International Civil Aviation Organization

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

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

THE LONG-TERM VISION FOR THE FUTURE AIR TRAFFIC SYSTEMS OF JAPAN (CARATS)

(Presented by Japan)

SUMMARY

Decarbonization is a keyword to the sustainable future development of civil aviation and should be made in response to corresponding to the growth in air traffic demand. Hence, it is considered that the improvement of the air navigation system will play an important role. This paper introduces JCAB's measures especially for Decarbonization through the long-term vision for the future air traffic system in Japan, known as Collaborative Actions for Renovation of Air Traffic Systems (CARATS).

1. INTRODUCTION

1.1 Decarbonization is a keyword to the sustainable future development of civil aviation and should be made in response to corresponding to the growth in air traffic demand. In order to achieve this, it is considered that the improvement of the air navigation system will play an important role. The GANP provides the overarching direction for a globally harmonized air navigation system with safe, effective and efficient air traffic. It also offers various measures and technical developments in the form of time-series blocks, such as the Aviation System Block Upgrade (ASBU) and the Basic Building Block (BBB).

2. DISCUSSION

The long-term vision for the future air traffic systems in Japan

2.1 In Japan, in order to correspond appropriately to the growth in air traffic demand as well as the diversified needs of users, through the collaboration of industry, academia and government, the future of the air navigation services has been examined from various angles and also based on global trends. In 2010, the CARATS, a long-term vision for the future of air traffic systems, was established. It defines goals and directions for renovation towards 2025, such as improving safety, meeting the increasing global aviation demand, increasing convenience, and improving operational efficiency. With the update of the 6th edition of the GANP, the planning horizon of the roadmap had been extended to 2040. JCAB is making a further review about CARATS emphasizing more on decarbonization.

2.2 The CARATS identifies the following 8 directions of renovation in order to achieve the goals with a core of the Trajectory Based Operations (TBO).

- Realization of TBO
- Improvement of predictability
- Ensuring information sharing for collaborative decision-making
- Promotion of Performance Based Operation
- Implementation of satellite navigation in all flight phases
- Improvement of situational awareness on the ground and on board an aircraft
- Maximum utilization of human and machine capability
- Realization of high-density aircraft operations at busy airports and congested airspace

2.3 The CARATS is consistent with the ASBU Methodology. JCAB has mapped its planning to respective Block Upgrade Modules to ensure the near and long-term global interoperability of their air navigation solutions.

Significant measures to realize TBO

2.4 It is necessary to respond to the increase in air traffic and reduce CO2 emissions at the same time by improving operational efficiency with renovating air navigation services. JCAB is implementing overall air traffic optimization and improvement for each flight phase in anticipation of future developments in air navigation systems and technological development trends. Typical examples are shown below.

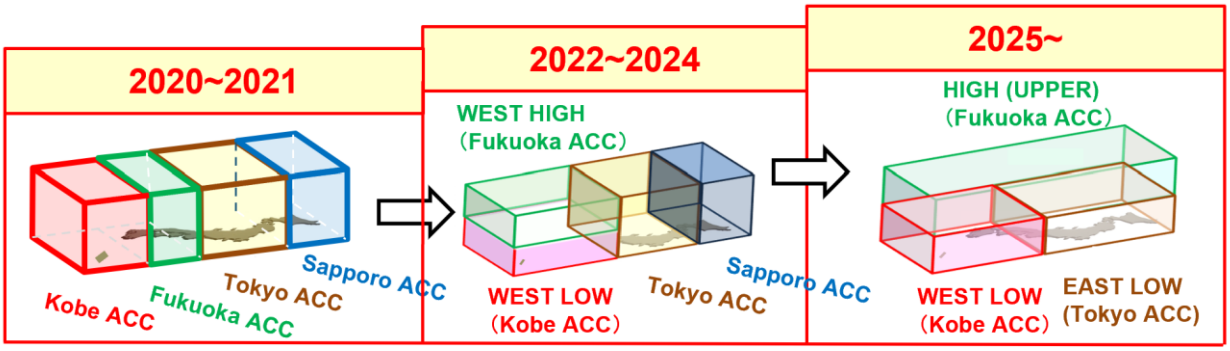
2.5 Collaborative Decision-Making (CDM) will allow all members of the air traffic management community to participate in the decisions that affect them. Enhancing CDM under the future TBO environment that utilizes 4D trajectory, a wide range of mass data must be shared among as many stakeholders concerned as possible. To this end, an information sharing structure is required. SWIM enables stakeholders to share necessary data with each other cost-effectively compared with the conventional style, which requires a dedicated system.

2.6 SWIM provides the environment where the relevant actors can access the information on aircraft operations any time. Furthermore, it ensures the reliability of data in order to maintain the trustworthiness of information for CDM.

2.7 A demonstration project of TBO concept, called Multi-Regional Trajectory-Based Operations (MR-TBO) project, has started and Japan participates in it (with Canada, Singapore, Thailand and U.S.A.) In this project, key TBO capabilities have been validated in the simulated environment using some operational scenarios. Japan will keep cooperating for the next step of this project.

Improved efficiency in ATC operations en-route

2.8 In 2020, JCAB launched a five-year plan to reconstruct its domestic airspace to increase ATC capacity. By vertically dividing the airspace where many transit aircraft pass over, such as flights between Asia and North America into high and low altitudes. It simplifies the workload of controllers and increases the ATC capacity.



2.9 In addition, CPDLC was introduced in the new high altitude sector. The trial operation started in domestic high-altitude airspace in March this year. Although the operationnal messages are limited at first, such as communication transfer, the application will be expanded to directions such as route changes (taking time and effort by voice communication) in the future. Also, applicable airspace is considered to be expanded in the future. This will lead to seamless operation and connecting to oceanic airspace, where CPDLC is already mainly used, and realize free routes (UPR, DARP) at high altitudes.

2.10 At the same time, in the oceanic airspace, JCAB will introduce the more efficient operation of Fukuoka FIR by such means as reviewing the airspace and route composition in accordance with PBN, promoting operations by PBCS. This will contribute to the acceleration of decarbonization.

Improved efficiency in ATC operations of take-offs and landings

2.11 JCAB is introducing more efficient air navigation systems for take-offs and landings. RNP to ILS enables curved routes and approach routes are assumed to be shortened. So, it will be effective for decarbonization as well as improvement of safety and operational efficiency.Ground Based Augmentation System (GBAS), which JCAB plans to introduce shortly, is assumed to enhance navigation accuracy more. JCAB will keep taking part in the discussion in ICAO.

2.12 Continuous Descent Operation (CDO) is the operational procedure with minimum engine thrust in the approach phase and reduces CO2 emission as well as noise. JCAB has introduced this system to three airports (including experimental operation) and will increase the number of airports that support this procedure.

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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