

**ICAO***International Civil Aviation Organization***Third Meeting of the Asia/Pacific Air Traffic
Management Automation System Task Force (APAC
ATMAS TF/3)**

Video Tele-Conference, 8– 10 June 2022

Agenda Item 4: ATM Automation System Implementation by States

4.2 Integration with External Systems

**APPLICATION OF DATA EXCHANGE PLATFORM IN THE ATM INFORMATION
SYSTEMS**

(Presented by China)

SUMMARY

This paper presents the application of data exchange platform among computer-based information systems related to air traffic services.

1. INTRODUCTION

1.1. Nowadays, more and more computer-based information systems have been developed and come into service for helping Air Traffic Service (ATS) more efficient and safety. In Beijing, we have these kinds of systems like main Air Traffic Management Automation System (ATMAS), backup ATMAS, Advanced Surface Movement Guidance and Control System (A-SMGCS), Electronic Flight Strips (EFS) system, Air Traffic Flow Management (ATFM) system, etc. There are large amounts of data exchange among the systems.

1.2. The Air Traffic Management Bureau (ATMB) of the Civil Aviation Administration of China (CAAC) has started a series of research in System Wide Information Management (SWIM) since 2017, but the application of SWIM hasn't been decided yet.

1.3. Before the use of SWIM, we try to establish a kind of data exchange platform in Beijing, for helping data exchange among the above ATM information system, which avoids the massive physical link, repeated data input and output among systems in traditional ways. At the same time, it will help to reduce cost and resource consumption, and increase the stability of the network and security.

2. IMPLEMENTATION**PLATFORM STRUCTURE**

Agenda Item 4.2

8-10/06/22

2.1 Considering the requirements of ATS data sharing and consistency in different units, including Area Control Center (ACC), Terminal Control Area (TMA) and control tower, we set up the data exchange platform with four data exchange sub-platforms, they are ACC, TMA, Capital airport tower, and Da-Xing airport tower, as shown in Figure 1. These four data exchange sub-platform locate in the different physical location. Each sub-platform is used to connect local systems to realize the interactive data between sub-platforms.

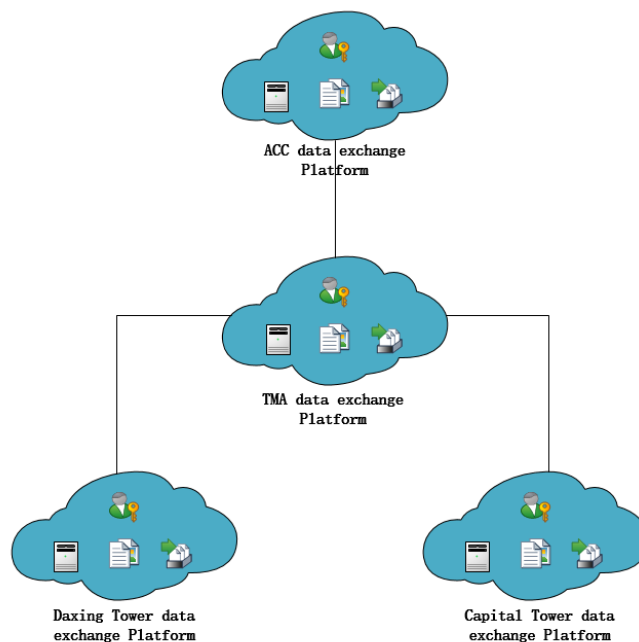


Figure 1. Structure of data exchange platform

2.2 In order to ensure stability, the sub-platform uses a dual machine mechanism with active and standby processing server configuration, both servers connect to input and output switch. The server is determined as master or standby automatically relies on the status, which will guarantee the reliability of data exchange. In order to ensure system stability and data security, the sub-platform is equipped with firewalls, which provide functions such as port and IP address filtering and unidirectional data flow.

2.3 According to the type of data, interface and transmission, the data exchange platform has been designed with a variety of connection methods, including:

- TCP protocol (support Client and Server mode).
- UDP protocol (support UDP unicast, broadcast, multicast, etc.).
- FTP file access.
- ActiveMQ.

2.4 The interconnection of each ATM information system forms a star topology with the data exchange platform as the center. The advantages of the data exchange platform are as follows:

- Realize data exchange among ATM information systems.
- Save network connection resources.
- Simplify the data receiving settings of ATMAS.

- Enhance the network security and stability.

APPLICATION EXAMPLE

2.5 Take the sub-module of the data exchange platform of Capital Airport Tower as an example. The structure of this sub-platform is shown in Figure 2.

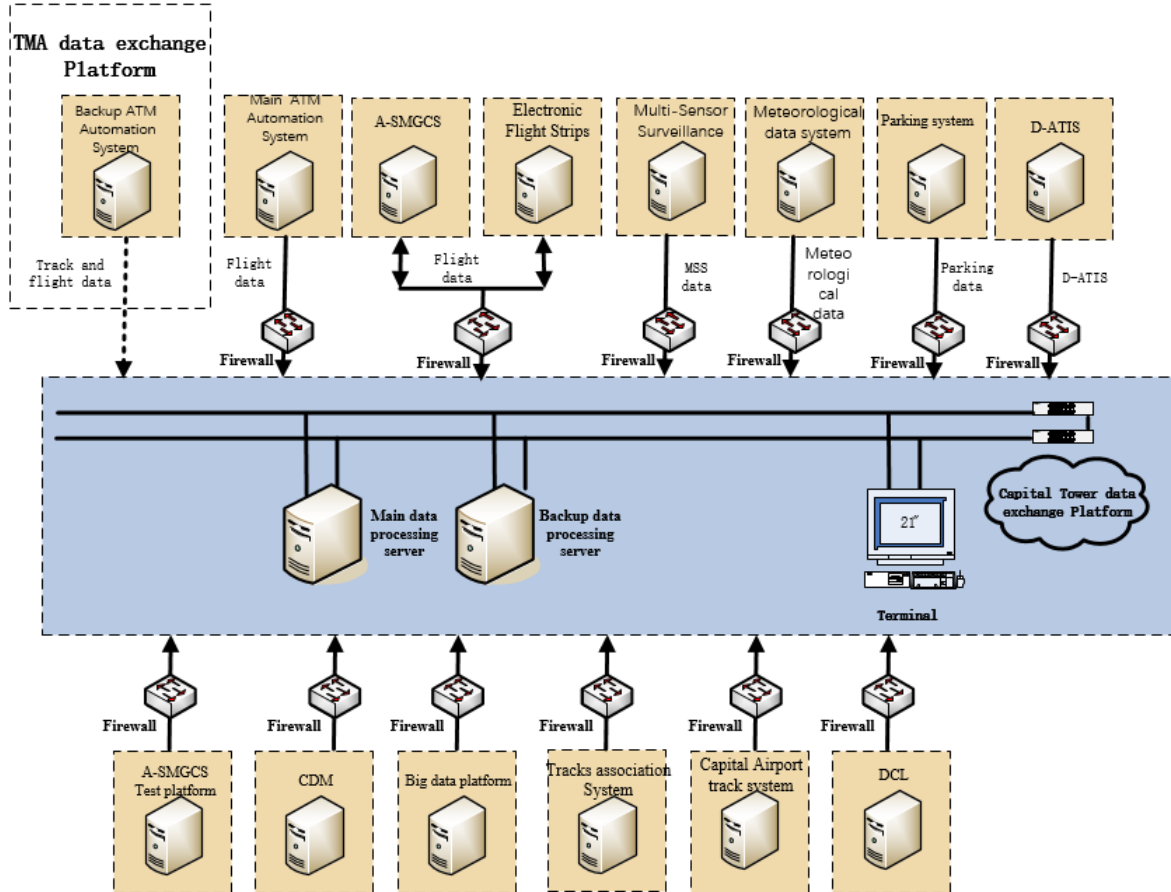


Figure 2. Sub-platform of Capital Airport Tower

2.6 The Sub-platform of Capital Airport Tower uses UDP and ActiveMQ to receive or send data. The specific information content and method are shown in the following table:

Data	Source	Destination	Method
SMR	Main ATMAS	A-SMGCS EFS system A-SMGCS test system EFS test system	UDP
MH4008 Track	Backup ATMAS	Tracks association System Capital Airport track system A-SMGCS	UDP
Flight Data of MH4029.3	Backup ATMAS	A-SMGCS EFS system A-SMGCS test system EFS test system	UDP

D-ATIS	D-ATIS	Main ATMAS Backup ATMAS	UDP
Parking Data	Parking System of Capital Tower	A-SMGCS EFS system A-SMGCS test system EFS test system	ActiveMQ
Multi-Sensor Surveillance data	Multi-Sensor Surveillance	A-SMGCS A-SMGCS test system Big data system	UDP
CAT062	A-SMGCS	Tracks association System Big data system	UDP
Flight Data	EFS system	A-SMGCS CDM	UDP
Meteorological data	AWOS	A-SMGCS EFS system A-SMGCS test system EFS test system	UDP
DCL data	DCL	A-SMGCS EFS system A-SMGCS test system EFS test system	ActiveMQ

2.7 According to the above statistics, a total of 32 physical links are required for data exchange among ATM information systems of Capital Airport Tower, without the application of a data exchange platform. After the sub-platform of Capital Airport Tower was established, 14 physical links are used to realize the data exchange of each system. A total of 18 physical link resources are saved, saving 56.25% of physical link resources.

2.8 ATM information systems can realize cross-location connections through the data exchange platform. For example, the Backup ATMAS located on the TMA site is connected to the TMA data exchange Platform. It sends surveillance tracks in MH4008 and flight plan information in MH4029.3. The systems that are connected to the Capital Airport Tower data exchange platform can get the above information, as shown in Figure 3.

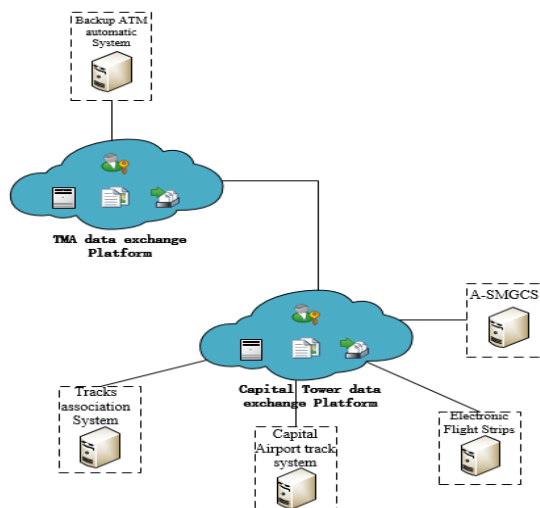


Figure 3. Structure of Sub-platform Connection

3. FUTURE IMPROVEMENT

3.1. We will gradually improve the functions of the data exchange platform, promote the application of the data exchange platform, and realize more cross-location system connections.

3.2. When ATMB is ready and decides to use SWIM technology, we will use SWIM instead of the current data exchange platform for standardized exchanging data formats such as FIXM, WXXM, and AIXM among ATM information systems

4. ACTION BY THE MEETING

4.1. The meeting is invited to:

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