International Civil Aviation Organization

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Agenda Item 6: Regional ATFM Framework, Regional ATFM Concept of Operations, A-CDM Plan and related Guidance Material

NARAHG UPDATES

ENHANCING CROSS-BORDER ATFM COLLABORATION THROUGH FLEXIBLE, AUTOMATED '0-VOICE' COORDINATION

(Presented by NARAHG)

SUMMARY

This paper presents an innovative cross-border Air Traffic Flow Management (ATFM) coordination method jointly trialed by China and the Republic of Korea under the North-East Asia Regional ATFM Harmonization Group (NARAHG) framework. The trial successfully validated a flexible, automated coordination concept that enables '0-VOICE' operations. By establishing parameters such as trailing interval, waypoint tolerance, and minimum interval, the upstream ANSP is granted the autonomy to manage flight sequences dynamically. The meeting is invited to consider this concept for wider regional application.

1. INTRODUCTION

1.1 As air traffic density continues to increase across the Asia/Pacific region, the demand for more efficient and scalable cross-border ATFM solutions becomes ever more critical. Traditional coordination methods, often characterized by rigid, manually negotiated slot times, present limitations in terms of operational flexibility and controller workload. Under such methods, any deviation from an assigned Calculated Take-Off Time (CTOT) typically requires manual voice coordination between upstream and downstream units to renegotiate the slot, consuming valuable time and resources.

1.2 Recognizing these challenges, the North-East Asia Regional ATFM Harmonization Group (NARAHG), through its Cross Region ATFM Collaborative Platform (CRACP), has been exploring advanced concepts to enhance cross-border collaboration. This paper details a recent trial that moves beyond simple CTOT exchange to a more dynamic and automated paradigm based on Calculated Time Over (CTO) at boundary waypoints.

1.3 The objective of the trial was to validate a new coordination concept that empowers the upstream ATFM unit with greater autonomy to manage its departure sequence, while ensuring the downstream unit's capacity constraints are respected — all achieved through a fully automated, '0-VOICE' environment requiring no manual voice communication between the coordinating units.

2. DISCUSSION

A New Paradigm: Flexible and Automated Coordination

2.1 The core of the new concept is a shift from rigid, pre-determined intervals to a flexible, rule-based framework. Instead of assigning a fixed CTOT for each flight that must be manually renegotiated upon deviation, the downstream ATFM unit defines a set of operational parameters that govern the traffic flow at the boundary point:

a) ***Trailing Interval:*** The desired time interval between consecutive aircraft at the boundary waypoint.

b) ***Waypoint Tolerance:*** The acceptable window (e.g., ±5 minutes) around the assigned CTO at the boundary waypoint.

c) ***Minimum Interval:*** The absolute minimum separation that must not be infringed, acting as a safety and capacity buffer.

2.2 Within this framework, the upstream ATFM unit has the autonomy to manage its departure sequence. As long as flights are predicted to meet the waypoint constraints, no coordination is required. If a flight is delayed or needs rescheduling, the upstream unit can independently adjust the sequence of its traffic queue, provided the adjustments comply with the defined trailing and minimum interval rules. The system provides automated alerts to the downstream unit only if a potential infringement of the minimum interval is detected, thereby ensuring that capacity protection is maintained without manual intervention.

2.3 This method represents a fundamental departure from the traditional approach where any deviation from a rigid interval necessitates human-to-human coordination between ATFM units and ATC. By establishing clear, pre-agreed rules, the need for such manual coordination is eliminated. This concept received positive endorsement from Shanghai Area Control Centre (ACC), as it reduces the burden of tactical ATC intervention and allows controllers to focus on maintaining safe and orderly traffic flow.

Trial Execution and Results

2.4 A live operational trial was conducted on 26 February 2026 between the Republic of Korea (upstream) and China (downstream) via the CRACP data-sharing network. The trial involved eight flights from airports in the Republic of Korea to Shanghai Pudong International Airport (ZSPD), with the boundary waypoint SADLI serving as the CTO reference point.

2.5 The results were as follows:

a) Four (4) flights required no adjustments whatsoever. These flights departed at the system-assigned times and crossed the boundary waypoint SADLI within the ±3-minute tolerance. This demonstrates that, under normal conditions, the CTO mechanism can deliver high-precision traffic flow with zero intervention.

b) The remaining four (4) flights were autonomously managed by the ROK ATFM unit based on the actual operational circumstances of each aircraft. The departure times were adjusted within the queue in accordance with the pre-defined trailing interval, tolerance, and minimum interval parameters. At no point was it necessary to contact the downstream ATFM unit in Shanghai for re-coordination.

c) Throughout the entire operation for all eight flights, the coordination between the two ATFM centres was conducted with '0-VOICE' — that is, zero manual voice communication. The Shanghai ATFM unit maintained full situational awareness by monitoring the shared real-time data on the CRACP system, and no manual intervention was required at any stage.

Future Development: Towards Higher Precision

2.6 NARAHG is planning a second phase of trials to further enhance the precision of the CTO mechanism. In this next phase, flight crews will enter the assigned CTO directly into the aircraft's Flight Management System (FMS). By leveraging the FMS's trajectory computation and speed management capabilities, the trial is expected to improve time conformance at the boundary waypoint, with a view to progressively narrowing the tolerance, potentially toward ±1 minute in suitable operational environments and subject to further validation. Further validation of these results will be continuously conducted within NARAHG, This could support the region's longer- term transition toward Trajectory-Based Operations (TBO), as envisioned in the ICAO Global Air Navigation Plan (GANP).

2.7 The success of this trial suggests that the '0-VOICE' concept may serve as a useful basis for further regional work on cross-border ATFM coordination across the Asia/Pacific region. Standardized guidance material, and potentially an SOP at a later stage, could provide a common framework for States and administrations to implement flexible and automated coordination, with the aim of reducing workload, improving efficiency, and enhancing predictability of cross-border traffic flows, which will be developed and established within NARAHG.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the successful trial of the flexible, automated '0-VOICE' cross-border ATFM coordination concept conducted by NARAHG using the CRACP platform;

b) discuss the potential operational benefits, applicability, and limitations of the '0-VOICE' concept for regional cross- border ATFM coordination.

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