International Civil Aviation Organization

Seventh Meeting of the Asia/Pacific ATS Inter-Facility Data-Link Communication Implementation Task Force (APA TF/7) of APANPIRG

Video Teleconference,

Agenda Item 3: Sharing of experience on AIDC implementation and update the implementation status

PROGRESS OF AIDC IMPLEMENTATION IN CHINA

(Presented by China)

SUMMARY

This paper presents the AIDC implementation progress and plan in China with adjacent ATSUs, the issues and experiences encountered during the implementation.

1. INTRODUCTION

1.1 China takes the electronic handover technology between ATS units as an essential way to improve the efficiency of flight coordination. To make aircraft transfer more efficient and more accurate, reduce the controllers' workload, and minimize Large Height Deviations (LHD), China continues to facilitate the AIDC implementation between domestic ATSUs and adjacent ATSUs by using AIDC Asia-Pacific Regional Interface Control Document (ICD) and Operation Guide Document (IGD).

1.2 China has implemented AIDC operation with Incheon ACC and Vientiane ACC, and OLDI operation with Khabarovsk ACC, and also China is conducting AIDC technical tests with three adjacent ATSUs, namely Ulaanbaatar ACC, Yangon ACC, and Hanoi ACC.

2. DOMESTIC IMPLEMENTATION PLAN

2.1 More than 90% of ATM automation systems in China have AIDC V3.0 capability, and more than 75% of ATS units with regional handover relations have implemented AIDC handover. Based on the critical use of AIDC in improving operational efficiency, China plans to fully implement AIDC between the domestic regional ATS units by 2025.

2.2 AIDC data links mainly include the AFTN network and dedicated line. AFTN networks account for about 75% in China. Dedicated lines are primarily used between regional ATS units with heavy air traffic. In terms of the types of messages used, China mainly using five core messages of AIDC, including ABI, EST, ACP, TOC, and AOC.

2.3 For the vertical handover between high level and low level sectors, China revised the *CAAC standard Civil Aviation Air Traffic Control Automation System – Part 3: Flight Data Exchange*

(MH/T 4029.3-2020) and issued the corresponding instruction guide document in 2020. Next step, China plans to promote the application of electronic handover among high-traffic ATS units with vertical handover relationships comprehensively by 2025.

3. IMPLEMENTATION PLAN BETWEEN REGIONS

Implementation with Hong Kong ACC, Taipei ACC, Incheon ACC, Khabarovsk ACC ,and Vientiane ACC

3.1 Sanya ACC implemented AIDC with Hong Kong ACC in February 2007 through the AFTN link network.

3.2 Shanghai ACC had implemented AIDC with Taipei ACC since 2013 through a dedicated line. And Guangzhou ACC implemented AIDC with Taipei ACC in 2013 and with Hong Kong ACC in May 2018.

3.3 Dalian ACC implemented AIDC with Incheon ACC in October 2016 through a dedicated line after conducting technical tests in 2014 successfully.

3.4 Shenyang ACC implemented On-Line Data Interchange (OLDI) with Khabarovsk ACC in October 2019 through a dedicated line with 2M bandwidth.

3.5 Kunming ACC and Vientiane ACC started the AIDC operational implementation in January 2021 after solving the main problem of link latency. The operation statistics show that the success rate of handover is above 95%, and the average link latency is less than 5 seconds. The following AIDC messages were implemented: EST, ACP, TOC, AOC, LAM, and LRM.

Kunming ACC with Yangon ACC

3.6 Kunming ACC plans to conduct AIDC technical test with Yangon ACC after improving ATS surveillance coverage at the coordination point done by Myanmar. Another problem is that the communication latency of the AFTN network from Kunming to Yangon is too large. The target of operational implementation will be in Q4th 2022.

Beijing ACC and Lanzhou ACC with Ulaanbaatar ACC

3.7 China and Mongolia had conducted technical tests between Beijing ACC (Thales Eurocat-X) and Ulaanbaatar ACC since 2018 through the AFTN network. In the test, the issue was found related to the software defect in the processing of the AOC message. So, the AIDC technical test was suspended at the time. From 2020 to 2021, after the upgrade of the Eurocat-X system of Beijing ACC, China started the test again, and all messages were exchanged and processed successfully.

3.8 According to the work plan, Beijing ACC plans to use the backup automation system (NUMEN3000) to conduct the technical tests with Ulaanbaatar. The target of trial operation will be in Q4th 2021. The following AIDC messages are planning to be exchanged: EST, ACP, TOC, AOC, LAM, and LRM.

3.9 China and Mongolia ATM coordination meeting were held at Xi'an in 2019 decided to implement AIDC between Lanzhou ACC and Ulaanbaatar ACC. Technical testing is scheduled to start in June 2021. The target of operational implementation will be in Q4th 2021.

Sanya ACC with Hanoi ACC and Ho Chi Minh ACC

3.10 Sanya ACC and Hanoi ACC conducted AIDC technical test in 2019. Affected by the construction of the new ATM automation system in Sanya, the AIDC implementation progress has been delayed. China plans to discuss the AIDC technical test with Hanoi ACC and Ho Chi Minh ACC as soon as practicable after the new ATM system is put into operation in August 2021. The target of operational implementation will be in Q1th 2022.

Shanghai ACC with Incheon ACC

3.11 Shanghai ACC plans to carry out AIDC implementation work with Incheon ACC. The transmission protocol at the link level is currently being negotiated. The target of operational implementation will be in Q3th 2022.

Nanning ACC and Hanoi ACC

3.12 China plans to discuss the implementation of AIDC between Nanning ACC and Hanoi ACC with Vietnam. The target of operational implementation will be in Q4th 2022.

Urumqi ACC and Novosibirsk ACC

3.13 China plans to discuss the implementation of AIDC between Urumqi ACC and Novosibirsk ACC with Russia. The target of operational implementation will be in Q4th 2022.

Summary Table

3.14 In summary, AIDC implementation with adjacent ATSUs are summarized in the table as below:

STATUS	ATS UNIT	ADJACENT ATSU	DATE OF TECHNICAL TEST	DATE OF IMPLEMENTATION	AIDC MESSAGES	MEDIA	REMARK
Implemented	Sanya, Guangzhou	Hong Kong	2007: Sanya Jul.2017: Guangzhou	2007: Sanya May.2018: Guangzhou	EST, ACP, TOC, AOC, LRM, LAM	AFTN	
Implemented	Shanghai, Guangzhou	Taipei	2013	2013	EST, ACP, TOC, AOC, LRM, LAM	Dedicated Line	
Implemented	Shenyang	Khabarovsk	May.2019	Oct.2019	ABI, ACT, PAC, REV, MAC, LAM, HOP, ACP	Dedicated Line	OLDI
Implemented	Kunming	Vientiane	Dec.2018	Jan.2021	EST, ACP, TOC, AOC, LRM, LAM	Dedicated Line	
Implemented	Dalian	Incheon	2014	Oct.2016	ABI, EST, ACP, TOC, AOC, LRM, LAM	Dedicated Line	
Technical test	Kunming	Yangon	Mar.2017	4Q2022	EST, ACP, TOC, AOC, LRM, LAM	AFTN	

Technical test	Beijing, Lanzhou	Ulaanbaatar	Nov.2016: Beijing	4Q2021: Beijing 4Q2021: Lanzhou	EST, ACP, TOC, AOC, LRM, LAM	AFTN	
Technical test	Sanya	Hanoi	2019	1Q2022	EST, ACP, TOC, AOC, LRM, LAM	AFTN	
Plan	Shanghai	Incheon	TBD	3Q2022	ABI, EST, ACP, TOC, AOC, LRM, LAM	TBD	
Plan	Sanya	Ho Chi Minh	TBD	1Q2022	EST, ACP, TOC, AOC, LRM, LAM	AFTN	
Plan	Nanning	Hanoi	TBD	4Q2022	TBD	TBD	
Plan	Urumqi	Novosibirsk	TBD	3Q2022	TBD	TBD	

4. IMPLEMENTATION ISSUES AND SOLUTIONS

4.1 In the technical tests, several issues occurred due to the ATM automation system's software defects that interrupted the AIDC handover process. The two main reasons are the lack of ODF field in the AIDC message header, and ATMAS cannot identify the metric unit in the message. Software upgrades can solve these types of issues.

4.2 In recent technical tests, the transmission of AIDC messages between adjacent ATSUs under the AFTN network has significant latency, resulting in unsuccessful AIDC message transmission due to message timeouts. In the test between Kunming ACC and Vientiane ACC, the average latency is 68 seconds, maximum up to 321 seconds. Latency caused the handover success rate to be only 48.72%. By setting up a dedicated line between the AFTN Data & Message Handling System (DMHS) of the ATSUs, the average delay of this link is reducing to less than 5 seconds, and the handover success rate is increasing to more than 95%. In addition, China is considering the AIDC message transmission method based on the Time Division Multiplexing (TDM) bearer network. Under the new network, the message latency between domestic ATSUs can reduce to less than 1 second.

4.3 The AIDC handover process must demand a clear waypoint as the intersection. To transfer flights between high and low sectors, which usually doesn't have a clear waypoint, China defined the interface standard for MH/T 4029.3 Class C messages, dividing the vertical handover relationship process into coordination and handover phase. The main message types used are CFPL, CHRP, and CHRQ. China has implemented electric handover based on Class C messages among several ATS units. During the operation, statistics show that it has a high success rate (>95%) and low latency (<1s).

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate.