



International Civil Aviation Organization

ICAO

Sixteenth Meeting of the Asia/Pacific Air Traffic Flow Management and Airport Collaborative Decision-Making Steering Group (ATFM & A-CDM/SG/16)

Bangkok, Thailand, 06 – 10 April 2026

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

**PROGRESS OF THE ATFM CONCEPT DESIGN AD-HOC GROUP**

(Presented by ATFM Concept Design Ad-Hoc Group)

**SUMMARY**

This paper presents the progress from the ATFM Concept Design Ad-Hoc Group, established following the ATFM/SG/15 meeting to review and propose a revised *Regional ATFM Concept of Operations*. The paper provides an overview of the Ad-Hoc Group working structure, overall work plan toward delivering the revised concept of operations document at ATFM & A-CDM/SG/17 in 2027, progress from Phase 1 of the work, and the planning for the remainder of the group's tenure.

**1. INTRODUCTION**

1.1 The meeting would recall that, at the previous meeting of the ATFM Steering Group (ATFM/SG/15, April-May 2025), a proposal to establish a working group to review and propose a revised regional ATFM concept of operations was tabled for discussion. The discussion resulted in the **Decision ATFM/SG/15-6** to establish the **ATFM Concept Design Ad-Hoc Group**, tasked with reviewing and redesigning the regional ATFM concept of operations, considering the challenges of the current operations and the advent of new capabilities and concepts including but not limited to System-Wide Information Management (SWIM), Flight and Flow Information for a Collaborative Environment (FF-ICE), and Trajectory-Based Operations (TBO). The Ad-Hoc Group was expected to deliver a draft revised *Regional ATFM Concept of Operations* (ConOps) document for adoption by the ATFM & A-CDM/SG at its 17<sup>th</sup> meeting (ATFM & A-CDM/SG/17) in 2027. This Decision was reported to the ATM Sub-Group at its 13<sup>th</sup> meeting (ATM/SG/13, August 2025).

1.2 Following the Decision by the ATFM & A-CDM/SG, the ATFM Concept Design Ad-Hoc Group organized its first meeting virtually in June 2025 to establish working arrangements and to start the work. Subsequently, the Ad-Hoc Group has been meeting monthly and has made considerable progress toward the final deliverable.

1.3 This Working Paper (WP) provides information on the progress of the Ad-Hoc Group between June 2025 – March 2026, along with an overview of the work plan for the rest of the group's tenure.

## 2. DISCUSSION

### *Administrative Overview and Working Arrangement*

#### Membership & Co-Rapporteurs

2.1 The Ad-Hoc Group comprises 36 representatives and 10 observers from 11 States/Administrations<sup>1</sup> and 3 International Organizations<sup>2</sup>. Organizations of the representatives include civil aviation authorities, air navigation service providers (ANSPs), and aerodrome operators.

2.2 At its first meeting, the Ad-Hoc Group elected 2 co-rapporteurs to coordinate the work of the group and to act as the Point of Contact (POC) between the group and the ATFM & A-CDM/SG. *Mr. Sugoan Fucharoen*, member nominated from Thailand, and *Mr. Yan Xiaoyu*, member nominated from China, were elected to serve in this role.

#### Working Arrangement

2.3 The Ad-Hoc Group has established working arrangements to facilitate the work, including scheduled virtual monthly meetings, working areas and groups, and a SharePoint workspace kindly hosted by ICAO APAC. ICAO Secretariat serving the ATFM & A-CDM/SG has been providing invaluable support to the group.

2.4 Insofar as in-person meetings, the Ad-Hoc Group has determined that such meetings may be organized as needed. One such meeting has been planned on the side of this ATFM & A-CDM/SG/16, and it is expected that another meeting will be organized in Q4/2026 as part of the concept development work. This expected meeting will be discussed in subsequent section.

### *Expected Deliverables*

2.5 According to the Terms of Reference (TOR) of the Ad-Hoc Group, the two deliverables expected for ATFM & A-CDM/SG/17 (~April 2027) are

- (1) Draft revised **Asia/Pacific Regional ATFM Concept of Operations** document, and
- (2) Principles guiding the amendment of the Asia/Pacific Regional Framework for Collaborative ATFM based on the revised Regional ATFM ConOps document.

2.6 With respect to the ConOps, the Ad-Hoc Group has discussed and agreed that the ConOps to be developed can be further divided to address the challenges and improvement areas, namely:

- **Concept of Operations to Address Short-Term Challenges** (2028), designed as concept elements that can be implemented by 2028 to address the most immediate challenges without requiring significant changes to technological and operational landscape.
- **Concept of Operations for Mid-Term Improvements** (2032), designed as concept elements that can leverage the new technological and operational enablers expected in the Asia/Pacific region in 2032 such as SWIM and FF-ICE Release 1 (FF-ICE/R1).

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<sup>1</sup> Australia, China, Hong Kong China, Japan, New Zealand, the Philippines, Republic of Korea, Singapore, Thailand, USA, and Viet Nam

<sup>2</sup> CANSO, IATA, IFATCA

- **Conceptual Framework for Long-Term Vision (2035)**, designed as a high-level conceptual framework that can achieve long-term vision for the region which may require more advanced technologies and future developments such as advanced system algorithms.

2.7 The Ad-Hoc Group also discussed and agreed on the outline of the Regional ATFM ConOps document; the detail of which is included in **Appendix A** to this WP.

**Work Plan**

2.8 Based on the expected deliverables and the division of the ConOps, the Ad-Hoc Group has developed a work plan dividing the work into several phases. Each phase is further divided into several work areas, into which members have volunteered to support. Each work area comprises volunteers from States and IOs and is led by the Work Area POCs.

2.9 An overview of the work plan is shown in **Table 1**.

*Table 1 - Overview of the Work Plan*

	Q3 2025	Q4 2025	Q1 2026	Q2 2026	Q3 2026	Q4 2026	Q1 2027
<b>Phase 1: Gaps and Needs Analysis</b>							
Work Area 1.1 Review of Existing Concept and Practices							
Work Area 1.2 Stakeholders’ Survey							
Work Area 1.3 Assessment of Techs and Ops Enablers							
<b>Phase 2: Concept Development</b>							
Work Area 2.1 Concept of Operations to Address Near-Term Challenges (2028)							
Work Area 2.2 Concept of Operations for Mid-Term Improvements (2032)							
Work Area 2.3 Conceptual Framework for Long-Term Vision (2035)							
Work Area 2.4 Preparation for Tabletop Exercise/Simulation							
<b>Phase 3: Finalization of Concept Document</b> (Work Areas TBD)							
<b>Phase 4: Implementation Guiding Principles</b> (Work Areas TBD)							
<b>Phase 5: Final Review of Documents</b> (Work Areas TBD)							

2.10 To date, the Ad-Hoc Group has made considerable progress for Phase 1 work, with initial draft sections of the ConOps document related to the current landscape, stakeholders' viewpoints, and technological and operational enablers developed. This progress is discussed in the next section.

### ***Progress of Phase 1 – Gaps and Needs Analysis***

#### **Work Area 1.1 – Review of the Existing Concept and Practices**

2.11 Work Area 1.1 was tasked with reviewing the existing ATFM concept and practices in the Asia/Pacific region. In doing so, a questionnaire was disseminated to team members to review existing concepts and practices relating to cross-border and domestic ATFM operations, with responses analyzed to identify common gaps, challenges, and areas for improvement across the region.

2.12 The findings revealed several **knowledge and coordination gaps** that affect ATFM effectiveness, including limited competency in capacity assessment and ATFM planning, limited awareness on the importance of CTOT compliance, and the downstream impact of untimely flight plan updates. In addition, inconsistent data availability, sub-optimal information exchange, and limited stakeholder engagement and feedback mechanisms were found to constrain collaborative planning and decision-making. These gaps highlight the need for more structured knowledge dissemination, strengthened coordination arrangements, and improved shared situational awareness to support more consistent and effective ATFM implementation.

2.13 The review also identified **system and technology integration gaps** that constrain stakeholders' ability to support data-driven ATFM operations. Key challenges include fragmented platforms, the absence of a regional traffic display and common data reference, inaccurate demand forecasting due to delayed flight updates, and limited automation to support capacity assessment, demand prediction, and post-operations analysis. These limitations reduce the effectiveness of ATFM measures, as operational decisions may be based on incomplete or inaccurate information. Enhancing system integration, automation, and analytical capabilities would strengthen the technological foundation for more forward-looking and coordinated ATFM operations at both domestic and regional levels.

2.14 Finally, **governance and standardization gaps** were identified as key structural challenges affecting regional ATFM outcomes. These include low CTOT compliance, which potentially reduces the effectiveness of ATFM measures, low participation rates in ATFM measures due to limited controlling mechanisms and existing exemptions, and the absence of standardized post-operations performance metrics. Collectively, these issues reflect the lack of a harmonized governance and accountability framework for ATFM across the region. Strengthening mandates, aligning procedures, establishing common performance targets, and exploring additional ATFM control mechanisms would support more consistent application of ATFM measures and enhance confidence in regional ATFM performance.

#### **Work Area 1.2 – Stakeholders' Survey**

2.15 Work Area 1.2 was tasked with writing and undertaking a survey of ATFM stakeholders - States, ATS authorities and airspace users - to understand how the ATFM service is working now across the Asia Pacific region and what stakeholders think is the best way to improve the ATFM operations in the region. Two surveys were written; one directed at States and ATS authorities, and another directed at airspace users. The surveys were hosted online using QuestionPro, and participants undertook the survey during December 2025 and January 2026. In total, responses were received from 25 distinct States and ATS authorities, and 41 distinct airspace users.

2.16 The respondents to the States and ATS authorities survey indicated a broad need for the ATFM service, with ~75% stating that their States had some need for an ATFM service for airspace

and/or aerodromes. The respondents broadly agreed that the AMNAC initiative was meeting the needs of their States for managing air traffic demand and capacity, with ~70% agreeing, while ~75% expressed a desire for an expansion of AMNAC within the Asia Pacific region. In response to questions regarding how AMNAC could be improved, efforts to resolve conflicting constraints, use of a wider array of ATFM measures, and improved coordination and governance were raised. Meanwhile, when considering the possibility of “outsourcing” the responsibility for provision of ATFM services, i.e. having ATFM services managed by a third-party organization or entity from another State, only ~10% of respondents indicated enthusiasm for this concept.

2.17 The respondents to the airspace user survey indicated strong support for expanding AMNAC, with ~90% agreeing that there would be benefits from such an expansion. Airspace users reported that comprehensive, timely, and accurate coordination of ATFM information would improve the ATFM service for airspace users. There were also multiple calls for greater transparency and collaboration, as well as a desire for standardization in the way in which different nodes handled air traffic demand and capacity imbalances. The move to a SWIM-based information exchange environment was expected to facilitate a more rapid sharing of accurate information.

2.18 To explore the reasoning behind some of the responses to the surveys, numerous online focus group discussions were conducted. Group discussions with States and ATS authorities were facilitated by the member of the work area nominated by the International Federation of Air Traffic Controllers' Associations (IFATCA), while group discussions with airspace users will be facilitated by the member of the work area nominated by the International Air Transport Association (IATA). The group discussions were effective at uncovering the reasoning behind the responses regarding the expansion of AMNAC and the provision of ATFM by third parties. The group discussions also provided the opportunity for insights regarding regional traffic flows where there is a need to improve the effectiveness of the ATFM service, and a willingness was expressed to explore methods by which governance and standardization could be improved across the region.

#### Work Area 1.3 – Assessment of Technological and Operational Enablers

2.19 Work Area 1.3 was tasked with reviewing technological advancements and emerging ATM operational concepts with the potential to enhance current ATFM operations and enable the implementation of new ATFM concepts and practices. Based on an assessment of existing and forthcoming developments, and with reference to the outcomes of the Fourteenth Air Navigation Conference (AN-Conf/14) and the Eighth Edition of the Global Air Navigation Plan (GANP), it was identified that key enablers for the transformation of ATFM include SWIM, FF-ICE, and Trajectory-Based Operations (TBO). In addition, the potential application of Artificial Intelligence and Machine Learning (AI/ML) to enhance ATFM operations was examined.

2.20 The review indicated that SWIM enables the modernization of ATFM through a transition to a net-centric, service-oriented architecture. By replacing point-to-point exchanges with a digital information infrastructure, SWIM allows stakeholders to access a common and authoritative source of operational data. Through the application of standardized information exchange models, such as Aeronautical Information Exchange Model (AIXM) and Flight Information Exchange Model (FIXM), SWIM supports global interoperability and seamless cross-border information exchange. This enhances shared situational awareness and enables a shift from reactive to more predictive ATFM, supporting improved demand forecasting and proactive flow management.

2.21 Building upon this digital foundation, FF-ICE and TBO were identified as key enablers for improved ATFM performance. In particular, modernized flight planning, supported by structured four-dimensional (4D) trajectory information under FF-ICE, enables high-fidelity demand forecasting in support of ATFM processes. The application of TBO, based on the management of continuous 4D trajectories, reduces reliance on conservative operational buffers, thereby increasing airspace capacity and enabling more tailored, flight-specific measures in lieu of broad flow restrictions. These capabilities

support the early identification and mitigation of potential constraints, thereby reducing the risk of network-wide congestion.




2.22 In view of the significant volume and complexity of data generated by these advanced technologies and operations, AI/ML technologies were identified as enablers for deriving actionable insights. Such technologies can support dynamic capacity prediction, taking into account variables such as weather conditions and controller workload, as well as automated decision support for trajectory optimization. In addition, AI/ML can support post-operational analysis to identify systemic inefficiencies and recurring delay drivers, enabling continuous improvement of ATFM operations.

### ***Work Plan for Phase 2 – Concept Development***

2.23 With the considerable progress made on Phase 1 work, the Ad-Hoc Group has begun the work of Phase 2 – Concept Development, which is the primary focus of the group and is anticipated to be the core focus of the remaining part of 2026.

2.24 To prepare for Phase 2 work, the group has discussed and agreed on the framework for defining *areas of improvement* to be addressed by the revised ConOps, based on the gaps and needs analysis conducted in Phase 1. The framework for ConOps development is shown in **Table 2**.

*Table 2 - Proposed Framework for ConOps Development*

<b>Proposed Framework for defining Short, Mid and Long-Term Areas of Improvement</b>			
	<b>Short-Term</b>	<b>Mid-Term</b>	<b>Long-Term</b>
<b>Implementation Period</b> 	2028 – 2032	2032 – 2035	Beyond 2035
<b>Potential methods or enablers to improve operations</b> 	<ul style="list-style-type: none"> <li>Refining or improving current ATFM processes</li> <li>Make better use of existing tools or systems for information exchange</li> </ul>	<ul style="list-style-type: none"> <li>Develop concept to harmonise with future ATM operational concepts</li> <li>Leverage technological enablers for improved regional coordination e.g. SWIM, FF-ICE</li> </ul>	<ul style="list-style-type: none"> <li>New technology deployment, i.e., adoption of AI/Machine Learning</li> <li>Infrastructure transformation</li> <li>Potential new concept of ATFM operations for the APAC region to facilitate regionally optimised ATFM solutions</li> </ul>
<b>Resource Requirements</b> 	Low to moderate investment	Moderate to high investment	<ul style="list-style-type: none"> <li>High investment</li> <li>Multi-year programmes</li> </ul>

2.25 This framework would be used to classify the gaps, challenges, and areas of improvement identified in Phase 1, and the various categories of improvement areas will be used by each of the Phase 2 work area – namely, the work areas for short-term challenges, mid-term improvements, and long-term visions – to develop appropriate concept elements.

2.26 It is anticipated that the Ad-Hoc Group will need to have 1 – 2 in-person meeting(s) during Phase 2 to facilitate effective brainstorming and discussion in concept development. One such meeting is scheduled for Thursday 9 April 2026 and Friday 10 April 2026, on the side of the ATFM & A-CDM/SG/16, to discuss the framework for Phase 2 work and to ensure alignment of the 3 Work Areas of Phase 2 before further work in the remainder of the year. Another in-person meeting is being planned in the 4<sup>th</sup> quarter of 2026 to discuss and finalize the ConOps based on the work done by the 3 Phase 2 Work Area teams. This planning is expected to be finalized during the April in-person session and will be coordinated further with the ICAO Secretariat and the Chair of the ATFM & A-CDM/SG.

***Conclusion***

2.27 The ATFM Concept Design Ad-Hoc Group has received great support and contributions from nominated members and would like to express appreciation to Asia/Pacific States/Administrations and IOs for the support of this work thus far. The group will continue its work diligently through the rest of its tenure. Progress of the work will continue to be shared with the Chair of the ATFM & A-CDM/SG and to be reported to relevant regional forums as needed.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper,
- b) share suggestions on the progress and the work plan of the Ad-Hoc Group, and
- c) discuss any relevant matters as appropriate.

**Appendix A**  
**Structure of the Revised Regional ATFM Concept of Operations**

Chapters	Topics
Chapter 1 - Executive Summary	(Overall summary of the document)
Chapter 2 - Introduction	Background Scope Development Methodologies Document Overview
Chapter 3 – Current Landscape	Current ATFM Operations <ul style="list-style-type: none"> <li>○ AMNAC</li> <li>○ NARAHG</li> <li>○ Others – China, Japan, New Zealand, the Philippines, Viet Nam</li> </ul> Stakeholders’ Needs Analysis Challenges and Opportunities
Chapter 4 – Future Concept Enablers	Technological Enablers Operational Enablers
Chapter 5 – Regional ATFM Concept of Operations	ConOps to Address Near-Term Challenges ConOps for Mid-Term Improvements Conceptual Framework for Long-Term Vision
Chapter 6 – Operational Scenarios	(Operational scenarios for the ConOps)

— END —