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

4.2 ATM Automation System Implementation Issues Sharing

ATM AUTOMATION SYSTEM FULL-BUSINESS-CHAIN OPERATION AND MAINTENANCE

(Presented by China)

SUMMARY

This paper puts forward the concept of full-business-chain operation and maintenance ATM automation systems to address global ATC challenges, particularly the surveillance data deviation issues in ATM automation systems and suggests that Member States/Administrations jointly establish regional methodologies and standards to enhance operational safety and efficiency.

1 INTRODUCTION

1.1 The ATM Automation System is one of the core systems in the civil aviation air traffic control operation. It serves not only as the core carrier for the fusion and processing of various ATC surveillance data, but also as a critical terminal for the intuitive presentation of operational status. Fluctuations and deviations in any link—from front-end surveillance data collection to intermediate signal transmission, and to back-end system processing—will be transmitted sequentially, ultimately affecting the accuracy of data display and operational efficiency of the ATM automation system. It is essential to adopt a holistic mindset toward full-business-chain operation and maintenance to systematically address various operational challenges of ATM automation systems.

1.2 Currently, the International Civil Aviation Organization (ICAO) is also discussing the Performance-Based Surveillance (PBS), which establishes surveillance performance evaluation criteria from the perspective of ATC end-users. This further confirms the industry development trend of deriving full-chain standard construction from application requirements, laying a foundation for the proposal of full-business-chain operation and maintenance for ATM automation systems in this paper.

1.3 At the SURICG/11 Meeting in 2026, China presented A Method for Azimuth and Range Monitoring and Calibration of Secondary Surveillance Radar System -China throught IP/06. The meeting discussed the potential inclusion of this method in the Mode S IGD document and formed a task to continue further study and provide updates at future meetings before considering its inclusion as guidance in the IGD.

2 DISCUSSION

2.1 The integrated tracks output by the ATM automation system are generated through the fusion of multi-source surveillance data, including Primary Surveillance Radar, Secondary Surveillance

Radar, and Automatic Dependent Surveillance-Broadcast (ADS-B), etc. Normally, when a single radar has a positioning deviation, the impact on the integrated track can be mitigated by multi-source data fusion algorithms; however, in special operational scenarios such as when carrying out shutdown maintenance of other radars within the same coverage area, the originally concealed radar accuracy deviation will become prominent, and in severe cases, it will disrupt the accuracy of the integrated track and result in a significant impact on ATC operations.

2.2 At present, ICAO has not formulated mandatory specifications for the regular calibration and periodic accuracy verification of ATC surveillance sources. Radar equipment, operating continuously under high load for an extended period, is prone to drift in positioning accuracy due to hardware aging and performance degradation. When the positional deviation (including azimuth, distance, etc.) of the radar exceeds a certain threshold, it will lead to deviations or even target splitting of the integrated track in the ATM automation system, thereby affecting operational safety and efficiency.

2.3 Globally, there remains a lack of unified quantitative control standards for surveillance data transmission, including key indicators such as transmission latency, stability, and data integrity. ATC operations impose stringent requirements on real-time performance, accuracy, and continuity. Excessive transmission latency or data loss will render the surveillance data received by the ATM automation system invalid, thus failing to meet the needs of dynamic airspace command and traffic flow management.

2.4 To address the aforementioned challenges, a full-business-chain operation and maintenance management framework for ATM automation systems must be established. This framework should cover the entire process from front-end surveillance source calibration to intermediate signal transmission monitoring, and to back-end system operation and maintenance. Only through full-business-chain management can we achieve comprehensive traceability of problems, closed-loop control of hidden dangers, and effectively improve the operational safety and efficiency of ATM automation systems.

2.5 China is actively exploring the establishment of a full-business-chain quality management mechanism for surveillance signals. Specific measures include: enforcing pre-connection parameter tuning for radar signals prior to their access to the ATM automation system; conducting regular monitoring and in-depth analysis of processed integrated track data and raw surveillance feeds; compiling key operational parameters and reasonable threshold ranges for each link (surveillance sources, transmission links, and ATM automation systems) and verifying them during routine equipment inspections; conducting comprehensive verification of radar parameters and network transmission performance upon system anomalies or scheduled systematic audits; and launching cross-departmental joint troubleshooting involving radar operation and maintenance (O&M), signal transmission, and ATM automation system O&M teams promptly upon the occurrence of faults.

2.6 As the global civil aviation industry advances toward digitalization, integration, and collaborative operation, fragmented and isolated O&M modes can no longer meet the development needs of next-generation ATC systems. It is recommended that all ICAO Member States and Administrations jointly incorporate the full-business-chain O&M of ATM automation systems into a coordinated research task, collaborate to formulate unified regional methodologies and standards, and establish a full-chain operational assurance system to continuously improve the overall safety performance, operational efficiency, and cross-border collaborative capability of ATC operations.

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