY OF INDIA)

**SUMMARY**

This paper presents various aspects of implementation strategy of reduced longitudinal separation of 20NM using Space Based ADS-B surveillance and CPDLC communication in oceanic region of Mumbai FIR and related issues.

## 1. INTRODUCTION

1.1 The post pandemic air traffic growth in the Indian ATS airspace has been phenomenal in both domestic and international sectors. The traffic growth in the oceanic region of Indian ATS airspace has been quite challenging in terms of capacity and efficiency, aggravated by limited use of Afghanistan airspace by airlines. This has prompted India to leverage the space-based surveillance technology deployed by Airports Authority of India in oceanic region of Kolkata, Mumbai and Chennai FIRs to reduce longitudinal separation between eligible aircraft for improvement of ATS route capacity. The new separation based on surveillance services where VHF is not available, has been on trial on two busy international routes L301 and L639 in Mumbai FIR.

## 2. DISCUSSION

### The Technology

2.1 Space Based ADS-B is a surveillance technology in which the ADS-B data transmitted by equipped aircraft through 1090ES transponder is received by a hosted payload on 66 low earth orbit satellites and re-transmitted to ground stations where it is processed and distributed to users. This technology eliminates line of site problems encountered in ground based surveillance and provides a global coverage which is especially helpful for extending surveillance coverage over high seas and remote areas. The EASA certified Space Based ADS-B technology with a update rate of 8 seconds is provided by Aireon in India. India has implemented SADS-B since 2020 and started using it from January 2021, initially for situational awareness which helped reduction of LHDs and also helped a lot during weather deviations, thereby improving safety to a great extent.

### The Separation

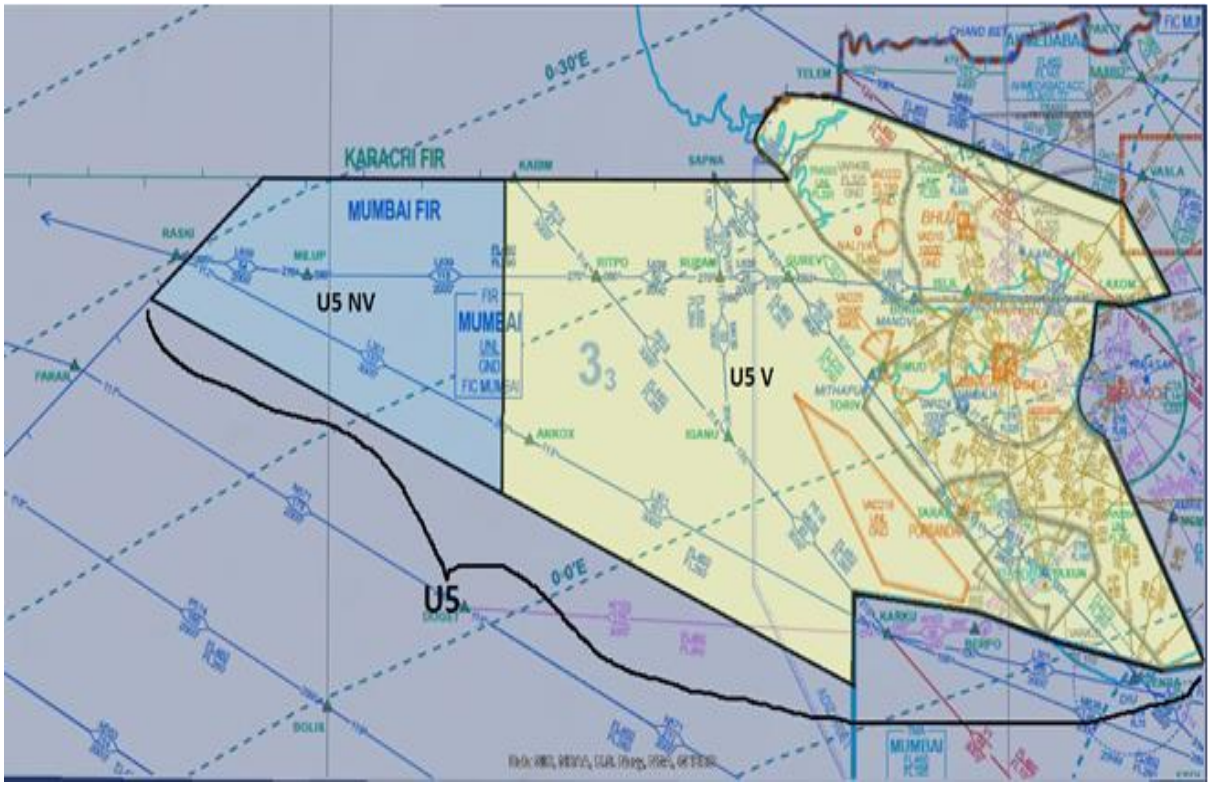
2.2 Normally, surveillance service requires direct controller pilot voice (VHF) communication which is generally not possible over high seas. However, in its 9th edition of PANS-ATM (Doc 4444) ICAO introduced a new separation under surveillance services (Chapter-8) for **Separation minima using ATS surveillance systems where VHF voice communications are not available** (section 8.7.4) paving way for reduction of longitudinal separation between eligible aircraft and lateral separation between ATS Routes. The primary communication means is CPDLC supported by HF and SAT phones as back up.

**The Implementation**

2.3 The longitudinal separation of 20NM trial based on SDAS-B and CPDLC was contemplated in last quarter of 2022 by the Airports Authority of India (ANSP) for trial on two busy routes L301 and L639 in Mumbai FIR which are transiting to Muscat FIR. The Stake holders meeting was conducted in March 2023 where airlines were enthusiastic to participate in the trial. The neighboring FIR Muscat was consulted on the proposed trial operation. A team visited Muscat in August 2023 to discuss the separation and operational modalities. Although Oman agreed to the proposal in principle, could not adhere to the time line for various issues at their end.

The concept and execution level safety assessment for the trial was conducted in November 2023. However, since Oman was not ready to implement the separation, India decided to start the trial operation for east bound aircraft only from 15th January 2024.

The trial was conducted in U5V and U5NV sectors of Mumbai ACC. The U5V sector has terrestrial ADS-B surveillance coverage and also VHF coverage. However, in U5NV sector aircraft are tracked by only space based ADS-B and communication is via CPDLC and HF. During the trial period, U5N sector was exclusively manned by Surveillance rated Controllers.



The trial operation of 20NM Longitudinal Separation using Space based ADS-B on ATS Routes L301 and L639 for the east bound flights only for the period from time 0800 to 1000 UTC on daily after promulgation of a NOTAM.

Initially a lean period was chosen for which would not expose Controllers to heavy traffic as the separation applied was new to them. Very few eligible pair available for application of said separation during the trial period. However, it helped controllers gaining experience.

Later on 5th March 2024 , the timings trial operation was changed to 0430 to 0630 UTC for better probability of identifying an appropriate pair of compliant aircraft and would aid in expanding the scope of the trials. Still a very few pairs of eligible aircraft were available for application of said separation during the trial period.

From 04-06-2024 the timings of trial operation were shifted to 0200-0800 UTC and from 15th June 2024 the timings were amended to 0800 to 1400 to have wider aspects of Operations. The numbers of eligible aircraft pairs were few.

From 25th June 2024 onwards, to cater needs during moderate to high intensity traffics in night and early morning the timings of trial operations were amended as 2200-0200(next day). The numbers of eligible aircraft pairs were few during this period also.

Subsequently On 1st July 2024, for further improving the services, it was decided to extend the application from 1400-0200 UTC (next day) and again on 11th July 2024, the duration of trial operations was amended as 0000-0200 UTC & 2200-2359 UTC. The number of eligible pairs of aircraft improved slightly.

After various meeting and follow up with Muscat, Muscat agreed to participate in the trial Operation w.e.f 14th August 2024. As per Mutual agreement with Muscat and as per request from Muscat the timing of trial Operations was amended to 0830 to 1100 UTC w.e.f 14th August 2024. The trial Operations was conducted for both East Bound and West bound flights after the addendum to LoA was signed by both parties. The number of eligible pairs further improved.

With effect from 1st September 2024 onwards the period of trial operation was revised to 0500-0800UTC & 1400-1700 UTC after agreement with Muscat. Further on 14th September 2024, the trial period was revised to 0600-1800 UTC in coordination with Muscat. The number of eligible pairs of aircraft improved.

From 14th October 2024, the trial period was revised to 1400-1700 UTC &2200-0200 UTC (next day) for east/west bound flights and the same is continuing till date. The number of eligible aircraft improved.

From 1st January the trial operation is continuing for 24 hours as agreed by Oman and India.

**The Analysis**

2.4 Operational Observations:

The Daily Average Traffic data on the two routes L301 and L639 are given in Figure-I and the average eligible aircraft satisfying the conditions stipulated in Doc 4444 i.e. RNP 2or RNP 4, CPDLC, RCP240 are given in Figure-II.

From Figure-II it may be observed that the number of eligible aircraft are 53% for L639 and 52% in L301. For, west bound flights the Ahmedabad and Mumbai ACCs and for east bound flights Muscat can apply the 20 NM separation between eligible aircraft. Other than these only those eligible aircraft who are requesting level change are coming in purview of the applicable separation of 20NM or more.

2.5 Mitigation:

To improve the eligibility criteria some non-exclusive mandate is contemplated by AAI such as level bands and/or time period so that the principle of "Better Equipped - Better Served" may be applicable. This will encourage the fleet operating in the region to equip their aircraft to reap the benefits of the separation.

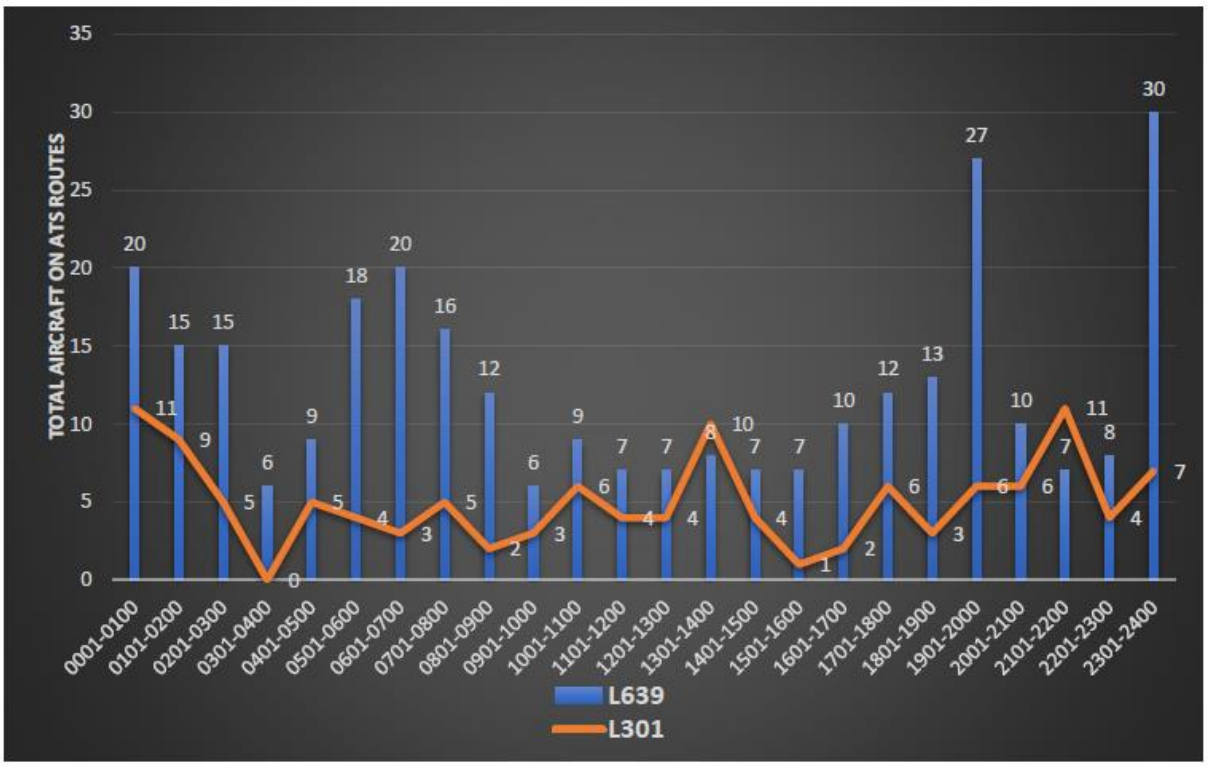



**Figure-I**

**Eligible No of Aircraft for application of 20 Nm Separation Minima**

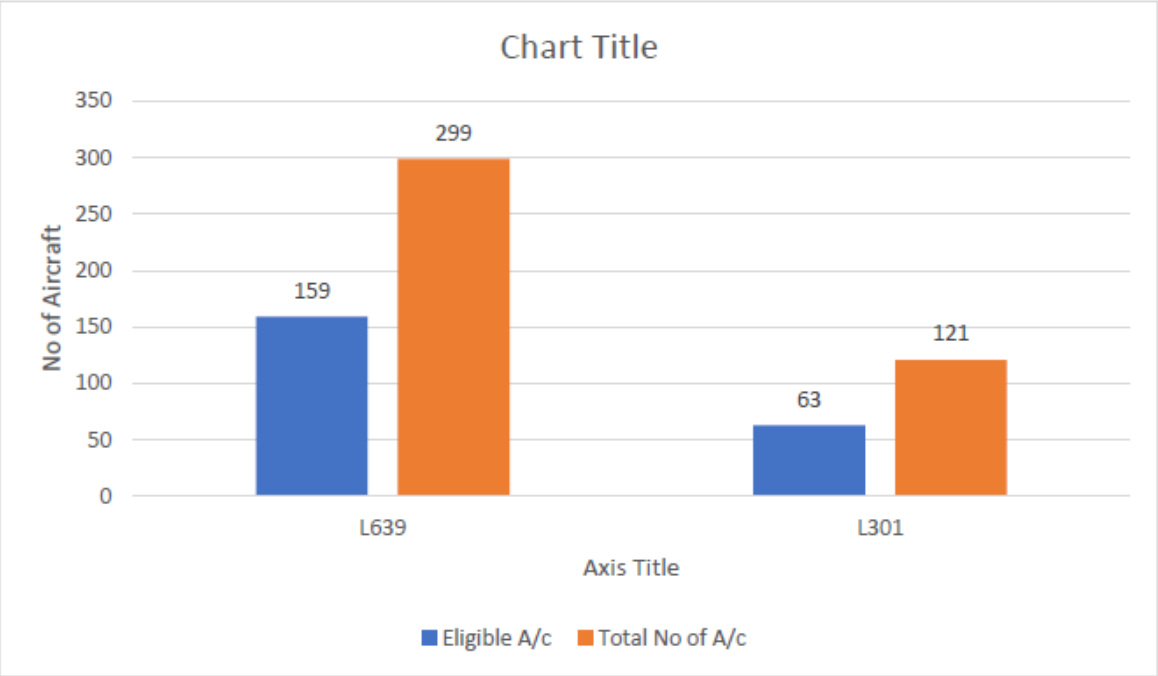



**Figure-II**

2.6 Safety Occurrence

Since starting of the trial operation till date there is no Safety Occurrences observed or reported by the ATCOs or Airlines with respect to application of Reduced separation of 20NM.

2.7 Issues Encountered

In some cases of SADS-B returns, intermittent drop of targets was observed. The problem was intimated to M/S-Aireon, the provider of SDAS-B data. AAI is in constant touch with Aireon for mitigation of the same. Although these drop of targets have not created any safety critical situation, a station level instruction to deal with the situation in case of extensive drop of target has been issued to the Controllers. A committee consisting of CNS and ATM officers and Aireon officials has been formed to resolve the issue.

2.8 Controllers' Opinion

Controllers are having the Opinion that this trial Operation has benefitted the Airlines to get the Optimum level when they are flying on ATS Routes L301 and L639 during the period of Trial operation and the traffic flows also become smoother. They have also expressed that when the fleet is fully compliant, the separation can be a game changer in oceanic airspace.

2.9 Cooperation between Neighboring States

It is realized that to reap the full benefit of any reduced separation, cooperation between neighboring states are of vital importance. Especially for India, the support and acceptance from both east and west neighboring states are important so as to pass the benefits to the airspace users.

**The Future Plan**

2.10 AAI propose to implement the said separation on the ATS routes L301 & L639 permanently. The safety assessment for this has been completed in December 2024. The regulator's approval is awaited for permanent implementation.

2.11 In a phased manner AAI proposes to extend the separation to other route in Mumbai FIR and thereafter in Chennai and Kolkata FIR.

2.12 AAI also proposes new RNP routes to improve the capacity and efficiency of operation in the oceanic airspace. This will be achieved with cooperation and help of DGCA, India, ICAO APAC and MID regions.

## 3. ACTION BY THE MEETING

3.4 The meeting is invited to:

a) note the information contained in this paper;

b) recognize India's effort to improve capacity and efficiency in oceanic airspace by deployment of latest satellite based surveillance technology and

c) discuss any relevant matters as appropriate.

……

<table>
<tr><td colspan="3">Draft Conclusion/Decision SAIOSEACG/4-2: REQUIREMENTS FOR UPPER AIRSPACE</td></tr>
<tr><td colspan="2">What: ICAO DECIDES TO MAKE UPPER AIRSPACE ABOVE FL290 IN OCEANIC REGION AS PBCS AIRSPACE. AIRLINES SHALL OBTAIN OPERATIONAL APPROVAL FOR RCP240, RSP180 AND RNP2/RNP4 FROM RESPECTIVE STATE OF REGISTRY.</td><td>Expected impact:<br>☐ Political / Global<br>☒ Inter-regional<br>☒ Economic<br>☒ Environmental<br>☒ Ops/Technical</td></tr>
<tr><td>Why: FOR IMPROVEMENT OF CAPACITY AND EFFICIENCY</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 1-Jan-26</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>