60th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Sendai, Japan
28 July - 1 August 2025

AGENDA ITEM 4: AIR NAVIGATION

ENHANCED RESILIENCE OF AIR TRAFFIC SYSTEM IN APAC

(Presented by Japan)

SUMMARY

This discussion paper introduces the recommendation at the 14th Air Navigation Conference (AN-Conf/14, Montreal 2024), regarding the update of the resilience focus area of the Global Air Navigation Plan (GANP, Doc 9750), and Japan's efforts to enhance the robustness and redundancy of its air traffic systems and mitigate the impact of unforeseen events on flight operations which is included in updated Collaborative Actions for Renovation of Air Traffic Systems (CARATS), and also calls on the APAC region to consider strengthening the resilience of its CNS, the technical foundation that supports air traffic systems.

ENHANCED RESILIENCE OF AIR TRAFFIC SYSTEM IN APAC

1. INTRODUCTION

1.1 In the Asia-Pacific (APAC) region, strong demand for aviation is expected to continue in the future. In addition to the emergence of new airspace users (drones, advanced air mobility, supersonic aircraft, Higher Altitude Platform Station (HAPS), sub-orbital aircraft, etc.), electric and hydrogen-powered aircraft that will contribute to net-zero aviation are also predicted. Alongside the integration of these new airspace users with existing aircraft, various initiatives are underway in the APAC region to realize Trajectory Based Operations (TBO).

1.2 On the other hand, new threats and challenges such as GNSS radio frequency interference (RFI) and cyber risks have emerged, highlighting the need to build resilient systems within the air traffic systems of the APAC region.

1.3 The discussion paper introduces Japan's efforts to enhance the robustness and redundancy of its air traffic systems and to mitigate the impact of unforeseen events on flight operations, and also calls on the APAC region to consider strengthening the resilience of its CNS, the technical foundation that supports air traffic systems.

2. DISCUSSION

2.1 At the 14th Air Navigation Conference (AN-Conf/14, Montreal 2024), the ICAO Secretariat presented AN-Conf/14-WP/12, which proposed a series of major updates at the strategic and technical levels of the seventh edition of the Global Air Navigation Plan (GANP, Doc 9750). These updates are expected to be submitted for endorsement at the 42nd Session of the ICAO Assembly. Regarding the proposed updates at the global technical level, the Conference agreed, in principle, to the updates of the environment key performance area and the resilience focus area of the GANP performance.

2.2 In Japan, Collaborative Actions for Renovation of Air Traffic Systems (CARATS), which was formulated in 2010, has been revised to set a new target year of 2040, and newly includes measures to strengthen the resilience of CNS and other facilities in Japan's future air traffic system, which is also in line with the directions of major updates of GANP.

2.3 The main directions for strengthening the resilience in CARATS are as follows:

2.3.1 For communications, by enabling simultaneous connections through multiple communication media, it will be necessary to prevent communication interruptions caused by media switching and ensure the continuity of safe flight operations even if a single communication medium fails.

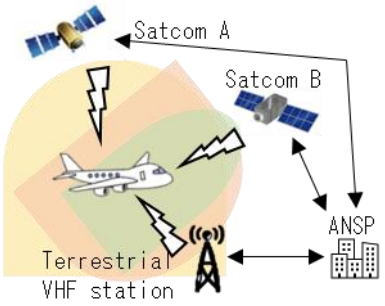

Figure – 1: System concept diagram (Communication)

2.3.2 For navigation, it will be required to ensure the continuous use of GNSS and frequency redundancy, introduce signal authentication technology, monitor the radio frequency conditions to minimize the impact on satellite navigation caused by ionospheric storms, jamming signals, spoofing, etc., and maintain a navigation environment using conventional navigation facilities at a minimum to ensure the continuity of operations.

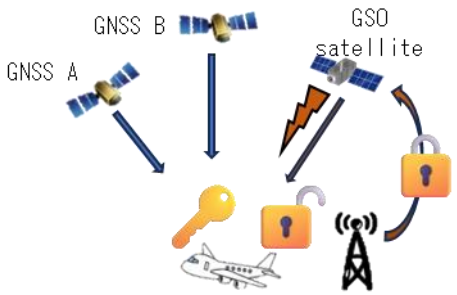

Figure – 2: System concept diagram (Navigation)

2.3.3 For monitoring, it is important to improve reliability by enhancing the mutual complementarity of monitoring systems through multiplexing the coverage area by combining multiple monitoring sensors, thereby minimizing the impact of jamming signals and other interference.

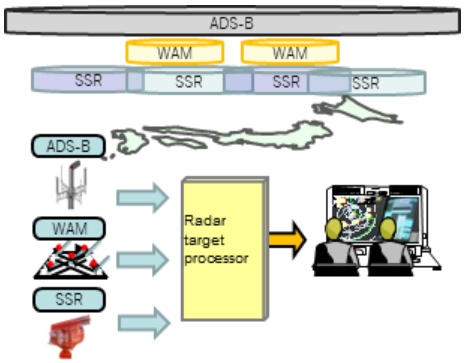

Figure – 3: System concept diagram (Surveillance)

2.3.4 For further information regarding to CARATS, please refer to DGCA/60/IP/04/02 UPDATE OF NATIONAL AIR NAVIGATION PLAN AND GOVERNANCE PLAN FOR THE ORGANIZATION.

2.3.5 In addition to introducing new technologies, it is also necessary to properly conduct performance monitoring and evaluations in order to ensure safety and efficiency. Furthermore, considering the increasing inter-dependency among CNS components – for example, ADS-B relies on GNSS position information, and a GPS failure can cause a timestamp mismatch in CPDLC –, a multi-disciplinary approach should be considered to effectively enhance the resilience of air navigation services.

2.4 Japan expects that APAC Seamless ANS Plan will also be updated in line with the revision of GANP, but we believe that the above-mentioned points should also be taken into consideration in order to strengthen the robustness and redundancy of air traffic systems and to mitigate the impact on operations in the event of unforeseen circumstances.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) note the content of this paper;

b) encourage APANPIRG to update the APAC Seamless ANS Plan in accordance with the revision of the Global Air Navigation Plan, which is expected to be endorsed at the 42nd Session of the Assembly; and

c) encourage APAC States to consider strengthening the resilience of their CNS, the technical foundation that supports the air traffic system, in order to enhance the robustness and redundancy of the air traffic system and mitigate the impact on operations in the event of unforeseen circumstances.

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