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

PROGRESS UPDATES 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 expansion of the network, network post-operation analysis, updates of the Common Operating Procedure, CDM enhancement, exploration of conflicting CTOT resolution, and updates of the technical infrastructure for SWIM-based information exchange.

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 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 will be 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 **Table 1**.

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

Table 1 *- Tiered Participation in AMNAC*

1.3 The AMNAC members have been meeting regularly over the years, albeit with a lapse during the COVID-19 pandemic. The first in-person meeting after the pandemic was the 19th AMNAC meeting (AMNAC/19) hosted by AEROTHAI in Bangkok, Thailand, and the key outcomes were reported at the ATFM/SG/13. Since the ATFM/SG/13, AMNAC had met twice:

– The 20th AMNAC Meeting (AMNAC/20) was hosted virtually by AEROTHAI (Thailand) on 21 – 24 November 2023.

– The 21st AMNAC Meeting (AMNAC/21) was hosted in Phnom Penh by CATS (Cambodia) on 12 – 15 March 2024.

1.4 Key outcomes from AMNAC/20 and AMNAC/21 are summarized in this working paper, continuing the tradition of reporting AMNAC project progress to the ATFM/SG over the years. Topics of discussion include expansion of the network, network post-operation analysis, updates of the Common Operating Procedure, CDM enhancement, exploration of conflicting CTOT resolution, and updates of the technical infrastructure for SWIM-based information exchange.

2. DISCUSSION

Expansion of the AMNAC Network

2.1 In the past year, there were two significant updates related to the expansion of the AMNAC network:

(1) ***Welcoming Republic of Korea as a Level-3 Member*** – The Republic of Korea (ROK), having participated in GDP trials initially through the East Asia ATM Coordination Group (EATMCG) and subsequently with a few AMNAC Core Members[1], declared their participation in the AMNAC network as a Level-3 member starting 1 January 2024. Not only has ROK been able to issue and distribute CTOTs in accordance with the established procedure, the State has also been providing valuable inputs into the conversation about resolving conflicting ATFM measures.

(2) ***Inclusion of India in the ADP Exchange*** – India informed the AMNAC group, during AMNAC/20, of their intention to participate in the ATFM Daily Plan (ADP) exchange as a way to chart the path toward the implementation of cross-border ATFM capability in India. Recognizing that India is located at a strategic position between Asia/Pacific and the Middle East and will eventually be the link for cross-border ATFM between the two

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

regions. India has been advised to share their operational points of contact with the AMNAC for this purpose.

2.2 In this regard, the core members of AMNAC (the AMNAC Core Team) wishes to acknowledge and appreciate the Republic of Korea's participation and India's interest in AMNAC.

Network Post-Operation Analysis

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

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

2.5 Based on the data up to December 2023, the AMNAC made the following key observations:

(1) 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.

(2) Following a quiet period during the COVID-19 pandemic, 2023 saw a return of air traffic demand and with it the necessity for ATFM measures. GDPs were initiated throughout the year to cope with traffic congestions, special events such as military exercises and airshows, unforeseen disruptions to ATM resources, and inclement weather.

(3) Overall, between 2019 and 2023, 72% and 52% of impacted flights departing from Level-3 ATFM nodes and Level-2 ATFM nodes were compliant with their assigned CTOTs respectively. Diving deeper into State-specific statistics shows varying levels of CTOT compliance performance across the region ranging from below 30% to almost 90%, signifying an area that can be improved.

2.6 During the discussions at the previous two AMNAC meetings (AMNAC/20 and AMNAC/21), several possible causes for CTOT non-compliance were identified and rectification discussed. These include:

(1) *Out-of-Date Points of Contact Information* – During the pandemic, changes were made to the workforce and organizations, and points of contact (POC) information for AMNAC members from several States/Administrations had become outdated. This could result in important ATFM-related information not being delivered to relevant operational units in a timely manner.

⇒ The AMNAC Core Team had sought to rectify this problem by updating the POC list, ensuring to include H24 operational contacts from all AMNAC members.

(2) *Late Delivery of CTOTs* – Under the AMNAC Common Operating Procedure (COP), and in line with the best practices elsewhere in the world, CTOTs should be delivered to stakeholders not less than 90 minutes prior to the flight's Estimated Off-Block Time (EOBT) stipulated in the flight plan ("EOBT – 0090"). However, there have been instances when CTOTs were delivered later than EOBT – 0090, due to reasons including short notice of ATFM requirements, ATFM system limitations, and late submission and/or distribution of flight plans.

⇒ Level-3 ATFM nodes have been encouraged to exempt flights receiving late CTOTs from compliance requirement and to reflect accordingly in the post-operations analysis. They have also been encouraged to track the CTOT delivery lead time performance to identify the issues.

⇒ Level-3 ATFM nodes have also been encouraged to anticipate disruptions and demand/capacity imbalance and to issue a notification of ATFM measure requirement as far in advance as possible, thus reducing the instances of "last minute" activation of an ATFM measure.

(3) *Late Flight Plan Submission/Distribution* – Under the AMNAC COP and in line with the Asia/Pacific Regional Framework for Collaborative ATFM, flight plans should be submitted not less than 3 hours prior to the EOBT to enable effective demand-capacity balancing. However, issues have been detected where flight plans were submitted or distributed with less lead time. The late submission or distribution of flight plans resulted in inaccurate traffic demand prediction and – in some cases – late calculation and distribution of CTOTs.

⇒ The issue was identified at the AMNAC meetings and members were encouraged to conduct in-depth analysis to identify problem areas. IATA could also be engaged to help coordinate with airlines with recurring late flight plan submission issues.

(4) Lack of Awareness or Local Procedure to Facilitate Compliance – The lack of awareness among operational staff and the absence of local procedures to ensure CTOTs are distributed to relevant operational units and to facilitate compliance are two of the main reasons for non-compliance issues.

⇒ The AMNAC Core Team would continue encouraging AMNAC members to report on their ATFM implementation progress and operational challenges at every AMNAC meeting, and would ensure post-operations analysis results are tracked, shared, and discussed routinely.

2.7 High CTOT compliance is the basis for effective implementation of GDPs. This relies on proper delivery of CTOT with appropriate lead times, which is generally contingent upon accurate traffic demand prediction, and efforts from stakeholders to facilitate compliance. In this regards, States/Administrations are invited to be reminded:

(1) That, in accordance with the Asia/Pacific Regional Framework for Collaborative ATFM (para. 7.20), flight plans should be submitted and distributed not less than 3 hours prior to the EOBT except where necessary for operational or technical reasons; and

(2) That, also in accordance with the Regional Framework (para. 7.32), local ATC procedures and – where available – CDM processes facilitating compliance with received CTOT are implemented.

Updates of the Common Operating Procedure

2.8 Within AMNAC, the *Common Operating Procedure (COP)* forms the basis for distributed ATFM operations in the network. This procedure document was developed to be used by AMNAC members to develop and align local ATFM procedures, to enable airspace users to operate smoothly from one ATFM Node to another.

2.9 The current version of the document is the **COP v5.4**, which has already been distributed to all AMNAC members. This version includes operational procedure updates discussed during AMNAC/20, including clarification of ADP publication procedure, CTOT dissemination procedure, and APAC bi-weekly ATFM web conference, in addition to formatting and editorial works. This version also includes the updated Points of Contact (POCs) of ANSPs and organizations relevant to AMNAC operations.

Collaborative Decision Making (CDM) Enhancement

APAC Bi-Weekly ATFM Web Conference

2.10 One of the most important basis for successful regional ATFM operations, especially in a distributed ATFM environment, is the culture and practice of CDM among network members. One such CDM practice in the region is the **APAC Bi-Weekly ATFM Web Conference** being held **every 2 weeks on Thursdays at 0800 UTC** hosted on a rotational basis by Hong Kong China, Singapore, and Thailand. The bi-weekly web conference has been a primary platform at which key regional updates such as, but not limited to, traffic demand situation, ATM capacity limitations, and planned ATFM measures are discussed.

2.11 Prior to December 2023, the information to be shared during the web conference were sent to Thailand for consolidation and shared on ICAO APAC COVID-19 information sharing webpage[1]. However, recognizing the inefficiency of manual consolidation and the inappropriateness of using an ICAO APAC webpage to host dynamically updated operational information, the AMNAC Core Team has decided to trial **a new status update submission procedure with Google-based online forms. Under the new procedure, States could submit their updates via https://bit.ly/apac-biweekly-form and could view the automatically consolidated report at https://bit.ly/apac-biweekly-report.**

2.12 The new procedure, having been in use since 7 December 2023, has proven to be effective in reducing the workload of consolidating the updates. However, several issues were also identified; the most significant of which was that some States were unable to provide their updates due to cybersecurity restrictions against Google-based public platforms and some representatives have resorted to using personal devices to get around their organizations' restrictions.

2.13 In view of the restrictions encountered with the procedure based on a Google form, the AMNAC group has agreed to **trial a new platform – Microsoft Teams (MS Teams) – which would serve as a central repository for ATM/ATFM Status Updates as well as a unified bi-weekly web conference platform for the network. The trial is expected to begin in May 2024, and the details will be discussed in a separate working paper.**

[1] https://www.icao.int/APAC/Meetings/Pages/APAC-ATM---ATFM-Status-Update.aspx

Common CDM Platform Exploration

2.14 Another CDM practice is the sharing of information via ATFM Daily Plans (ADPs). Currently, the exchange of ADPs among AMNAC members is done over emails in accordance with the procedure established in the COP and the APAC ADP Exchange Procedure (Working Draft). However, there are also other aspects of CDM enablers which are not yet implemented in the most effective way in the AMNAC network such as:

- A central repository of framework documents including the COP and POC list,
- A central repository of operational documents including the ADP,
- A means to readily notify and coordinate with stakeholders when activating an ATFM measure,
- A regional overview showing ATM and ATFM situations in the region, and
- A channel to conduct effective coordination and information sharing during contingency events.

2.15 To establish a more structured CDM process, the AMNAC Core Team had agreed to explore the development of a centralized/common CDM platform for timely information exchange and coordination leveraging – initially – platforms available in the market if one is suitable.

2.16 The CANSO Aviation Data Exchange for Cooperative Excellence (CADENCE) initiative, established through a collaboration between CANSO and CGH Technologies, Inc., offers an Operational Information System (OIS) as a potential solution. This system has been successfully used in the Latin America and Caribbean region and was demonstrated to the AMNAC Core Team in recent months.

2.17 The AMNAC Core Team acknowledged the potential of the CADENCE OIS. However, the group also recognized that the OIS, in its current state, may not perfectly align with the operational concept and context in the region. Therefore, the AMNAC Core Team has established a CADENCE OIS Study Group. This study group will collaborate with CANSO's CADENCE Task Force to explore its use and to develop operational procedures that would provide more options for AMNAC operations.

Exploration of Conflicting CTOT Resolution

2.18 One of the core challenges of the distributed ATFM network model employed in the APAC region is that of *conflicting ATFM measures*. This occurs when a single flight is subjected to more than one ATFM measures, e.g. CTOTs, due to multiple requirements put in place by ATFMUs along the route of the flight. As an example, a flight from Bangkok overflying Sanya FIR landing in Incheon may be subjected to different CTOTs from Sanya and Incheon ATFMUs.

2.19 The AMNAC Core Team has been battling with this issue, which has become more prevalent with the return of traffic in the region especially along the main Southeast Asia – Northeast Asia traffic flow. Thanks to the initial research efforts from Republic of Korea and China, the AMNAC Core Team had opportunities to conceptually discuss the methods of resolving the issue during AMNAC/20 and AMNAC/21. The group identified 3 strategies to address the issue:

(1) *Prevention* – The first strategy aims to *prevent* the occurrences of multiple ATFM measures by increasing capacity and enhancing coordination among different stakeholders.

(2) *Identifying Hotspots* – The second strategy involved *identifying* hotspots in the region, such as specific routes and waypoints, that are frequently subjected to multiple ATFM requirements or constraints. ANSPs/ATFM units involved in the hotspots could use the information to collaboratively improve the management of traffic in the area and reduce the need for multiple ATFM measures.

(3) *One CTOT Solution* – The third strategy proposes to *consolidate* all ATFM measures along the same flow into a single CTOT by the most upstream ATFMU, which would help to reduce the risk of a flight being subjected to multiple CTOTs but would require very effective CDM among ATFMUs involved in the traffic flow.

2.20 Based on the strategies above and recognizing that the Southeast Asia – Northeast Asia is one of the main traffic flows in the region often faced with multiple ATFM measures, **China, Hong Kong China, and the Republic of Korea agreed to conduct operational trials based on the *One CTOT Solution* concept and bring the results for further discussion by the AMNAC group.** This operational trial may potentially pave the way for effective resolution of conflicting ATFM measures in the region duly.

Technical Updates

2.21 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 to drive the development of SWIM-based infrastructure which would enable "ATFM-on-SWIM" operations in the region. The Technical Subgroup has been supporting the work of ICAO Asia/Pacific SWIM Task Force (SWIM TF) in this area, with the most notable recent accomplishment being the development of an extension to the Flight Information Exchange Model v4.2 (FIXM v4.2 Extension) that would support cross-border ATFM, A-CDM, ATFM/A-CDM integration as well as the future concept of traffic synchronization and FF-ICE/TBO.

2.22 **In late 2023, an ATFM information exchange trial via SWIM technical infrastructure over the region's Common aeRonautical VPN (CRV) was conducted** to illustrate how existing ATFM slot messages sent over AFTN could be done over SWIM converted into FIXM format. **The trial, while successful, highlighted some issues relating to the formalization of FIXM version to be used in the region. This topic will be further discussed in a separate working paper.**

2.23 In addition to supporting the current ATFM operations, the Technical Subgroup has also begun to explore the evolution of ATFM in an FF-ICE/TBO environment, considering the impending implementation of FF-ICE/R1 and drawing from experiences of AMNAC members that were involved with demonstration projects such as the *Multi-Regional TBO Demonstration*. This evolution toward FF-ICE will be explored further in future AMNAC meetings.

2.24 Additionally, the AMNAC Core Team has also been apprised of the development of Flow Information Exchange Model (FLXM), which could potentially be a candidate information exchange model to support the exchange of ATFM Daily Plans (ADP). However, data elements contained in the AMNAC ADP template will still need to be reviewed to enable effective mapping of the elements with FLXM data attributes, a task which will be duly undertaken by the AMNAC Core Team.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper,

b) recognize the expansion of the AMNAC network, with the Republic of Korea joining as a Level-3 member and India participating in the ADP exchange,

c) continue to ensure the submission and distribution of flight plans not less than 3 hours before EOBT in accordance with the Asia/Pacific Regional Framework for Collaborative ATFM,

d) continue to ensure that local procedures to facilitate compliance with CTOT are established and practiced in accordance with the Asia/Pacific Regional Framework for Collaborative ATFM,

e) discuss the issues and/or challenges with complying to flight planning and CTOT compliance requirements stipulated in (c) and (d),

f) note the current APAC Bi-Weekly ATFM Web Conference procedure based on Google Form and Google Sheet, and participate in the activity on Thursday every two weeks at 0800 UTC,

g) note that the APAC Bi-Weekly ATFM Web Conference will be transitioned to be based on MS Teams platform with details to be discussed in a separate working paper,

h) note the Study Group established by AMNAC Core Team to explore the possibility of adopting CADENCE OIS as a Common CDM Platform for the AMNAC operations.

i) note the planned operational trial of *One CTOT Solution* concept along the major Southeast Asia – Northeast Asia traffic flow by China, Hong Kong China, and the Republic of Korea, and share best practices and experience with the relevant States/Administrations on this matter,

j) note the technical development relating to SWIM-based infrastructure to support ATFM information exchange in the region and the issue with formalization of FIXM version which will be further discussed and addressed in a separate working paper, and

k) discuss any relevant matters as appropriate.

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