Multiple ATM Automation System Data Collaboration and Sharing

A Traffic Control Data Sharing Solution Based on the SWIM Concept

Presented by China

CONTENTS

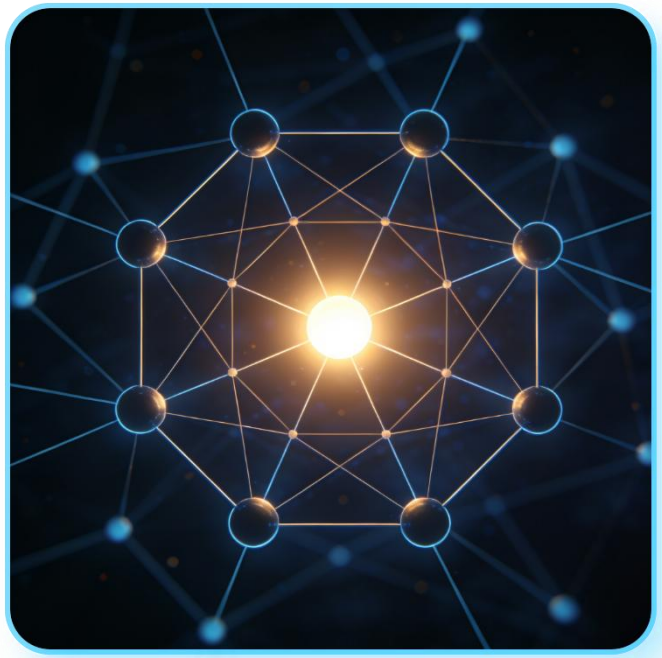
Current Situation: Isolated Data Island

Unified data processing mechanisms
The automation systems of different ATC units vary in their methods and frequencies for processing and updating flight data.

Lack of data association and integration standards
There are no clear standards for how to associate, merge, and update external flight data with local flight data.

Time consuming for emergency response
During emergency takeover, the system fails to rapidly establish airspace conditions in the takeover region, compromising emergency response efficiency.

Objective: Unified Data Awareness



Objective

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.

Value: Breaking data barriers · Establishing standardized interfaces · Ensuring operational security

CONTENTS

Overview: Building an Information Sharing

Unified standard

Implement a unified flight data standard and data exchange model to establish the foundation for data sharing.

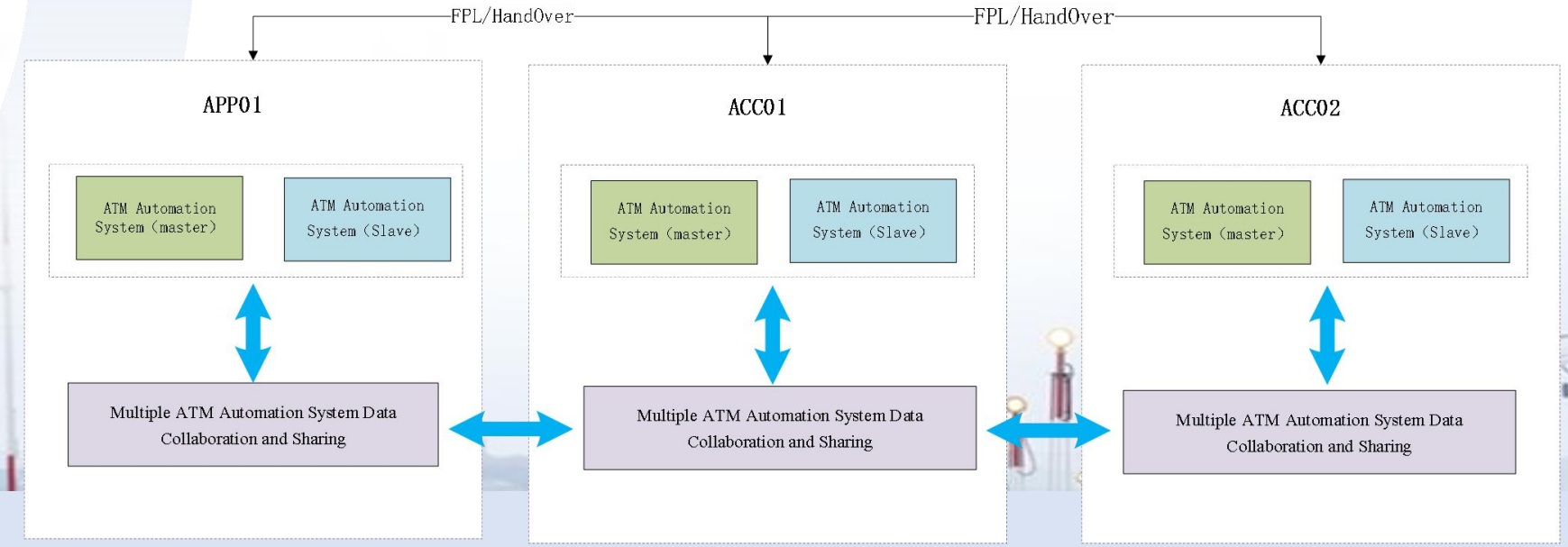
Efficient Distribution

The trigger/subscription mechanism enables efficient real-time data transmission across multiple systems.

Collaborative Verification

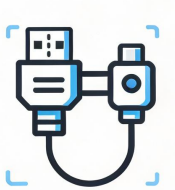
Establish a collaborative sharing platform, conduct comprehensive functional validation, and ensure system reliability.

This system is designed to meet the information service requirements for coordinated operation and intelligent support among multiple ATM automation systems, eliminate data silos, and enhance overall operational efficiency.



CONTENTS

Platform Interfaces and Security Mechanisms



Unified Interface Standards

- Based on MH/T 4029.3 "Automated Systems for Civil Aviation Air Traffic Control – Part 3: Flight Data Exchange"
- Refer to FIXM and expand data items according to operational requirements.

Security Policy

- Deploy security devices such as firewalls between ATM Automation System and the sharing platform.
- Configure security policies to ensure the legitimacy and security of data access.

Establish a standardized and highly secure aviation data exchange system to ensure stable business operations.

Technical Framework 1: Trusted Segmentation Management Based on GUFI

Unique Identifier (GUFI)

The platform assigns a globally unique flight identifier (GUFI) to each flight and establishes a unified flight data sharing model.

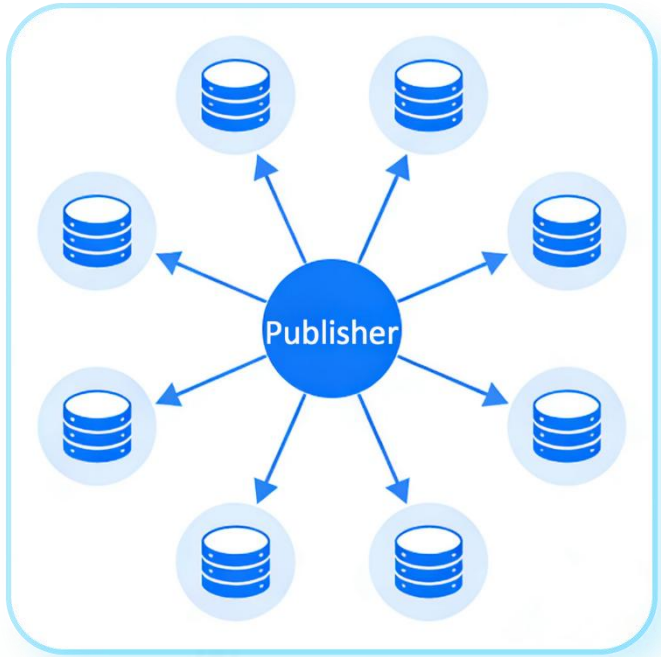
Trust Segmentation Management

Establish reliable segmented management rules for flight data based on multiple factors such as the flight's control zone, information sources, and aircraft position.

Data Fusion

Based on the aforementioned rules, effectively integrate flight data from different sources for the same flight, and manage and share it through a unified GUFI.

Technical Framework 2: A Subscription-Publishing Mechanism Based on SWIM



Clarify operational relationships

Analyze business flows, data flows, and request-publish relationships between multi-level systems to clarify interaction patterns.

Data service-oriented

Based on the data service architecture and flight data modeling concept, design the foundational and real-time data sharing interfaces.

Efficient Sharing

Based on the SWIM framework, it enables efficient data sharing between different systems through on-demand subscription and real-time publishing.

Objective: Breakdown data silos and build a real-time data ecosystem with low latency and high reliability.

Technical Framework 3: Airspace Environmental Data Sharing Management

Unified Management (AIXM Standard)

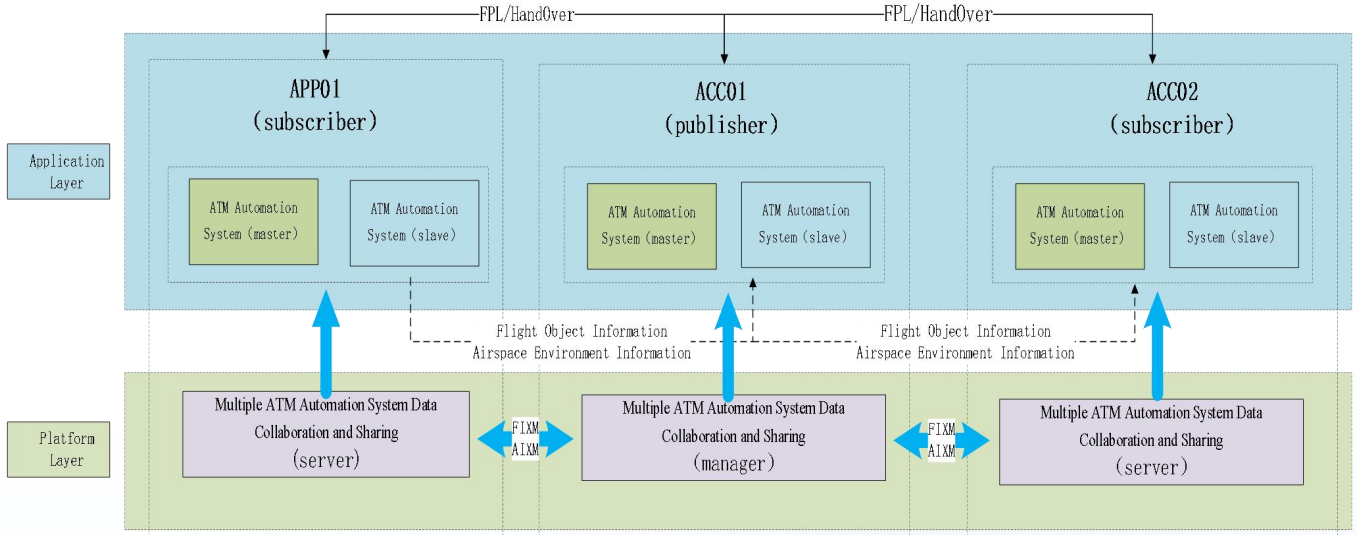
Based on the aviation information exchange model standard, achieve unified publication and management of fundamental data such as airspace and airports.

Reduce Redundancy and Errors

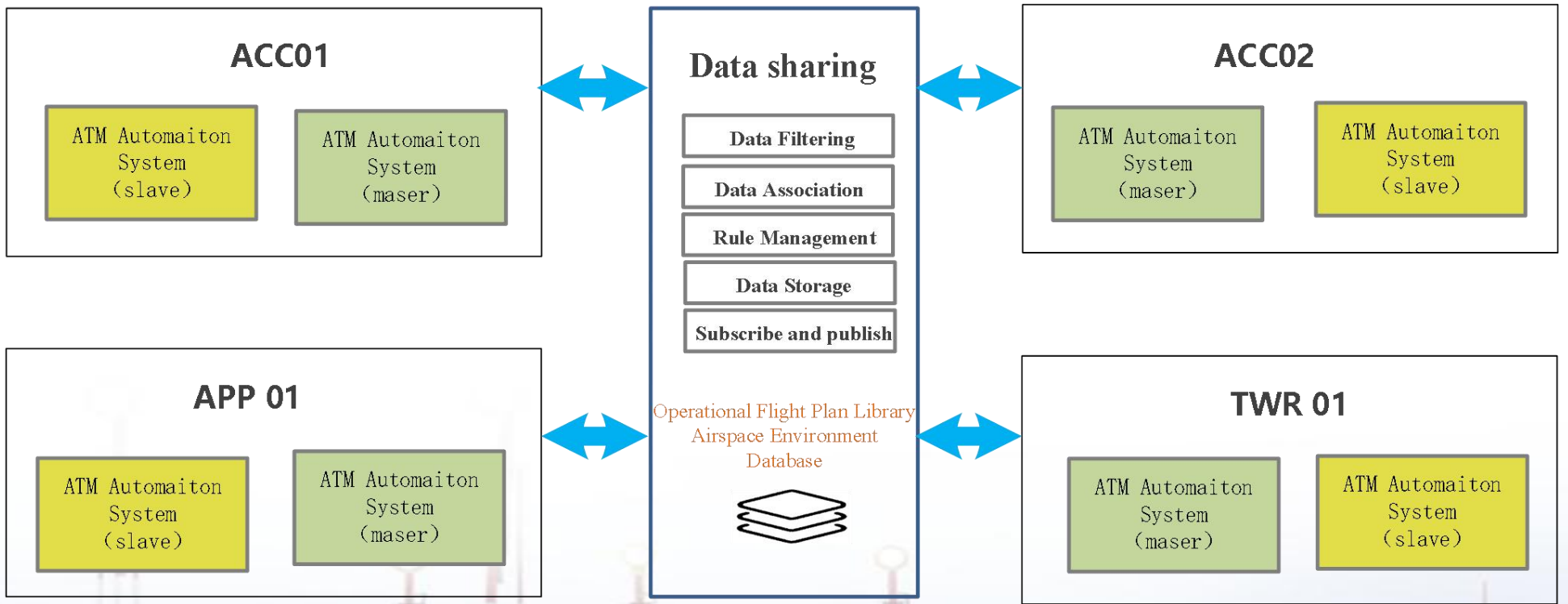
Avoid duplicate data input and maintenance across different systems, reducing the likelihood of human errors at the source.

Highly Efficient for Emergency Response

The takeover system enables rapid acquisition of comprehensive baseline data for the designated area, significantly reducing emergency response preparation time.



Core Functional Framework



Data-driven · Collaborative efficiency · Context-specific empowerment

Core Functional

Flight Data Model Redefinition

Referring to FIXM data fields, expanded in the MH/T4029.3 flight data exchange interface.

Flight Data Record Establishment

Region Recognition;
Data Item Parsing;
Feature Correction;
Associative Storage

Flight Data Association and Fusion

For incoming flight, identifying the matching relationship;
For newly created data record, record establishment;
For existing record, data item content is updated

Flight Data Subscription and Publishing

Flight Data Subscription and Publishing in emergency takeover cases

Flight Data Zone Storage

provides the takeover service

CONTENTS

Summary

Solution for Data Uniformity

The issue of inconsistent real-time data among ATM Automation Systems of ACC,TMA and tower in East China has been effectively resolved.

Improve exchange efficiency

It enables efficient data exchange across systems, addressing data gaps between different systems.

Supporting intelligent operations

Provide critical technical support for operations based on TBO.

中国民用航空局
空中交通管理局
Air Traffic Management Bureau. CAAC

Thanks!

Looking forward to progress together !