International Civil Aviation Organization

Fifteenth Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/15)

Bangkok, Thailand, 28 April – 02 May 2025

Agenda Item 4: Review of Current ATFM Operations and Problem Areas

PROGRESS UPDATE FROM ASIA-PACIFIC CROSS-BORDER MULTI-NODAL ATFM COLLABORATION (AMNAC)

(Presented by China, Hong Kong China, Singapore, Thailand,
CANSO, and IATA)

SUMMARY

This paper presents the progress update of the *Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC)*, a collaborative effort by Air Navigation Service Providers (ANSPs) from States/Administrations in the Asia/Pacific region to implement cross-border ATFM. This paper discusses recent updates from AMNAC, including the AMNAC network, post-operation analysis, results on operational trial based on One CTOT Solution (OCS) Concept, FF-ICE workshop and related works accomplished by the AMNAC Technical Subgroup (TSG).

1. INTRODUCTION

1.1 The **Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration** (**AMNAC**) has been ongoing since 2015, laying down the foundation for cross-border ATFM in the region under the *Distributed Multi-Nodal (DMN) ATFM Network* concept. The concept, upon which the Asia/Pacific Regional Framework for Collaborative ATFM was founded, is based on a network of *ATFM Nodes* responsible for demand-capacity balancing within their areas of responsibility while being connected to the network's information exchange infrastructure. The ATFM operations in each node are based on regionally agreed principles and high-level operating procedures, with local adaptations as necessary.

1.2 The focus for this collaboration has been on building the infrastructure for information exchange and developing the common operating procedure for members to use **Ground Delay Program (GDP)** to achieve demand-capacity balancing capabilities in a distributed ATFM environment. To enable participation by ANSPs of varying readiness levels, AMNAC has adopted a tiered level participation model as shown in Error! Reference source not found.

Table 1: Tiered Participation in AMNAC

Tiered Level	Capabilities
Level 3	▪ Able to generate, deliver, and receive CTOTs, ▪ Able to comply with CTOTs from all Level-3 ATFM Nodes. *Current members:* ▪ *Cambodia, China, Hong Kong China, Republic of Korea, Singapore, Thailand, Viet Nam*

Tiered Level	Capabilities
Level 2	▪ Able to comply with CTOTs from all Level-3 ATFM Nodes. *Current members:* ▪ *Indonesia, Malaysia, Myanmar, the Philippines*
Level 1	▪ Observe and participate in the project's progress. *Current members:* ▪ *Lao PDR*

1.3 The AMNAC members have been meeting regularly over the years and have been meeting twice a year since 2023. The key outcomes from the 20th and 21st AMNAC meeting were reported at the ATFM/SG/14. Since the ATFM/SG/14, AMNAC had met twice:

a) The 22nd AMNAC Meeting (AMNAC/22) was hosted in Singapore by CAAS on 14 – 18 October 2024.

b) The 23rd AMNAC Meeting (AMNAC/23) was hosted in Hong Kong China by HKCAD on 24 – 28 March 2025.

1.4 Key outcomes from AMNAC/22 and AMNAC/23 are summarized in this working paper, continuing the tradition of reporting the progress made by AMNAC to the ATFM/SG over the years. Topics of discussion include updates to the AMNAC network, post-operation analysis, results on operational trial based on One CTOT Solution (OCS) Concept, FF-ICE workshop and related works accomplished by the AMNAC Technical Subgroup (TSG).

2. DISCUSSION

Updates to AMNAC Network

2.1 In the past year, there were two significant updates to the AMNAC Network, namely:

a) ***Viet Nam progression to Level 3 ATFM Node*** – Viet Nam had conducted some operational GDP trials with a few members of the AMNAC Core[1] Team and declared their participation in the AMNAC Network as a Level 3 ATFM Node since October 2024. While some operational issues had been identified during the initial phase of trial, the issues were eventually resolved, and Viet Nam was able to issue and distribute CTOTs in accordance with the AMNAC established procedure.

b) ***Establishment of procedures for AMNAC members looking to progress to Level 3 ATFM Node*** – Procedures on the conduct of GDP operational trials had been introduced and incorporated into the AMNAC Common Operating Procedure (COP) to ascertain that AMNAC members looking to progress to Level 3 have established the necessary procedures and infrastructure to support ATFM operations. Besides requiring sufficient advance notice for advancing to a Level 3 ATFM Node, the GDP trials would evaluate how effectively the ATFM Daily Plan (ADP) is shared, as well as how CTOT are allocated and handled, including support for collaborative decision-making across borders.

Adoption of revised ADP Template

2.2 The AMNAC Core Team observed variations in the information and data formats in the ADPs being exchanged among ANSPs and acknowledged the need to standardise the ADP in support of eventual transition to machine-readable digital exchange. The AMNAC Core Team reviewed the existing ADP template, harmonised the data elements and incorporated the revised template into

[1] The AMNAC Core Team comprises of China, Hong Kong China, Singapore, Thailand, IATA and CANSO.

AMNAC COP (see **Attachment A** for reference). This new template would form the basis for efforts to develop an information exchange model to support SWIM-based digital ADP exchange.

2.3 Note that this new template is slightly different from that included in the *Asia/Pacific ATFM Daily Plan (ADP) Exchange Procedure (Working Draft)*[2] developed in May 2020.

Network Post-Operation Analysis and Challenges

2.4 As previously reported, the AMNAC Core Team had developed a network post-operations analysis dashboard to track the impact of and compliance to GDPs activated over time as part of the AMNAC initiative. The aim of the dashboard is to quantitatively identify problem areas to be addressed, which is important for the continuous enhancement of ATFM, and to enable collaborative resolutions.

2.5 The network post-operations analysis is a web-based dashboard updated based on data submitted by ATFM Units from Level 3 ATFM Node every 3 months. The dashboard is maintained by Thailand and can be accessed at **https://bit.ly/amnac-poa**.

2.6 During the AMNAC/23 meeting, it was agreed that, starting from April 2025, AMNAC Level 3 ATFM Nodes would submit data on flights impacted by ATFM operations monthly by uploading the data on the Network Post-Ops Analysis channel under the AMNAC community within Microsoft Teams (MS Teams). This would enable the dashboard to be updated monthly, providing a more timely view of the network performance.

2.7 Based on the data submitted up to March 2025, the following key observations could be made:

a) From 2019 onward, a majority (> 90%) of flights with assigned CTOTs departed from aerodromes under the jurisdiction of Level 3 and Level 2 ATFM nodes, signifying that CTOT compliance facilitation should be provided for most flights.

b) GDPs were initiated throughout the year to manage traffic congestions, special events such as military exercises and airshows, unforeseen disruptions to ATM resources, and inclement weather.

c) Comparing 2023 and 2024, compliance rates from Level 3 ATFM nodes remained at 65% while compliance rates from Level 2 ATFM nodes increased by 8%, from 49% to 57%. Diving deeper into State/Administration specific statistics showed that compliance rates increased across most States/Administrations. While there were improvements in compliance rates, much can still be done to further improve it.

2.8 Possible causes for CTOT non-compliance were reported at ATFM/SG/14. These included untimely ATFM measure notification, late flight plan submission/distribution which resulted in late CTOT delivery (CTOTs were issued to stakeholders with less than 90 minutes prior to the flight's Estimated Off-Block Time (EOBT) stipulated in the flight plan), and the lack of local procedures to facilitate compliance. In the past 2 AMNAC meetings, members had reported fewer occurrences of late flight plan submission/distribution, an indication of efforts by AMNAC members to improve procedures to be in line with the Asia/Pacific Regional Framework for Collaborative ATFM.

2.9 In investigating CTOT compliance problems, issues associated with CTOT compliance data integrity were identified, specifically mismatches between data submitted by the initiating ATFM Unit and data tracked by the facilitating ATFM Unit. The facilitating and initiating ATFM Units were encouraged to work together to identify these data discrepancies.

[2] Available in the ICAO APAC e-Document webpage, under "ATM"/ "ATFM" section.

Results on Operational Trial based on One CTOT Solution (OCS) Concept

2.10 Conflicting ATFM measures remain prevalent and continue to be one of the main challenges of the distributed ATFM network model in the APAC region. This occurs when a single flight is subjected to more than one ATFM measures put in place by various ATFM Units along the route of the flight.

2.11 The OCS concept was one of the identified strategies which could potentially address the issue of conflicting ATFM measures. The OCS concept aims to consolidate all ATFM measures along the same flow of traffic into a single CTOT, generated by the most upstream ATFMU. China, Hong Kong China and the Republic of Korea conducted operational trials based on the OCS concept. The operational trials required both Hong Kong China and Republic of Korea to provide the capacity of the constrained location in the form of a flow rate to China, who then generated CTOTs to regulate the traffic overflying Sanya FIR. Under the OCS concept, China acted as the ATFM Harmony Unit (AHU), while Hong Kong China and Republic of Korea acted as the ATFM Requirement Unit (ARU). The key findings from the operational trials were:

a) Trials were effective in regulating the traffic flow: actual traffic demand was kept within the flow rate provided to China for CTOT generation

b) During the initial trial phase, facilitating ATFM Units were unclear about which units to coordinate CTOT revisions with. This was subsequently clarified and facilitating ATFM Units were to coordinate with the AHU for CTOT coordination

c) CTOTs generated by upstream AHU could be shared with downstream ARU to enhance predictability and enable better traffic demand planning for downstream ARU

2.12 One of the issues that have become apparent was the lack of transparency in identifying the source(s) of ATFM delays. When multiple ATFM measures are combined under the OCS concept, the communication of actual ATM resource(s) causing the delay and associated reasons may become lost. This could result in confusion of the Facilitating ATFM Nodes and Airspace Users.

2.13 Another challenge involved Airspace Users (AUs), not knowing the actual source of ATFM delay, filing for route change with a CHG to avoid ground delay from the CTOT issued by AHU. However, as the CTOT issued by the AHU was due to traffic congestion at the destination airport of the ARU, the flight still needed to be managed. This could be attributed to the lack of clarity when AHUs disseminate CTOT without specifying the reason for the ATFM delay assigned. Depending on when the CHG was initiated by the AU, the ARU might not have sufficient lead time for CTOT dissemination to regulate affected flight into their traffic flow.

The Next Generation ATFM

2.14 In the past year, several issues had been surfaced during AMNAC meetings. Apart from the frequent occurrences of conflicting ATFM measures, there were issues associated with the perceived high cost required for ATFM implementation hindering the implementation progress, as well as issues associated with the DMN ATFM Network Concept being focused on local optimisation of air traffic flow rather than cross-border reconciliation/optimisation. The AMNAC Core Team acknowledged the gaps in current ATFM/DMN concept and recognised the need to rethink of the future ATFM concept aimed at optimising traffic at the regional level and to better integrate with the future implementation of Flight & Flow-Information for a Collaborative Environment (FF-ICE) and Trajectory-Based Operations (TBO).

2.15 Accordingly, a workshop participated by ATFM Subject Matter Experts (SMEs) from the ANSPs of Hong Kong China, Singapore, Thailand as well as CANSO was conducted in March 2025 to discuss how the current ATFM operations could be improved and to brainstorm ideas on what the next generation ATFM concept of operations for the region could look like. Outcome from the workshop is detailed in WP/16.

Workshop on FF-ICE

2.16 An FF-ICE workshop was conducted for the AMNAC members during AMNAC/22, where members were introduced to the concept of FF-ICE and key enablers such as SWIM, Collaborative Decision Making (CDM), Globally Unique Flight Identifier (GUFI) and Flight Information Exchange Model (FIXM) required for the implementation of FF-ICE. AMNAC members were apprised of how FF-ICE was intended to replace the current ICAO FPL2012 and were provided with an overview of the six FF-ICE/Release 1 (FF-ICE/R1) services, which focused on pre-departure negotiation of flight trajectory between ATM Service Providers (ASP) and Airspace Users (AU).

2.17 A comparison between present flight planning system using AFTN/AMHS with the future FF-ICE system using SWIM-based technologies was made to highlight that the latter would allow more information to be shared among stakeholders and would provide flexibility for eAU[3] and eASP[4] to dynamically negotiate and derive an agreed flight trajectory considering operational and business requirements.

2.18 Some members expressed concerns on the excessive coordination when eFPLs are filed by eAUs, particularly for flights passing through multiple eASPs; specifically, feedback from one eASP could conflict with another eASP, potentially leading to a cycle of continuous and unresolved conflicts. Discussion is still ongoing whether eAU would have to adjust the flight route or profile so that their eFPL would be acceptable to all eASPs prior to departure.

Technical Updates

2.19 Distributed ATFM operations relies heavily on effective information exchange. To enhance the effectiveness of AMNAC cross-border ATFM information exchange and communication, the AMNAC Core Team had established the Technical Subgroup (TSG) to drive the development of SWIM-based infrastructure which would enable “ATFM-on-SWIM” operations in the region. Some notable works included recommending the adoption of FIXM v4.3 as the standard format to support information exchange for cross-border ATFM operations in the Asia Pacific Region (refer to ATFM/SG/14 WP/12 and Conclusion APANPIRG/35/4). The AMNAC TSG had also developed a change process for the revision of the common FIXM version to support information exchange in Asia Pacific, as proposed in WP/24 for discussion.

2.20 The AMNAC TSG had identified mandatory data fields required for cross-border ATFM operations and had set up monthly virtual meetings to discuss on mapping these mandatory data fields with data attributes of FIXM v4.3 Core and the necessity for an extension to be developed to support ATFM information exchange. WP/07 discuss the proposal on the data mapping and adoption of FIXM v4.3 Extension in support of ATFM information exchange. Following the outcome on the adoption of FIXM v4.3 Extension, the TSG would plan for the various phases of trials to exchange ATFM information based on FIXM v4.3 via SWIM.

[3] eAU – An Airspace User that is capable of using mandatory FF-ICE services
[4] eASP – An ATM Service Provider that is capable of providing mandatory FF-ICE services

2.21 Notwithstanding SWIM-based information exchange development, the distribution of CTOT information using the Slot Allocation Message (SAM), Slot Revision Message (SRM) and Slot Cancellation Message (SLC) via AFTN/AMHS is currently preferred by most facilitating ATFM Units as it allows for integration with other ATM processes or system, enabling timely information dissemination and better compliance facilitation. These messages are based on *Asia/Pacific AFTN/AMHS-Based Interface Control Document for ATFM, v2.0* available on ICAO APAC e-Document webpage (under "CNS" / "AFS" section). When delivering SAM/SRM/SLC messages over AFTN/AMHS, one of the fields available for use is REGCAUSE, which contains codes representing the reason for the ATFM measure. Another field also available for use is REGUL, which contains the designation of the ATFM measure which can also be used to identify the constraint location. To enhance post-operations analysis in identifying hot spots and reasons for activation of ATFM measures, as well as to enable the automated data processing of SAM/SRM/SLC and SWIM-based information exchange models, the AMNAC Core Team agreed to adapt the full REGCAUSE codes from the EUCONTROL's ATFCM Users' Manual and harmonised the use of REGUL (name of ATFM measure). Further details on the proposed amendments to the *Asia/Pacific AFTN/AMHS-Based Interface Control Document for ATFM* reflecting this change are shared in WP/06.

2.22 Over the years, not only has AMNAC expanded its membership, but members had stepped up on their ATFM capabilities to progress to Level 3 ATFM Nodes. There was also consistent effort from AMNAC members to highlight operational issues and discussion potential solutions. AMNAC had also made good progress to improve information exchange while leveraging on technological advancement. AMNAC seeks to broaden its collaborative network for better traffic optimisation and welcomes other States/Administrations to join the collaboration.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper,

b) Note the good progress made by AMNAC and its invitation to other States/Administrations to participate in the collaboration, and

c) discuss any relevant matters as appropriate.

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Attachment A

ORIGINATOR	ICAO 4 LETTER CODE [E.G. VTBB]
DATE / TIME OF ISSUANCE	DD MMM YYYY / HHMM UTC [E.G. 14 OCT 2024 / 0800 UTC]
VERSION	1

CONSTRAINTS AND IMPACT				
LOCATION	**APPLICABLE PERIOD (UTC)**		**DESCRIPTION**	**CAPACITY IMPACT**
	START	**END**		
AD or FIR ICAO 4 LETTER CODE	DD MMM YYYY HHMM	DD MMM YYYY HHMM	[FREE TEXT]	[FREE TEXT]
VTBS	14 OCT 2024 2300	15 OCT 2024 1100	TFC CONGESTION	AAR = 32
VTBB SECTOR 1S	15 OCT 2024 0200	15 OCT 2024 1100	TFC CONGESTION	(Nil)

ATFM MEASURE			
LOCATION	**APPLICABLE PERIOD (UTC)**		**DESCRIPTION**
	START	**END**	
AD or FIR ICAO 4 LETTER CODE	DD MMM YYYY HHMM	DD MMM YYYY HHMM	[FREE TEXT]
VTBS	14 OCT 2024 2300	15 OCT 2024 1100	GDP FOR FLT DEST VTBS
VTBB SECTOR 1S	15 OCT 2024 0200	15 OCT 2024 1100	GDP FOR FLT INTO 1S DEST VTBD, VTBS, VTBU DURING CONGESTION (FLOW RATE: MINIT = 4)

OTHER INFORMATION
Bangkok ATFMU Contact Information E-Mail: atfmu@bobcat.aero Phone: +66 2287 8024 / +66 2287 8025 CTOT View Page: https://atfm.aerothai.aero

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