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Eleventh Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/11)

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Agenda Item 4: Review of Current CDM/ATFM Operations and Problem Areas

AIR TRAFFIC FLOW MANAGEMENT DEVELOPMENT IN CHINA

(Presented by China)

SUMMARY

This paper presents the overview of the construction of “Three Centre Project” and National Traffic Flow Management system in China which will be officially launched in 2021. Centralized Multi-Participant Collaborative ATFM Network (CMC) as the operation concept has been introduced which dedicate to respond to the rapid growth of civil aviation development and the performance requirements of ATFM. NTFM as a unified ATFM system has been developed based on ATFM operation concept of China and deployed in the Operation Management Centre (OMC), 8 regional ATFM units and 36 ATM sub-bureaus and stations which forms a "two-level decision-making, one-level execution" ATFM management system. In addition, China will also strengthen the cross-border ATFM cooperation and boost ties with AUs, AO and stakeholders to build up a better collaborative ATFM operation environment.

1. INTRODUCTION

1.1 The aviation community and in particular China has experienced a sustained annual growth in air traffic demand between 9-10%. It is undeniable that the capacity to match this sustained robust growth demand is fast approaching current limit. Air traffic flow management (ATFM) has been identified as an effective means to achieve efficient demand capacity balancing while capacity enhancement initiatives continues in tandem to provide broad ATM solutions. ATFM is not a new concept to the global aviation community as it has been employed in Europe, the United States and APAC to efficiently manage the flow of air traffic. However, existing ATFM concepts and system should keep up with times especially on the new challenges with the fast growing traffic demand and new aviation operation environment. Therefore, China has embarked on a collaborative journey of exploration to seek a viable ATFM solution that can be suitable for domestic traffic demand and connected with cross-border traffic seamlessly.

1.2 Since 2012, China has gradually built regional ATFM systems to solve the issues of information sharing and collaborative departure management in the region. However, the distributed ATFM operation mode in various regions can't meet the demand of the rapid increase of civil aviation, nor can it effectively coordinate the national ATFM resources. To this end, China started the "Three Centre Project" construction in 2016, with a view to achieving the integration, coordination, networking and precision of ATFM through the construction of the national ATFM unit - Operation Management Centre. In order to realize the upgrading of ATFM in China from the traditional ATFM operation mode to the resource-based collaborative ATFM operation mode, so as to provide AUs, AO and other stakeholders with better air traffic services.

1.3 National traffic flow management system (NTFM), as an important part of the construction of the National ATFM Centre, will achieve unified ATFM measures, unified operation platform, unified data exchange, unified workflow, unified slot allocation, and unified cross-border ATFM collaboration. At the same time, NTFM will also realize interconnection with stakeholders such as AUs and AO to promote common situational awareness by enhancing information sharing, and provide a collaborative decision-making platform for stakeholders in China. NTFM will be officially launched in 2021. As a user driven ATFM system, it can not only effectively improve predictability and equity, but also optimize the use of ATM resources to greatly improve the efficiency of ATFM operation in China.

2. DISCUSSION

Concept of operations

2.1 *Concept Development.* "Two-level decision-making and one-level implementation" has been adopted as the ATFM operation system in China, whereas, it is mainly concentrated in eight regional ATFM units before 2020 and each regional ATFM unit has also established its own ATFM system, while the national ATFM unit is mainly responsible for coordination and monitoring, and realizes the national ATFM information sharing through the current ATOM system. The common situational awareness has been built up but the functions of national "decision-making" still need to be enhanced.

2.2 ATFM is a process based on collaborative decision-making, and it requires the joint efforts of ATFM units at all levels to achieve the best ATFM performance. Based on the characteristics of civil aviation operations in China and the objectives of future development, a single ATFM measure is not an effective way to solve the problem of imbalance in demand and capacity. Instead, it is necessary to use the advantages of whole ATFM system to face the challenges of different scenarios. As well as the collaborative decision-making of stakeholders, the optimal ATFM solution is formed so as to best respond to the rapid growth of civil aviation development expectations in the future.

2.3 *Fundamental Concept of ATFM.* ATFM in China is a service set up for the purpose of safety, order and fast-flow. Through the overall plan of ATM resources, it manages the temporal and spatial distribution of air traffic flows following the basic steps of monitoring, analysis, decision making, implementation and evaluation, to make the maximum use of the ATM system capacity without overload. It aims to optimize flow distribution, keep balance of flight demand and airspace capacity by scientific deployments. It is important to improve the utilization of airspace and to reduce airspace congestion and flight delays.

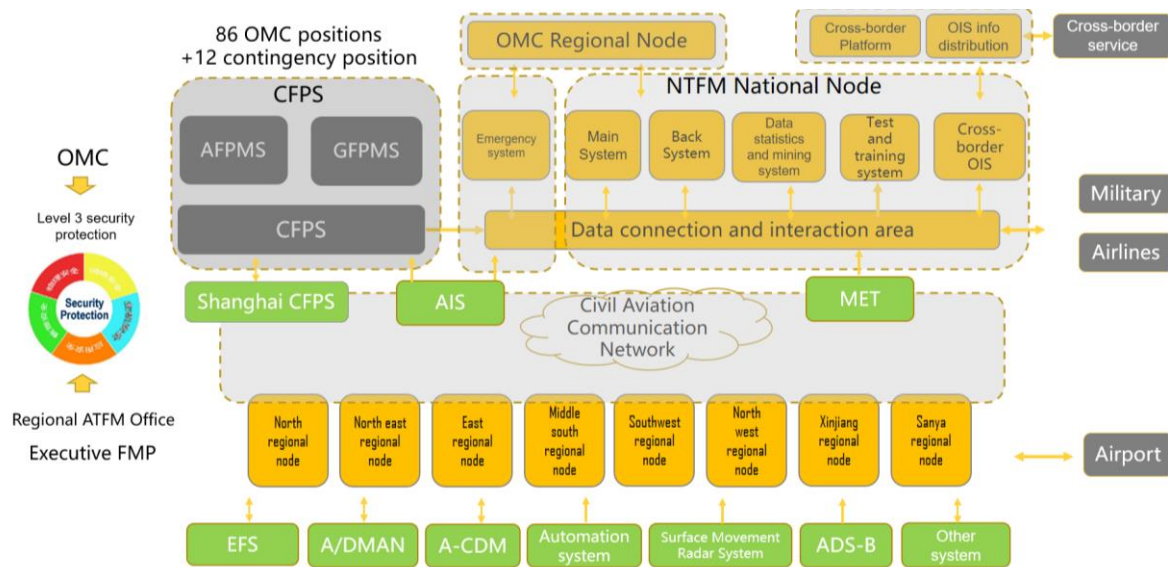
2.4 *Concept of operations.* Centralized Multi-Participant Collaborative ATFM Network (CMC) is main ATFM operation concept in China. It has three meanings, first is a centralized ATFM network, through the national unified advanced and integrated ATFM/CDM procedures and system, it provides ATFM services for domestic flights, and is also connected with cross-border ATFM. The second is multiple operational nodes, after the national ATFM units generate ATFM solutions based on collaborative decision-making, eight regional ATFM nodes in China will support the execution of the decisions-making, and the regional ATFM units can also make their own decisions in each region. The third is CDM with stakeholders, the establishment of a common situational awareness of all stakeholders carry out multi-party collaborative decision-making, so as to provide a more feasible ATFM solution.

National traffic flow management system

2.5 NTFM is a unified ATFM system developed based on ATFM operation concept of China and deployed in the Operation Management Centre (OMC), 8 regional ATFM units and 36 ATM sub-bureaus and stations. "two-level decision-making, one-level execution" management system cover the entire ATM system with the OMC as the hub, supported by regional ATFM units, and extended by the executive ATFM units located in the ACC, APP and TWR. NTFM will form an ATFM coordination linkage system covering the civil aviation system with airlines and airports, and will also effectively connect with cross-border ATFM in the Asia-Pacific region.

2.6 AFPMS, GFMPs and CFMS have provided flight plan information for NTFM system. AIS, MET, ATC automation system and Airport Surface Movement Radar System and other information have been introduced to provide information for the support of NTFM. At the same time, as an important link in the ATFM system, NTFM also interacts with A-CDM, A/DMAN and other related systems. CTOT of the constrained flights can be automatically released to AUs, AO and EFS through the interconnection of related systems to achieve automatic information sharing related to ATFM.

2.7 NTFM covers the strategic, pre-tactical and tactical stages from the ATFM execution phase, as well as the ATFM post-operation analysis, and can also provide reasonable suggestions for the ATM planning phase. NTFM provides automatic evaluation recommendations for operational capacity based on the measures of similar days and simulations and provides AMNAC Multi-Nodal ATFM cooperation platform and NARAHG CTO-based coordination platform. It also provides the OIS services as the support for those who can't achieve System to System.



2.8 Based on NTFM, ATFM in China will gradually transition from FMIT-based separation parameter management to capacity-based ATFM measures. When it is impossible to increase capacity and need to manage demand, NTFM provides FMPs with GDP, AFP, GS, STAM, Cherry Picking, Collaborative Reroute and Level Capping, etc. which ATFM managers can simulate the measures and their possible influences. One or a set of measures are selected to form a ATFM solution. It is worth mentioning that when a flight is subject to multiple constraints, the slot calculation of NTFM will fully consider the requirements of each constraints to generate a CTOT that meets multiple constraints.

2.9 While building NTFM, China also pays attention to the construction of the whole ATFM system. China has deployed A-CDM at airports with a passenger throughput of more than 10 million. In 2019, there were 39 airports with a passenger throughput of more than 10 million in China. China has also strengthened the construction of AMAN and DMAN responding to a complete ATFM related system. Meanwhile, China also issued the "Cooperative ATFM Business Rules" and the "Cooperative ATFM Operation Procedures" to standardize ATFM operations and gradually create an efficient ATFM collaborative operation environment.

ATFM Cooperation

2.10 ATFM as one of the efficiency way to improve the capability of ATM will play a key role on the implementation of the plan. In recent years, the development of ATFM in China not only focus on the domestic ATFM but also highlight the harmonization development between Cross-Border and Domestic ATFM under the ICAO ATFM Framework in Asia-Pacific region. In respect to the harmonized ATFM development plan in Asia-Pacific region, China has been positively getting involved in cross-border ATFM cooperation. Based on the current cross-border ATFM cooperation on Distributed Multi-Nodal ATFM Network Cooperation and Northeast Asia Regional ATFM Harmonization Group, China has further developed the planning on cross-border ATFM projects in a more pragmatic and systematic way which named “East, South, West and North” four directions international ATFM cooperation. China will be along with partners and relevant stakeholders to promote the development of cross-border ATFM under the ICAO ATFM Framework in APAC.

2.11 The operating mode of ATFM in China is designed based on the current particular status of ATM operations under the ICAO ATFM framework. It has similarities and differences with other states and regions in terms of ATFM operation concepts, workflows and ATFM measures. Therefore, strengthening the understanding of ATFM in China and seeking common ground while reserving differences is the basis for the collaborative ATFM operation in the future. The new National ATFM Center, known as an important part of the "Three Centre project ", will be officially opened in 2021, and NTFM will also be used simultaneously with the new National ATFM Centre. Strengthening cooperation with stakeholders such as AUs, AO and aviation industry to understand each other's requirements, exchange information in a timely manner to enhance situational awareness, will have a positive role in promoting safety, efficiency, environmental protection, capacity and sustainable development advocated by the ICAO.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss the viable of ATFM CONOPS in China toward future development;
- c) put forward reasonable suggestions for the construction of NTFM;
- d) strengthen ATFM cooperation with China
- e) discuss any relevant matters as appropriate.