



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

**Agenda Item 3: Enhancing the global air navigation system
3.3: Air traffic flow management (ATFM)**

**IMPLEMENTATION OF CROSS-BORDER AIR TRAFFIC FLOW MANAGEMENT (ATFM) IN
THE ASIA PACIFIC REGION THROUGH COLLABORATION**

(Presented by China, Thailand and Singapore)

EXECUTIVE SUMMARY

This paper presents the progress made by air navigation service providers (ANSPs) from various States in the Asia Pacific Region in implementing cross-border air traffic flow management (ATFM) through the Distributed Multi-Nodal ATFM Network Project. This collaboration has been ongoing since 2015, and has thus far attracted eleven ANSPs and their relevant stakeholders. This paper charts the development of cross-border ATFM capabilities in the Asia and Pacific (APAC) Region and highlights the need for continuous ICAO facilitation and commitment from States to achieve ATFM data exchange harmonisation and inter-operability.

Action: The Conference is invited to:

- a) note the Distributed Multi-Nodal ATFM project group's efforts in cross-border ATFM development for the APAC Region;
- b) contribute to and support ICAO's efforts to harmonise ATFM data attributes through the work of the ATFM/Information Requirement (IR)/Small Working Group (SWG) and the implementation of SWIM for the APAC Region; and
- c) consider adopting a collaborative approach similar to that of the Distributed Multi-Nodal ATFM Project group to implement cross-border ATFM.

1. INTRODUCTION

1.1 air traffic flow management (ATFM) is one of the priorities in the ICAO *Global Air Navigation Plan* (GANP, Doc 9750) aimed at supporting the growth of air traffic, by optimising capacity and improving efficiency of the global civil aviation system. Various international and regional documents provide guidance for air navigation services provider (ANSPs) in their efforts to implement ATFM. The GANP documents the implementation pathway for ATFM and its eventual integration with other capabilities, including flight and flow information for a collaborative environment (FF-ICE) and

trajectory-based operations (TBO). Strategic regional implementation guidelines for the Asia and Pacific (APAC) Region, such as the ICAO APAC Seamless ATM Plan, have also been developed to fulfil ICAO aviation system block upgrade (ASBU) requirements.

1.2 Many States/administrations in the world have recognized the priority of ATFM and have begun to implement the processes within their jurisdictions. In Asia Pacific however, with the region comprising large number of small flight information regions (FIRs) and a rapid growth of short-haul regional flights, purely domestic ATFM programs alone are often not effective for management of traffic demand. Most of the times, Asia Pacific States/administrations find themselves needing to apply ATFM measures to flights coming from outside their jurisdictions. The need to manage both domestic and regional traffic demand prompted the need to establish a cross-border ATFM network in the region. The initiative had begun in 2011 as CANSO Bangkok – Singapore City Pair collaborative decision making (CDM) Pilot Project with a focus on information exchange and collaborative decision-making (CDM) and had since evolved into networked cross-border ATFM implementation effort for the Asia Pacific Region. This WP updates on the significant progress made in the past few years.

2. DISCUSSION

2.1 Distributed Multi-Nodal ATFM Network Project

2.1.1 In 2012, Aeronautical Radio of Thailand Ltd (AEROTHAI), Civil Aviation Authority of Singapore (CAAS) and Hong Kong Civil Aviation Department (HKCAD) collaborated in an initial concept exploration of networked airport collaborative decision making (A-CDM) to manage traffic flow between their major airport. This initial collaboration was intended to help assess the possibility of conducting effective cross-border traffic flow management in the absence of a centralized ATFM unit in the region. This laid the foundation to the expanded collaboration and development of a regional cross-border CDM-based ATFM concept of operations.

2.1.2 The Distributed Multi-Nodal ATFM (DMN-ATFM) network concept was developed by the initial three ANSPs and Civil Aviation Authority of China, Air Traffic Management Bureau (CAAC ATMB). It was subsequently adopted by ICAO as a potential means of ATFM in the APAC Region. Under this DMN-ATFM network concept, participating ANSPs manage their own respective local ATFM units, and collaboratively share ATFM-related information. At the core of the operation is CDM whereby inputs factors and limitations considerations from various stakeholders across the network are factored into the equation and balanced to ensure smoothest flow of traffic regionally. System-wide information management (SWIM), with its promise in enhanced information exchange, will become another core pillar for to enhance the operations when it becomes available. This improves the robustness of the DMN-ATFM concept.

2.1.3 To date, eleven ANSPs and more than thirty five airports have participated in the DMN-ATFM network project. The project adopts a tiered participation level for collaborative ATFM implementation. This caters to the readiness level of each ANSP and ensures a systematic progress of ATFM capabilities. The project also adopted a phased approach in implementation, where Phase 1 focused on developing the process flow for regulating flights into a constrained/congested airport and Phase 2 for regulation of flights into a constrained/congested volume of airspace. With the maturing of the 2 key phases, the project team hopes to work towards connectivity and interoperability with other ATFM operations/network outside the APAC Region; possibly through enhanced SWIM-based information exchange.

2.1.4 The DMN-ATFM network project operational trials began in 2015 to validate Phase 1 concept of operations. Prior to that, table-top exercises and a series of demonstration flights were conducted to familiarise stakeholders to the processes and procedures of DMN-ATFM, as well as their roles and responsibilities in the CDM process of cross-border ATFM operations. In 2016, AEROTHAI and CAAS led the trial of Ground Delay Programs (GDP) to regulate traffic into planned airports with constraints with publications of Calculated Take-Off Time (CTOT). These were typically implemented on periods of constraints at the airports such as during planned airspace closures and air defence exercises. Subsequently, as the group gained familiarity with the processes of cross-border ATFM operations, ANSPs implemented ATFM measures on an ad-hoc basis to manage inclement weather conditions that impacted runway capacity at the airport during monsoon seasons. The group gained better appreciation of the requirements of cross-border ATFM operations. Through frequent project meetings, sharing of post operations analysis, the operational concept and procedures were further refined throughout Phase 1 operational trials. Phase 1 of the DMN-ATFM network project was operationalised, as at 1 April 2017, progressing the region towards the full realisation of collaborative cross-border ATFM.

2.1.5 The group is currently working on implementing Phase 2 of the DMN-ATFM project. This phase focuses on establishing an even more dynamic operating environment of airspace flow procedures and restrictions. AEROTHAI, CAAC ATMB and CAAS identified the frequent flow restrictions imposed on airways A1/A202 and M771 as opportunities to derive the initial concept of operations with regards to airspace constraints. The target solution of converting MINIT/MIT to CTOT will increase predictability and provide operational benefits to airlines and ATS units. CAAC ATMB and HKCAD are both playing large roles in leading the effort as the major routes converge within their FIRs. While the initial work is centred on ATS route restriction, references could be drawn for further development of these into common operating procedures to regulate traffic into an airspace volume. The group aims to conduct a series of operational trials, similar to the approach taken in Phase 1, to validate the concept in Phase 2.

2.2 **Technical Subgroup of Multi-Nodal ATFM Network Project**

2.2.1 As the development of the DMN-ATFM project progresses, a dedicated technical subgroup (TSG) of DMN-ATFM project was formed. This group aims to address the technical challenges pertaining to multi-lateral information exchange in a distributed ATFM environment, in order to support a distributed mode of operation. It had been recognized earlier on that SWIM-based technology, with its scalable and efficient service-oriented architecture, would be the basis for distributed ATFM data communication. The TSG also has the important role to ensure that this exchange framework would be able to support the eventual SWIM implementation in line with GANP requirements.

2.2.2 The TSG collaborates closely with ICAO APAC SWIM Task Force, and contributes to the development of broad level operational scenarios. These scenarios aid technical experts in identifying the essential ATFM data attributes to be exchanged between ATFM systems. The same operational scenarios have also been shared with the ATFM subgroup of the ICAO ATM Operations Panel (ATMOPSP), to be considered for use at the global-level to align ATFM data exchange provision in further coordination with the ICAO ATM Requirements and Performance Panel (ATMRPP) and Information Management Panel (IMP). SWIM is relatively nascent in the APAC Region. While ICAO guidance would enhance the delivery of the SWIM capabilities, the participation and acceptance of States is required to ensure its success.

2.2.3 The TSG of DMN-ATFM also contributes to the ATFM/Information Requirement/Small Working Group (ATFM/IR/SWG) of ICAO Asia/Pacific ATFM/Steering Group. The SWG was established to address the need to ensure harmonized information exchange development and requirement within the APAC Region. With the development of sub-regional effort to implement ATFM, such as the

North-Asia ATFM Harmonization Group (NARAHG), the convening of the SWG is most timely, as there is an increasing need to achieve interoperability and harmonisation in the exchange of data attributes between different ATFM operational groups in the APAC Region. The TSG will collaborate with other ATFM groups to support the efforts of the ATFM/IR/SWG.

3. CONCLUSION

3.1 The DMN-ATFM project aims for all participating States to attain a Level 3 ATFM Node status. In doing so, the objectives of establishing cross-border collaborative ATFM would be met, ultimately contributing to the realisation of the GANP. The DMN-ATFM network concept has been proven viable and successful in regulating air traffic flow into a constrained/congested ATM resource. This has reduced airborne holdings and accumulated both tangible (e.g. fuel savings) and intangible benefits – such as increased safety through reduced ATC workload, airlines’ and stakeholders’ efficiency in flight schedule management through increased predictability. The project now aims at expanding the concept further with airspace work, while also supporting other members in the region to improve their ATFM capabilities and join the network at the highest level.

3.2 The DMN-ATFM project will focus on fine-tuning and increasing the efficiency of ATFM measures and concurrently work on the next phase of the project. With a distributed mode of operations, harmonisation of procedures and processes is crucial in ensuring interoperability between different regions and groups. Continued support from participating ANSPs is also essential for the implementation of cross-border ATFM operations.

3.3 The Conference is invited to agree to the actions in the executive summary.

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