



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 5:** ATMAS integration into SWIM**MULTIPLE ATM AUTOMATION SYSTEM DATA COLLABORATION AND SHARING**

(Presented by China)

**SUMMARY**

In response to the current challenges posed by the large number of ATM Automation Systems, cumbersome data configuration, and data from multiple sources and types, this paper introduces a data collaboration and sharing technology among multiple ATM Automation Systems. It breaks through key technologies for the trustworthy fusion of multi-source flight data, and develops a platform for sharing airspace environmental data and real-time operational data among ATM Automation Systems based on the SWIM concept. A field validation environment is established in East China ATMB to achieve data collaboration and sharing among ATM Automation Systems of ACC, TMA, Tower, and other information systems, thereby providing more comprehensive and accurate data support for air traffic management.

**1 INTRODUCTION**

1.1 The completeness of flight data for the same target is inconsistent among ATM Automation Systems used by different ATC units, making it difficult to grasp the associated flight data in upstream systems and accurately predict the operational situation among multiple control units. Based on the SWIM concept, it is necessary to study the sharing mechanism of real-time operational data and airspace environmental data among different systems, define data standards and interface protocols, unify the information of the same target flight data across various systems, and thereby provide technical support for daily operations and emergency takeover.

1.2 Currently, flight data for the same flight is processed and stored in multiple ATM Automation Systems. Due to differences in operational status, flight profile, and control actions, the information held by each system varies. Moreover, there is no clear standard for how to associate, merge, and update external flight data with local flight data. Therefore, it is necessary to clarify the authority and responsibility relationships between systems and flight data, and under the SWIM-based framework, adopt unified flight data and trusted models to help multiple systems effectively associate and share data for the same flight target in real time.

1.3 ATM Automation Systems of different control units store different flight data internally. During mutual emergency support handovers, the emergency takeover system cannot establish the airspace scenario of the takeover region in a short time. However, through the data collaboration and sharing platform's multi-system flight data storage and subscription/publishing mechanism, providing all real-time flight data related to the required region can reduce the preparation time for emergency system takeover and ensure data accuracy.

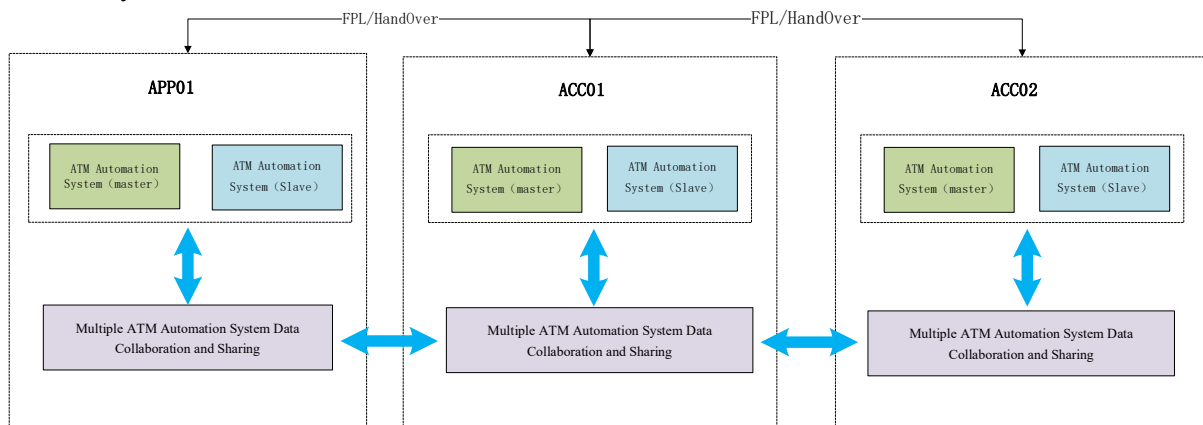
## 2 DISCUSSION

### Overview

2.1 Multiple ATM Automation System data collaboration and sharing addresses the information service demands arising from collaborative operations and intelligent support among multiple ATM Automation Systems. It builds a multiple operational system information sharing architecture, implements unified data standards, and uses trigger/subscription distribution methods to transmit and share flight data among multiple systems, establishing data collaboration and sharing platforms for verification.

### Platform Architecture

2.2 A data collaboration and sharing platform is established to handle data exchange between different ATM automation systems. One set of virtualized platform and supporting network equipment is deployed at each control unit. Security equipment is deployed at the platform boundary to ensure network security and data security for the data collaboration and sharing platform and all external systems.



**Figure 1** Platform Framework

### Technical Framework

#### *Trustworthy Segmented Flight Data Management Based on Globally Unique Flight Identifier (GUFID)*

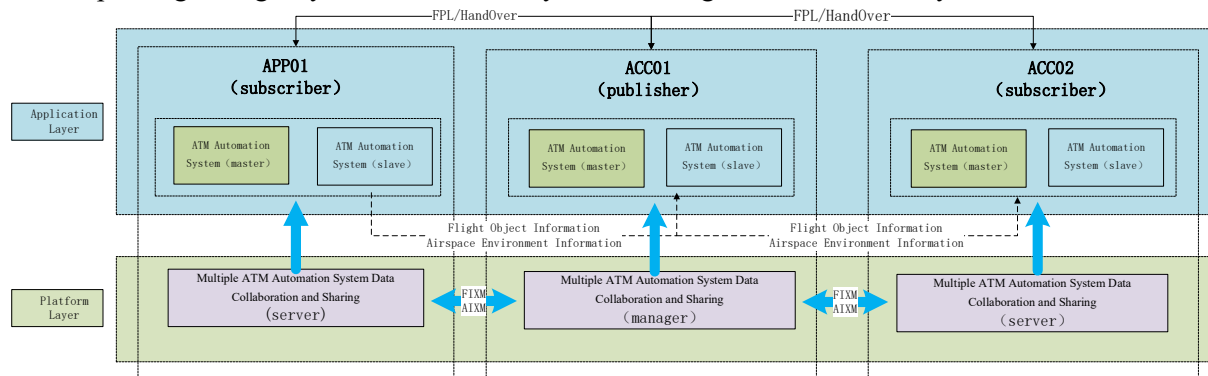
2.3 When a single ATM Automation System performs data operations on controlled flights and reports the operation results to the data collaboration and sharing platform, the platform assigns a Globally Unique Flight Identifier (GUFID) to the received flight data based on the SWIM framework and establishes a flight data sharing model. Based on multiple elements such as flight control regions, information source locations, and aircraft positions, trustworthy segmented management rules for flight data are established, realizing effective integration of flight data from different sources for the same flight and management and sharing with unified identifiers.

#### *Data Sharing Management Based on SWIM Subscription/Publishing Mechanism*

2.4 Analyzing the shared data, request and publishing relationships among multiple ATM Automation Systems, clarifying flight data collaboration and sharing application scenarios; for the unified data perception requirement among multiple systems, data services are implemented based on data service-oriented architecture and flight data model concepts, and data service interfaces and business processes for airspace environmental data and operation data sharing are designed based on the SWIM framework, realizing efficient data sharing among different systems.

*Airspace Environmental Data Sharing Management*

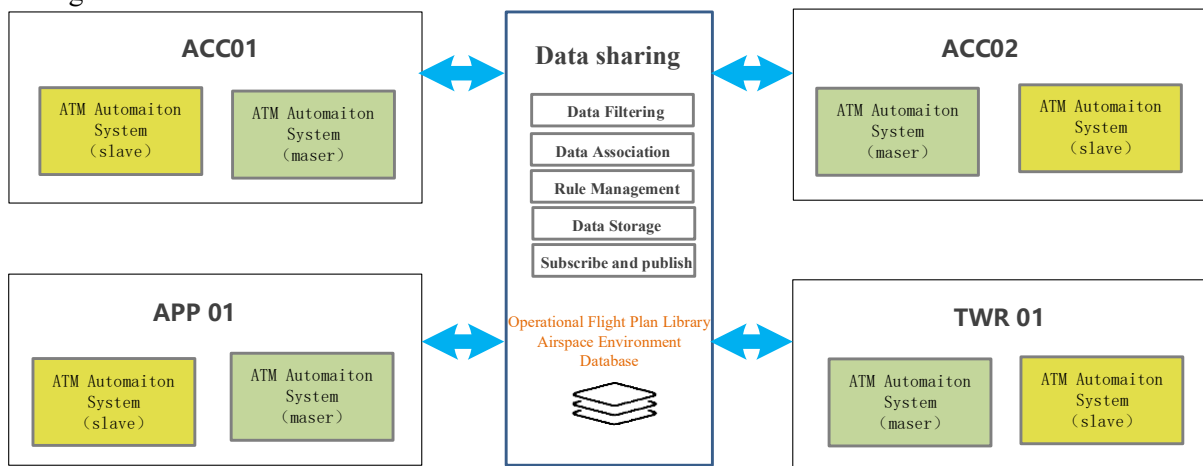
2.5 By constructing a sharing platform, airspace environmental data among systems is managed and published uniformly based on the AIXM standard, reducing repetitive manual input airspace environmental data in different systems; meanwhile, when emergency takeover occurs, the takeover system can obtain the taken over system's basic data from the platform in a timely manner, thus improving emergency takeover efficiency and ensuring basic data accuracy.



**Figure 2 Data Flow**

Core Functional Framework

2.6 The data sharing collaboration platform implements acquisition, integration, and management of flight data from multiple ATM Automation Systems, providing data differentiated by service recipients; it provides scalable services to provide an implementation platform for centralized management.



**Figure 3 Functional Framework**

*Flight Data Model Redefinition*

2.7 Based on SWIM concepts, the flight data interaction model is standardized to meet the flight data requirements of TOWER, TMA, and ACC. Referring to FIXM data fields, feature information (unique code, source system, control status, etc.), various surface movement times, approach/terminal sequencing information, etc., are segmentally expanded in the MH/T4029.3 flight data exchange interface.

*Flight Data Record Establishment*

2.8 The platform identifies, parses, features-corrects, property-identifies, and associatively stores the incoming flight data.

- a) Region Recognition: Determining regional attributes based on data source;
- b) Data Item Parsing: Segmenting and coding fields in flight data to form flight data records;
- c) Feature Correction: Correcting fields (groups) that can uniquely point to flight data as flight data record identity recognition codes;
- d) Associative Storage: Storing parsed and corrected flight data in specified regional databases and achieving update and maintenance of designated flight plans.

#### *Flight Data Association and Fusion*

2.9 For incoming flight data, identifying the matching relationship between control sectors and source attributes; if it is a newly created data record, record establishment is executed; if it is an existing record, data item content is updated according to update rules.

#### *Flight Data Zone Storage*

2.10 For ATM Automation Systems with emergency takeover services, to ensure these system's situational awareness of the takeover region when switching to emergency takeover role, the data service platform provides the takeover region's flight data publishing service.

2.11 Based on emergency takeover relationship configuration, the operational flight plan library for the takeover region is established, which can be pre-set or dynamically added and managed as an emergency takeover region table.

#### *Flight Data Subscription and Publishing*

2.12 When emergency takeover is required, the takeover ATM Automation System sends flight data request message to the platform, including but not limited to: viewing unit, request region, etc. The data service platform retrieves data from the designated regional operational flight data library based on the request information, converts the library table's flight data to MH 4029.3 basic flight data format, and publishes it.

### **SUMMARY**

2.13 The research and implementation of multiple ATM Automation System data collaboration and sharing technology can practically solve the real-time data unification problem for the systems of East China region's Tower, TMA, and ACC. By providing efficient data exchange function across systems through this platform, it can compensate for data inconsistency between systems and realize real-time information sharing between air traffic control and other relevant units; meanwhile, it can also provide platform technical support for TBO-based operations, and through unified construction and maintenance, significantly reduce construction and maintenance costs.

2.14 Multiple ATM Automation System data collaboration and sharing is an important requirement for unified management of civil aviation, applicable to collaborative operation scenarios of multiple ATM Automation Systems, capable of comprehensive promotion in ACC and TMA, realizing full lifecycle management of flights across systems.

2.15 By establishing a data sharing collaboration platform, flight data can be centrally collected and stored, providing real-time, reliable, and efficient data services to all related parties.

**3 ACTION BY THE MEETING**

- a) note the information contained in this document;
- b) discuss any relevant matter as appropriate.

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