



ICAO

*International Civil Aviation Organization***SEVENTH MEETING OF THE ASIA/PACIFIC AIR
TRAFFIC MANAGEMENT AUTOMATION SYSTEM
TASK FORCE (ATMAS TF/7)***Bangkok, Thailand 2-4 June 2026*

Agenda Item 4: ATM Automation System Implementation Experience by States

4.5. Integration with External Systems

SPACE-BASED ADS-B TRIAL IN THAILAND ATM AUTOMATION SYSTEM (ATMAS)

(Presented by Thailand)

SUMMARY

This paper presents information on the trial operation of Space-based ADS-B in Thailand ATMAS.

1. INTRODUCTION

1.1 Thailand conducted a trial integrating Space-based ADS-B into ATMAS to assess its compatibility, capabilities, and potential to enhance surveillance, address existing gaps, and provide an additional layer of ATS surveillance coverage within the Bangkok FIR.

1.2 This paper presents the integration process of Space-based ADS-B data into Thailand ATMAS and presents the performance evaluation results observed during the trial period.

2. DISCUSSION

Background

2.1 Thailand currently operates seven ground-based ADS-B stations integrated into ATMAS to support en-route air traffic control operations, despite ADS-B not being mandatory in the country. However, these ADS-B ground stations do not provide full coverage of the Bangkok FIR at all flight levels. Terrain obstacles, particularly mountainous areas, limit signal reach and prevent complete surveillance coverage across all airspace, as illustrated in Figure 1.

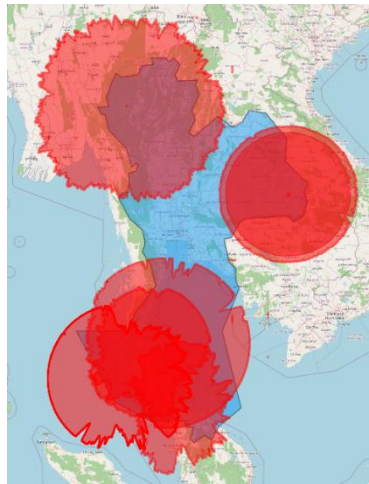


Figure 1 shows the coverage of seven ADS-B ground stations at flight level 20,000 ft.

2.2 To enhance the safety, efficiency, and coverage of ATS surveillance within Thailand’s airspace, AEROTHAI (Thailand’s ANSP) conducted a trial of integrating Space-based ADS-B into the ATMAS test platform.

2.3 The ATMAS test platform operates independently from the main operational system (MOPS) and is deployed at two locations: AEROTHAI Headquarter and Suvarnabhumi Airport. This configuration reflects Thailand ATMAS architecture, which consists of two primary operational centers:

- **NAS-MK** (Nationwide Air Traffic Management System - Tungmahamek) supports the operation of the Area Control Center and the Bangkok Approach Control Center within the Thailand FIR.
- **NAS-SBA** (Nationwide Air Traffic Management System - Suvarnabhumi) supports the operation of the Bangkok Approach Control.

Space-based ADS-B Trial

2.4 The trial of space-based ADS-B was carried out over eight months, from the beginning of August 2025 to the end of March 2026.

2.5 The Space-based ADS-B volume geometry covered the Bangkok FIR with an additional 50 NM transition region from August to December 2025. Following evaluation and testing in January, the transition zone was extended to 100 NM to enhance safety at FIR boundaries. The vertical limits range from –1,200 ft. to 66,000 ft. above mean sea level. The coverage of Space-based ADS-B is shown in Figure 2.

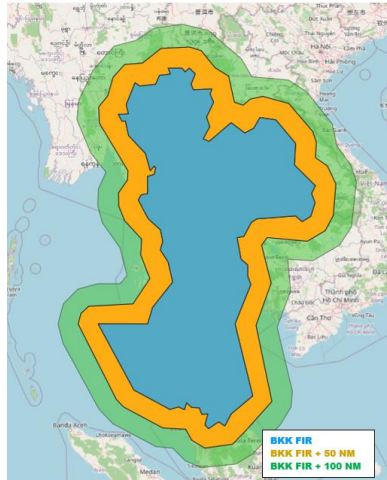


Figure 2 Space-based ADS-B coverage in Bangkok FIR

2.6 The trial was divided into 4 phases:

Phase 1 Compatibility testing

2.7 Prior to introducing live data into the ATMAS test platform, ASTERIX Category 21 Version 2.1 data, recorded in PCAP format, was put into the system to evaluate compatibility. This step was necessary because the current operational ATMAS processes only ASTERIX Category 21 Version 0.26 from ground-based ADS-B stations.

2.8 The results indicated that the ATMAS system is capable of processing and displaying ASTERIX Category 21 Version 2.1 data.

Phase 2 Space-based ADS-B on CRV network

2.9 After the compatibility testing was completed, an initial throughput analysis was conducted by the service provider to assess bandwidth utilization within the CRV network. Following confirmation of the required bandwidth, a Service Delivery Point (SDP), comprising a router and a server for data access and quality monitoring, was installed at the headquarters and connected to the CRV network to receive live data. The data stream, configured as a multicast stream, was fed into the NAS-MK test platform as one of the ADS-B interfaces. The NAS-SBA test platform also received the multicast stream and fed to the system via the internal network. The connectivity architecture is illustrated in Figure 3.

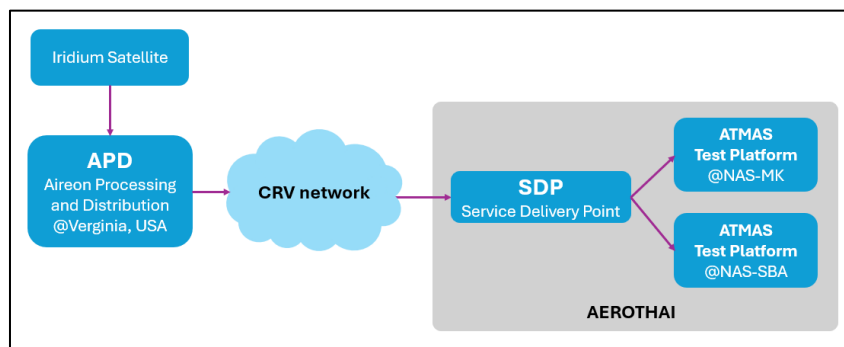


Figure 3 Connectivity diagram of Space-based ADS-B data to ATMAS test platforms

2.10 In this phase, bandwidth utilization was first evaluated over a seven-day period to ensure that CRV bandwidth usage did not exceed the allocated capacity or adversely affect other services. The measured bandwidth consumption was 147 kbit/s, which remained within the reserved limits.

2.11 A demonstration service checkout was subsequently conducted to assess system performance. In addition, the ASTERIX data was recorded by ATMAS for further analysis.

Phase 3 Space-based ADS-B on MPLS network

2.12 In this phase, another SDP channel was also installed at the headquarters for redundancy testing. This SDP was connected to MPLS line by Telco as another communication link. The data stream from this SDP was also sent to NAS-SBA test platform via different internal links. The data stream is also fed to ATMAS as another channel of Space-based ADS-B interface.

Phase 4 Performance evaluation

2.13 The evaluation assesses data reception performance, processing, and display over the eight-month trial period to support future surveillance system development.

Performance Evaluation Results

2.14 The latency of Space-based ADS-B data from the provider's processing center in Virginia, USA, to SDP in Bangkok is less than or equal to 0.5 sec.

2.15 The average bandwidth in the CRV over the eight-month trial can be divided into two periods. During the period when coverage was limited to the BKK FIR with a 50 NM buffer zone, the average bandwidth was 164 kbit/s. After January, when the buffer zone was extended to 100 NM, the average bandwidth increased to 192 kbit/s.

2.16 The signal could be displayed, coupling/decoupling with flight plan and show ADS-B quality status indicator in ATMAS normally.

Conclusion

2.17 From the trial, better coverage was obtained compared to ADS-B ground stations, especially in mountainous areas and in low airspace. The Space-based ADS-B was filled in the coverage below and between terrestrial ground stations. The comparison between 7 ADS-B ground stations and Space-based ADS-B at flight level 2,000 ft. and 20,000 ft. is shown in figure 4.

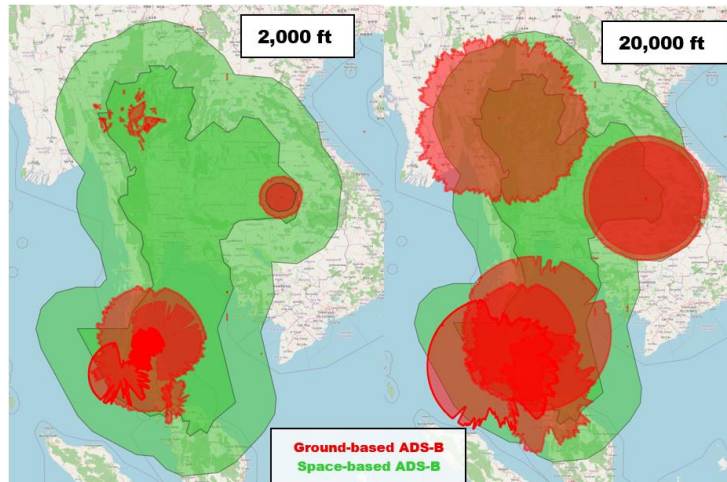


Figure 4 Coverage comparison of Ground-based and Space-based ADS-B at 2,000 ft. and 20,000 ft.

2.18 Furthermore, the implementation of Space-based ADS-B provides additional benefits in supporting troubleshooting and anomaly analysis of ATS surveillance systems. By enabling comparisons with SSR and ground-based ADS-B data, it facilitates the identification of causes associated with aircraft target loss and enhances the investigation of GNSS interference events, including GPS spoofing and jamming incidents.

2.19 Thailand is currently in the process of integrating Space-based ADS-B into the main operations as an additional surveillance input to the ATMAS system; safety assessments are ongoing, and further regulatory actions are in progress.

3. ACTION BY THE MEETING

- 3.1 The meeting is invited to:
- a) note the information contained in this paper; and
 - b) discuss any relevant matter as appropriate
