*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 6: ATS Inter-Facility Data - Link Communication Implementation by States

6.1 AIDC Implementation Status Update and Experience

# PROGRESS OF AIDC IMPLEMENTATION IN CHINA

(Presented by China)

**SUMMARY**

This paper presents the status of the AIDC implementation in China, the progress of implementation with adjacent ATSUs in 2021, and the related issues and suggestions encountered during the implementation.

## 1. INTRODUCTION

1.1 To promote better cooperative air traffic management with China's adjacent FIRs and domestic ATS units, to realize automatic information exchange to replace voice communication between ATS units, and to respond to the requirements of the ICAO Asia-Pacific Seamless ANS Plan, China made AIDC-based electronic transfer function one of the necessary functions for the construction and operation of the ATM automation system in 2012 and started to promote the practical application of AIDC electronic transfer between domestic ATS units and with adjacent ATS units.

## 2. DISCUSSION

Status of AIDC Implementation in Mainland China

2.1 By 2021, more than 90% of China's domestic ATM automation systems are capable of the AIDC ICD V3.0 interface. 63 AIDC groups are in operation, with an overall implementation rate of 79%, achieving the expected utilization effect. Based on the beneficial effect of AIDC in improving efficiency, China plans to fully implement AIDC electronic handover in domestic regional in the following two years.

2.2 China's domestic operation of AIDC links are AFTN network and dedicated line. AFTN network accounts for about 75%, and the dedicated line is used between some heavy traffic regional ATS units. In the AIDC electronic handover, China mainly uses seven types of core AIDC messages, including ABI, EST, ACP, TOC, AOC, LAM, and LRM.

Status of AIDC Implementation with regions of China

2.3 China has implemented AIDC electronic transfer between the regions of Sanya and Hong Kong, Guangzhou and Hong Kong, Shanghai and Taipei, and Guangzhou and Taipei. As shown in the following table.

| Location of ATSU1 | Correspondent ATSU2 | Interface Status | Implementation Date or Target Date | AIDC messages used | Transmission Means | Remarks |
|---|---|---|---|---|---|---|
| Sanya | Hong Kong China | Operational | Feb.2007 | EST, ACP, TOC, AOC, LRM, and LAM | AFTN | |
| Guangzhou | Hong Kong China | Operational | May.2018 | EST, ACP, TOC, AOC, LRM, and LAM | AFTN | |
| Shanghai | Taipei China | Operational | 2013 | EST, ACP, TOC, AOC, LRM, and LAM | Dedicated Line | |
| Guangzhou | Taipei China | Operational | 2013 | EST, ACP, TOC, AOC, LRM, and LAM | Dedicated Line | |

Status of AIDC Implementation with adjacent ATS units

2.4 China-RoK AIDC control transfer was implemented between Dalian ACC and Incheon ACC, and China-Russia OLDI electronic transfer was implemented between Shenyang ACC and Khabarovsk ACC.

2.5 China completed the test work of AIDC between Beijing and Ulaanbaatar and carried out AIDC trial run between Kunming ACC and Vientiane ACC. Meanwhile, China plans to promote the implementation of AIDC between Shanghai - Incheon, Nanning - Hanoi, Haikou - Hanoi, Haikou - Ho Chi Minh, Kunming - Yangon and Lanzhou - Ulaanbaatar by 2025.

2.6 The implementation of AIDC between China and seven adjacent ATS units, totaling 10 pairs of ATSUs, is updated in the following table.

| Location of ATSU1 | Correspondent ATSU2 | Interface Status | Implementation Date or Target Date | AIDC messages used | Transmission Means | Remarks |
|---|---|---|---|---|---|---|
| Dalian | Incheon | Operational | Oct.2016 | ABI, EST, ACP, TOC, AOC, LRM, and LAM | Dedicated Line | |
| Shenyang | Khabarovsk | Operational | Oct.2019 | ABI, ACT, MAC, HOP, ACP, LAM, and LRM | Dedicated Line | OLDI messages |
| Kunming | Vientiane | trial run interruption | 2022Q4 | EST, ACP, TOC, AOC, LRM, LAM | Dedicated Line | |
| Kunming | Yangon | Testing | 2023Q4 | EST, ACP, TOC, AOC, LRM, LAM | AFTN | Affected by transmission delay, |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | surveillance capability, and epidemic |
| Beijing | Ulaanbaatar | Testing | 2023Q4 | EST, ACP, TOC, AOC, LRM, LAM | AFTN | The other system does not support TOC, AOC Messages |
| Lanzhou | Ulaanbaatar | Testing | 2023Q4 | EST, ACP, TOC, AOC, LRM, LAM | AFTN | |
| Sanya | Ho Chi Minh | Testing | 2023Q4 | EST, ACP, TOC, AOC, LRM, LAM | AFTN | |
| Shanghai | Incheon | Planned | 2023Q3 | ABI, EST, ACP, TOC, AOC, LRM, LAM | AFTN | |
| Sanya | Hanoi | Planned | 2023Q4 | EST, ACP, TOC, AOC, LRM, LAM | AFTN | |
| Nanning | Hanoi | Planned | 2023Q4 | TBD | AFTN | |

Beijing ACC and Ulaanbaatar ACC AIDC technical test

2.7 The three border points (INTIK, NIXAL, POLHO) where Beijing and Ulaanbaatar carry out the transfer are among China's busiest entry and exit points. The daily inbound and outbound flights affected by the epidemic have dropped to about 80-100 flights per day, with about 30 flights per hour during the peak period, which is about 30% of the same period in 2019. With the continuous recovery of the epidemic, the flight volume is expected to recover gradually.

2.8 In 2018, the AIDC testing between Beijing and Ulaanbaatar officially started. Beijing ACC used the primary Thales ATMAS to interconnect with the Ulaanbaatar ATMAS through the AFTN link. During the first test, it was found that the Ulaanbaatar ATMAS could not handle AOC messages without reference information (ODF-3 field). This problem was solved by upgrading the software of the Beijing ATMAS to add the information in AOC messages header. Still, due to the link delay problem, the success rate of electronic handover was insufficient and failed to meet the implementation requirements.

2.9 In 2021, we redesigned the test plan of the AFTN link and contacted Ulaanbaatar to carry out the test. In August 2022, we successively completed all the tests of the main Thales and backup Numen ATMAS to confirm that the Beijing ACC has the technical capability to carry out AIDC handover with the Ulaanbaatar ACC.

2.10 According to the latest testing, due to the functional limitations of the Ulaanbaatar ATMAS, the electronic handover messages received in Beijing are replied manually. In this case, after our ATM automation system automatically initiates coordination (EST message) to Ulaanbaatar, there is no guarantee of receiving confirmation of coordination (ACP message) reply within 1 minute. When the corresponding ACP message reply receives exceeds 1 minute, the corresponding flight label of the Beijing ATMAS system will generate a U alarm, resulting in AIDC handover failure.

2.11 Currently, China is communicating with the Mongolian side to consider resolving the issues through an automated system upgrade.

Kunming ACC and Vientiane ACC AIDC Trial run

2.12 One international route (A581) connects Kunming ACC and Vientiane ACC. The control transfer point is SAGAG, and the total number of flights transferred in 2019 is 43,900. Since 2018, relevant technicians from both China and Laos have started to explore the use of AIDC instead of a telephone for the handover of flights and commenced the electronic handover test between Kunming ACC NUMEN-2000 ATMAS and Vientiane ACC TopSky-C ATMASAS officially in the late December of 2018.

2.13 In the years of technical testing, two types of issues were found.

- One is the ATMAS software function-related problems, such as the height of the metric system conversion, the lack of routes in the ABI message and the absence of ODF-3 in the AOC message header, etc. We resolved these problems by upgrading the ATMAS system software.
- The second issue is that the considerable and unstable transmission delay of cross-country AIDC messages under the AFTN network caused the automated system to fail to receive the reply messages in time and ended the handover process prematurely. We opened a dedicated transmission network between the DMHS system and reduced the average delay of AIDC messages to less than 5 seconds.

2.14 From January 12 to August 2021, the trial run of AIDC between Kunming and Vientiane was conducted. The specific way to handover flights from Kunming to Vientiane is:

- Fifteen minutes before the junction point (SAGAG) automatically sends an ABI message for notification.
- Ten minutes before the junction point (SAGAG) automatically sends an EST message for coordination.
- At the junction point manually sends a TOC message and AOC message for transfer.

2.15 During the trial run, we enhanced the functions of the Kunming main/backup ATMAS system, added the function of inbound flight alert for handover, and conducted statistics on the success rate of handover. The statistics showed that the average success rate during the trial run was 81.18% (percentage of successful EST/ACP).

2.16 After analysis, the main reasons affecting the success rate of Kunming - Vientiane AIDC handover:

- First, when the ABI message received by the TopSky ATMAS in Vientiane has more than about 400 characters of grouping 15 route information, it may cause the system to get stuck and failed to process AIDC messages;
- Secondly, the Vientiane suggested that in some cases, when the TopSky ATMAS does not have the corresponding FPL, it needs to create the plan through the ABI message sent from Kunming, so it needs to add the grouping 18 information that is not mandatory to be sent in the received ABI message.

2.17 To address the problem of long ABI messages, we upgraded the ATM automation system software by referring to the instructions on the use of grouping 15 in AIDC ICD APPENDIX A. Through the upgrade, the waypoint information before the handover point SAGAG in the ABI message was truncated, significantly reducing the message's length. To meet the requirement of adding Formation 18 to ABI messages, we are actively conducting research and plan to realize it through system upgrades again.

2.18 Following up, China plans to complete the promotion of the Kunming ATMAS in 2022 and promote the implementation of AIDC with Vientiane.

## 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

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