International Civil Aviation Organization

Tenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/10) of APANPIRG

Video Teleconference, 17 – 21 October 2022

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

UPDATES OF TRAJECTORY BASED OPERATIONS (TBO) ACTIVITIES IN CHINA

(Presented by China)

SUMMARY

This paper presents the progress made by China in the development of the concept of the Trajectory-Based Operations (TBO) through technical validation and flight tests in recent years and the next-step plan.

1. INTRODUCTION

1.1 The plan on Aviation System Block Upgrade (ASBU) in the 6th edition of the Global Air Navigation Plan (GANP) published by ICAO specifies Trajectory Based Operations (TBO) is one of the ultimate goals in the ASBU and it will be put into practice after 2031.

1.2 China attaches great importance to the development and application of the new concept of TBO and new technologies relating to it. In March 2020, the Air Traffic Management Bureau of Civil Aviation Administration of China (ATMB of CAAC) formulated the Roadmap for the Implementation of the China Civil Aviation ATM Modernization Strategy (CAAMS), which sets the application of TBO as one of the three major goals of the ATM modernization in the next 15 years and specifies 16 key tasks regarding the application of TBO and approaches to the implementation of each task.

1.3 The ATMB of CAAC has organized universities, research institutes and enterprises related to the field of ATM to establish a TBO task force to actively promote the research, development, validation, and demonstration of TBO concept and related technologies.

2. DISCUSSION

Progress in the past three years

2.1 In March 2019, the first flight test of the initial four-dimensional (I4D) trajectory operation was carried out by ATMB, which fully validated the I4D operational concept and capabilities of Controller–Pilot DataLink Communications (CPDLC), Extended Projected Profile (EPP) and Required time of Arrival (RTA), achieving good results and laying a solid foundation for TBO concept and technology validation and demonstration in China.

The challenges of TBO

2.2 The realization and application of TBO is a complex and systemic project with wide coverage, long implementation period and high-level technical integration. It involves not only the upgrading and renovation of flight planning, traffic flow management system, ATC automation system, data link system and airborne avionics system and equipment, but also the development, validation and application of a series of technical standards such as ATC operation procedure, traffic flow management strategy and methods, flight operation standards, and collaborative information environment. In order to unify the understanding of the operational concept of TBO and clarify the development vision of ATM operations, ATMB developed the TBO Operational Concept in 2020, with reference to the TBO operational concept developed by the Air Traffic Management Requirements and Performance Panel (ATMRPP) of the Air Navigation Commission (ANC) of ICAO ,which answers the questions of what is TBO, what will the future TBO operation look like in China, and what kind of technical enablers are required to be enhanced.

The roadmap for FF-ICE

2.3 Flight and Flow Information for a Collaborative Environment (FF-ICE) is an important technical enabler for TBO to realize information interaction, collaborative decision-making and efficient operation. The ICAO Doc 9965 of the Manual on FF-ICE describes in detail the concept of FF-ICE in the future ATM system and ATMRPP developed the guideline on FF-ICE. Since 2018, the ATMB has organized research on the standards and specifications for pre-departure collaborative flight planning services, conducted several tabletop exercises and developed a validation platform for collaborative flight planning services based on Flight Information Exchange Model (FIXM) to carry out validation of the effectiveness and adaptability of the application in China. Based on the above tabletop exercises and validations, ATMB has proposed comments and suggestions for ATMRPP on the development of the FF-ICE Implementation guideline. The ATMB is also working on the development of the implementation roadmap for FF-ICE in China.

Further validation of TBO Operational concept

2.4 In order to continuously carry out test validation of new TBO concept and technologies, ATMB launched a dual-aircraft TBO test flight project in 2021. The project is an extension to the single-aircraft I4D test flight project in 2019, which is embodied specifically in the following three aspects:

- the extension of operational concept, namely, "air-ground collaboration" is extended to "air-ground and ground-ground collaboration"; the I4D ATC application is extended to a combination of collaboration between ATC and ATFM;
- the extension of test scenarios, that is, ground-air flight control test scenarios for one single aircraft is extended to the collaborative and interactive scenarios between the two aircraft;
- the purpose is to extend the development of technical standards and operational specifications.

2.5 Through deploying an air-ground data link communication network and integrating the ground ATM systems such as I4D ATC automation system, air traffic flow management system and arrival management system, this dual-aircraft TBO flight test is planned to take place on the route from Urumqi Diwopu International Airport to Beijing Daxing International Airport in the second half of 2022.

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 matters as appropriate.

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