International Civil Aviation Organization

The Second Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/2)

Video Tele-Conference, 14 - 16 September 2021

Agenda Item 4: ATM Automation System Implementation by States

4.2 System Operations, Enhancements and Maintenance Management Practices

APPLICATION OF FLIGHT DATA EXCHANGE IN ATM AUTOMATION SYSTEM

(Presented by China)

SUMMARY

This paper introduces the application of flight data exchange in China Air Traffic Management Automation System.

1. INTRODUCTION

1.1 In China, ATMB of CAAC implements two ATM Automation Systems in all the ATC centers. The two systems are working as main/standby systems to provide un-degraded ATC services without interruption, and to ensure safety and reliability of ATC services. So, the real-time synchronization between the dual systems is introduced in China.

1.2 AIDC (ATS Inter-facility Data Communication) is a widely used electronic handover method in China, but it has obvious disadvantages in some cases. In general, it doesn't have enough time to complete the AIDC handover when a flight is transferred between high and low sectors, or between ATC center and regional airport .In addition, the AIDC handover process must demand a clear waypoint as the intersection which is applicable in neither of two cases.

2. INTRODUCTION OF MH/T 4029.3

2.1 In order to solve the problem of data synchronization and interaction between ATM automation system, CAAC published its technical standard in 2015 for the first time, *MH/T 4029.3 Civil Aviation Air Traffic Control Automation System- Part 3: Flight Data Exchange*, and then CAAC released the revised edition and guidance manual in August 2020 on the basis of summarizing previous verification operation experience.

2.2 The MH/T 4029.3 defines three categories of messages based on the actual requirements of air traffic management operations in China:

- Cat I, flight data exchange message, for the fundamental flight data exchange between ATC automation systems and relevant systems.
- Cat B, main and standby ATC system exchange message, for the data exchange

between main and standby ATC automation systems.

- Cat C, ATC unit exchange message, for the flight data exchange between different ATS Units.

2.3 The standard adopts a semi-structured and open messages defined method, which has the advantages of strong readability and scalability, open structure, good modifiability, and data combination on demand.

2.4 Cat I and Cat B are used to achieve flight plan data and basic environmental data(ATC control sectors, control authority, maps open or close etc.) consistency between different ATM automation systems, and reduce safety risks caused by inconsistent flight plans and operating environment data during the switching process of the main and backup ATM automation systems.

2.5 Cat C is used as supplementary messages of AIDC, focusing on solving the problem that AIDC cannot be used between ATC centers. It is suitable for ATM automation system and other systems that require flight plan, and screen handover between different ATC centers. The controllers intuitive feeling of MH/T4029.3 screen handover between two ATC centers is like being in different sectors of the same ATM automation system, while the two ATC centers do not need to define a fixed handover point and the handover height in each and do not need to coordinate the handover height and handover time in advance, which has high flexibility.

3. THE APPLICATION OF MH/T 4029.3 IN ATM AUTOMATION SYSTEM

Data synchronization between main and standby ATMAS

3.1 At present, China has realized real-time synchronization in 32 ATC centers, accounting for 69% of the total. It significantly improves the efficiency of main/standby ATMAS switching, and effectively improves the security and reliability of ATC services in China.

3.2 In November 2018, China proposed the design, connection mode, working mode and data exchange of main/standby synchronization for ATM automation system. See the relevant files:

- *ICAO APAC ATMAS SYMPOSIUM SP105 Overall System Design and Implementation of Main/Backup ATM Automation System*

Data exchange between ATMAS in different ATC centers

3.3 ATMB of CAAC has completed the screen handover test and validation between independent ATMAS in different ATC centers based on Cat C messages in Lanzhou TMA and Xining ACC, as well as Xiamen ACC and Fuzhou TMA, and put into operation.

- Since the trial operation in November 2019, Lanzhou and Xining ATC centers have been in stable operation of the screen handover. The number of screen handover flights is about 150 per day and the handover success rate has reached 99.9%.

- Xiamen ACC and Fuzhou TMA had validated in 2020 and put into operation in March 2021, with a handover success rate of over 95% and a reduction of 400 calls per day for control transfer coordination.

3.4 ATMB of CAAC has introduced the method of electronic handover between ATC centers through MH/T4029.3 in a complicated operational situation of horizontal and vertical handover co-exist, by taking the flight handover between upper and lower sectors in Chengdu and Chongqing as an example at ICAO APAC APA TF/7, see the relevant files:

- *ICAO APAC APA TF/7 IP15_CHN AI. 3 - Research on technical solutions electronic handover between upper and lower sectors*

Extended application of data exchange between ATMAS in different ATC centers

3.5 Since 2018, ATMB of CAAC had begun to explore the electronic handover between regional airports and ATC centers. ATMB of CAAC has made use of the open structure and expandable features of MH/T 4029.3 to expand the Cat C message, and realize the SSR code and CTOT (calculate take off time) request and distribution between the ATC center and the small transportation airport .

3.6 Taking Yunnan and regional airports as examples ,China introduced the verification and practical application of MH/T4029.3 screen handover at SURICG/4 meeting in April 2019 and APA TF/6 meeting in July 2020, see the relevant files:

- *ICAO APAC SURICG/4 IP14_ CHN AI8 ATC handover between Automation Systems.*
- *ICAO APAC APA TF/6 IP07_CHN AI.3_Promotion and application of electronic handover technology based on MHT4029.3*

3.7 At present, Kunming ATM automation systems (both main and backup systems) have realized the MH/T4029.3 screen handover with Xishuangbanna and Dali airport. Since the completion of verification in 2018 and the start of operation in 2019, the Cat C extension application reduces 300~500 control handover calls every day.

4. BENEFIT ANALYSYS

4.1 Eliminate potential safety hazards and improve the safety assurance capabilities of the ATM automation system. Ensure the consistency of flight plan data and basic environmental data between the main and standby ATM automation systems and reduce the safety risks caused by inconsistent data when the main and standby systems are switched.

4.2 Improve collaborative operation efficiency. The flight screen handover, as well as the electronic request and distribution of SSR and CTOT, could effectively improve the efficiency of the ATC control works.

4.3 Effectively reduce human error and workload, as well as improve controller's experience. The MH/T4029.3 screen handover could avoid the error-prone problem of oral notification, and greatly reduce the voice communication time, and also make the controller feel like screen handover between different sectors in the same ATM automation system.

5. ACTION BY THE MEETING

5.1 China has shared the application scenarios and application achievement of this technical standard at relevant ICAO APAC's meetings. And some member states have proposed the need for a unified standard in the Asia-Pacific region on the basis of this standard.

5.2 China suggests that the Regional Office of ICAO APAC conduct a demand survey among member states in the Asia-Pacific region. If there is a certain demand, China is willing to compile relevant technical standards in the Asia-Pacific region as the main bearer.

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