International Civil Aviation Organization

The Fifth Meeting of the South Asia/Indian Ocean ATM Coordination Group (SAIOACG/5)

Bangkok, Thailand, 03-06 March 2015

Agenda Item 7: ANSP Coordination and Civil/Military Coordination

AIR TRAFFIC FLOW MANAGEMENT OPERATIONAL TRIAL BASED ON DISTRIBUTED MULTI-NODAL CDM/ATFM CONCEPT

(Presented by Australia, China, Hong Kong China, Indonesia, Malaysia, Singapore, Thailand, Viet Nam, IATA, CANSO, and IFATCA)

SUMMARY

This paper provides background information and progress of the collaborative effort for the ATFM Operational Trial between Australia, China, Hong Kong China, Indonesia, Malaysia, Singapore, Thailand and Viet Nam. The ATFM Operational Trial, based on Distributed Multi-Nodal ATFM/CDM Network concept, aims to enhance operational efficiency, to optimize capacity and to pave the way for a regional harmonized Cross-Border ATFM solution for Asia-Pacific.

This initiative is a collaborative effort to balance the ever-growing air traffic demand to the available capacity in this region.

1. INTRODUCTION

1.1 States, ANSPs, aircraft operators and airport operators have acknowledged the robust growth in air traffic demand experienced globally in the recent years. The traffic growth in the Asia Pacific Region has shown a sustained annual growth between 5-6% and the capacity to match the growing demand is fast approaching the limit. Air Traffic Flow Management (ATFM) has been identified as an effective means to achieve efficient demand-capacity balancing while continuous capacity enhancement initiatives are ongoing to address broad ATM solutions. However, ATFM concepts that are established and practiced globally essentially address the needs of domestic traffic flow or traffic flow managed by a single administration, which is not the case for Asia-Pacific region. Therefore, an ATFM solution for cross-border application that would be suitable for the region comprising multiple FIRs and administration is needed. Several ANSPs and industry stakeholders have therefore embarked on a journey to seek and validate a viable solution for the region.

1.2 Following recognition of the needs for a solution, the **Distributed Multi-Nodal ATFM/CDM Network** concept was conceived through a collaborative research project by Singapore and Airbus ProSky, with ANSPs from Hong Kong China, Malaysia and Thailand among others providing operational inputs to help shape the concept. The concept was presented to the ICAO Air Traffic Flow Management Steering Group Meeting (ATFM/SG/3) in March 2014 as well as the CANSO Asia/Pacific Conference in May 2014. The concept was well accepted and has been endorsed as a viable solution for the region through formulated Decision of the ATFM/SG/3.

ATFM/SG Decision 3/1: Distributed Multi-Nodal Networked ATFM Concept
That, the distributed multi-nodal networked ATFM concept be considered as a viable foundation to be incorporated into the regional ATFM framework for the development and implementation of ATFM for the Asia/Pacific Region, taking into account the guidance of ICAO Doc 9971.

1.3 Further, at ATFM/SG/4, IATA presented the outcomes of a study into regional flow management and resulting recommendations which led to the following decision being adopted:

ATFM/SG Decision 4/1: Asia Pacific Regional ATFM Concept of Operations and timeline:
That, the Asia Pacific Air Traffic Flow Management Steering Group:

- *Adopts the Multi-Nodal ATFM Concept of Operations as the foundation for the Regional Concept of Operations/Implementation Strategy for regional cross-border ATFM implementation; and,*
- *Confirms 8 November 2018 as the target date for regional cross-border ATFM implementation, for inclusion in the performance objectives of the Regional Framework for Collaborative ATFM, in alignment with ASBU and the APAC Seamless ATM Plan);*

1.4 The collaborative efforts have since progressed towards an ATFM Operational Trial among participating States using the Multi-Nodal concept, and have received robust support from several ANSPs, ICAO as well as IATA, ACI, CANSO, EU/AATIP and IFATCA.

2. DISCUSSION

2.1 The Distributed Multi-Nodal ATFM Operational Trial Project has progressed over the year through three Project Meetings and two Airlines Focus Group Meetings. This paper provides foundation of the concept as well as summarizes key points from said meetings with the focus on the latest 3rd Distributed Multi-Nodal ATFM Operational Trial Project Meeting (Multi-Nodal/3).

Members and Commitments

2.2 AEROTHAI, AirNav Indonesia, Airservices Australia, CAAC ATMB (China), Civil Aviation Authority of Singapore (CAAS), Department of Civil Aviation Malaysia, Hong Kong Civil Aviation Department (HKCAD), Viet Nam ATM (VATM), Airport Authority Hong Kong (AAHK), Airports of Thailand (AOT), Changi Airport Group (CAG), IATA, AirAsia, Bangkok Airways, Cathay Pacific, Malaysia Airlines, Nok Air, Singapore Airlines, Thai Airways, Thai Smile, Thai Lion Air and Tiger Airways have indicated strong support and commitment to collaborate and actively participate in the ATFM Operational Trial.

ATFM Operational Trial Approach

2.3 The collaborative ATFM Operational Trial initiative started its preparatory efforts since the kick off meeting in June 2014. The ATFM Operational trial is planned to commence in June 2015. Participating members will review their level of preparedness at a Go/No-Go decision point in May 2015 prior to the commencement of the ATFM Operational Trial.

2.4 The Distributed Multi-Nodal ATFM Network concept forms the foundation for the ATFM Operational Trial. However, in order to trial the complete scale of elements within the Distributed Multi-Nodal ATFM Network concept, a greater level of preparation and capability development would be required by all stakeholders. Thus, the ATFM Operational Trial would adopt only selected elements of the Multi-Nodal concept for timely commencement of the trial. This

approach enables continuous development as well as expansion of participation as the trial progresses into subsequent phases.

2.5 The ATFM Operational Trial would initially focus on addressing Demand-Capacity Balancing for aircraft arriving at select airports of participating ANSPs. This would be achieved by applying ATFM Measure such as Ground Delay Program (GDP) to regulate arriving flights through the provision of Calculated Take-Off Time (CTOT) information computed based on expected arrival time at the destination airport. Subsequently the trial would focus on addressing Demand-Capacity Balancing within sectors and airspace managed by participating ANSPs.

2.6 It is acknowledged that upon successful ATFM implementation, ATFM measures would only be required for achieving effective demand-capacity balancing on as needed basis. However, for the purpose of the ATFM Operational Trial, ATFM measures will be applied in a structured fashion to allow for comprehensive exploration and study of their effectiveness. Through such comprehensive trial and study, best practices could be formulated to facilitate quality ATM and ATFM service provision.

Multi-Nodal/1 and Multi-Nodal/2 Project Meetings

2.7 The first ATFM Operational Trial Project Meeting (Multi-Nodal/1) was held as a Kick-Off Meeting on 2 – 3 June 2014 in Singapore. The meeting provided a structured plan and milestone to address capability development akin to ATFM Capability Elements in the Draft Regional ATFM Framework document prepared by the ATFM Steering Group. These capabilities include Demand Prediction and Demand-Capacity Management, ATFM System Requirements, and common business rules for stakeholders and ATFM personnel management.

2.8 To progressively trial the concept, the meeting also agreed that the ATFM Operational Trial based on the Distributed Multi-Nodal ATFM Network Concept would commence in June 2015 in a two-part phased approach with a mid-trial review in between. This approach allows for timely commencement and room for further expansion of participation as mentioned in para 2.4.

2.9 Phase 1 of the ATFM Operational Trial would focus on addressing Demand-Capacity imbalance at airports by imposing ATFM Measures such as GDP through the provision of CTOT information back-engineered from Calculated Time Over (CTO) entry waypoint into destination airport's standard arrival procedure (STAR). This approach should assist regulation of arriving flights in the event that temporary adverse situations such as weather and runway/taxiway availability resulted in capacity reduction below demand. Phase 2 would address the Demand-Capacity Balancing for sectors and airspace managed by participating ANSPs in addition to elements from Phase 1. Members agreed to review their level of preparedness at a Go/No-Go decision point in May 2015 prior to the trial commencement.

2.10 Dedicated Point of Contacts (POCs) from each stakeholder formed the working group that would continue to work off-line and concentrate on the details of ATFM Operational Trial preparation in between meetings. The work from the POCs would continue to be reviewed at Project Meetings to provide refinement in capability building.

2.11 The second ATFM Operational Trial Project Meeting (Multi-Nodal/2) was held on 28 – 29 August 2014 in Bangkok, Thailand and saw a continued support and participation from States and their ANSPs as well as ICAO and industry partners such as IATA, CANSO and IFATCA. The meeting allowed members to discuss off-line work from the POCs as well as key elements including flight data source for demand prediction, CTOT management and applicability, and participation level for the ATFM Operational Trial.

2.12 The approach of imposing ATFM measures only as required was recommended for ATFM implementation. However, the meeting agreed that for the ATFM Operational Trial purpose, ATFM measures would be implemented in a structured fashion to ensure that a comprehensive trial covering the full spectrum of ATFM is conducted and studied. Post-Operational Analysis will then help to formulate best practices for quality ATFM service during implementation.

2.13 The necessity for a high level of participation by Airspace Users to provide for equitable delay absorption was re-emphasized. Thus, the ATFM Operational Trial initiative would consider applying ATFM measures to all flights operating into a participating airport. Exemption to this will be accorded to special flights such as Humanitarian, Emergency, Medical Evacuation and Head-of-State as per ICAO Manual on Collaborative ATFM (Doc 9971).

2.14 Timely distribution of CTOT to relevant stakeholders is necessary to allow for effective use of the information. For the purpose of the ATFM Operational Trial and alignment with international practice, it was agreed that CTOT would be distributed no less than 2 hours before Estimated Off-Block Time (EOBT). Along the same token, the timely and efficient handling of flight plans (FPL) and Air Traffic Service (ATS) messages is critical to accuracy of demand predictability. Therefore, it was agreed that Airspace Users would file FPLs no less than 3 hours prior to EOBT and any changes and delays beyond 15 minutes from EOBT would have to be notified via ATS messages. This information was given to Airspace Users at the Airlines Focus Group Meeting held on 16 – 17 October 2014 in Bangkok.

2.15 The meeting agreed on a Participation Level approach to the ATFM Operational Trial for all stakeholder groups: ANSPs, Airport Operators and Airspace Users. This enables wider participation from stakeholders from the onset of the initiative even with varying levels of readiness, with the view that all stakeholders would aspire to eventually be ready to participate with highest level of capabilities. Participation Level model for ANSPs is enclosed in **Annex A** and for aircraft operators is enclosed in **Annex B**. Further details and model for Airport Operators will be subsequently developed, taking into account Airport Collaborative Decision Making (A-CDM) framework and process.

Multi-Nodal/3 Project Meeting

2.16 Following the first two Project Meetings and an Airlines Focus Group Meeting, the third ATFM Operational Trial Project Meeting (Multi-Nodal / 3) was held in conjunction with the Airlines Focus Group Meeting on 28 – 29 January 2015 in Yogyakarta, Indonesia with strong presence from many new States in addition to the already participating States. A one-day seminar on Collaborative ATFM/CDM Implementation was conducted prior to the meeting. This allowed the opportunity to provide necessary foundations for all new members. Following the seminar, discussion took place on the details for trial commencement. Several key topics were discussed including the ATFM workflow, ATFM Operational Trial arrangement and stakeholder communications.

2.17 The meeting discussed the ATFM Workflow for the ATFM Operational Trial. It was agreed that the process should be, for the initial phase, be simple to understand and implement. To ensure conformance to industry standards, CTOT distribution to relevant stakeholders will take place no less than 2 hours before EOBT. This is in line with the discussion during Multi-Nodal / 2. It was also agreed that the communication of CTOT and/or other ATFM-related information will follow standard industry practice. This includes the use of ATFM messages selectively adapted from EUROCONTROL's template (ADEXP Standard supplemented by EUROCONTROL ATFM User Manual) for cross-border suitability. Further details surrounding workflow and operational information dissemination would continue to be developed.

2.18 To further develop the structure of the ATFM Operational Trial and also to facilitate comprehensive trial for most informative result, the meeting acknowledged the need to develop operational scenarios that would provide a guideline of how the real capacity-impacting situations may look like and how ATFM measures could be efficiently handled. In creating appropriate scenarios for the ATFM Operational Trial, each participating ANSP would assess traffic characteristics at their participating major airports and potential coverage of flights given different time horizons in which ATFM measures are effective; building the specific time horizons into ATFM Operational Trial Scenario including (1) Demand-Capacity balance impact situation, (2) Impacting time and (3) Impact estimation and ATFM measure required. A sample preliminary ATFM Operational Trial Scenario is included in **Annex C**.

2.19 The meeting had further discussion on the two-part phased approach (2.8) to the ATFM Operational Trial, focusing on the first phase. To ensure a structured implementation of the trial, the first phase will consist of three (3) stages as follow:

a) Stage 1: Testing of telecommunication linkage, monitoring of traffic demand prediction effectiveness, testing of CDM process between stakeholders, and an exercise to simulate CTOT workflow.

b) Stage 2: Implementation of CTOT in real operations, albeit under predefined / preselected time periods and scenario as well as real capacity-impacting situations.

c) Stage 3: Introduction of slot swapping mechanism.

2.20 To support the trial, Airservices Australia agreed to develop Business Rules for the ATFM Ops Trial, while maintaining the assumption that ATFM Users Manuals would be developed for each participating ANSPs based on the common Business Rule.

2.21 Further detail of this plan will continue to be developed, ensuring smooth commencement of the ATFM Operational Trial.

2.22 The importance of having a clear picture of participation capabilities among member stakeholders was also reiterated, and the Participation Level model (2.15) was revisited. The meeting tasked each participating ANSP to assess capabilities and select their appropriate Participation Level for the commencement of the ATFM Operational Trial, with a view that this selection can be changed as their capabilities are developed progressively in the future. It should also be noted that, within a single ANSP, there could be varying levels of participation at different aerodrome control units based on readiness and necessity.

2.23 The meeting recognized the importance of awareness on the part of all stakeholders for this initiative. For stakeholder communications, the meeting agreed to use AIP Supplement and/or AIC for general information with weekly NOTAMs to specify time period during which ATFM measures will be applied. To further mutual understandings among all stakeholders involved, an "awareness package" may also be developed prior to the trial commencement.

ATFM Operational Trial Effort Continuation

2.24 The ATFM Operational Trial preparations are progressing with series of monthly meetings between members and teleconferences between core POCs. This will allow the group to continually refine the process and prepare capabilities to ensure smooth commencement of the trial. Progress of the work will continue to be shared at all relevant forums to provide updates to the larger aviation community in the region.

2.25 The ATFM Operational Trial aims to set the stage for cross-border ATFM/CDM processes, procedures and harmonized business rules for the region, with guidance from ICAO Doc 9971 and the leadership of ICAO ATFM Steering Group. The concept adopted for this initiative may pave the way as a common solution for region-wide adoption in Asia-Pacific, as an effort to balance the ever-growing traffic demand to the available capacity in the region, safely and efficiently.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information contained in this paper;

b) Encourage States to continue working towards ATFM convergence and harmonization, taking example from this initiative; and

c) Discuss any relevant matters as appropriate

…….

Annex A

Tiered Participation Level for ANSPs

Note: Outside ATFM Ops Trial ANSPs may already have been asked to support ATFM Operations through Minimum Departure Intervals between flights or providing longitudinal separation between flights such as Miles-in-Trial or Minutes-in-Trail

Level 1 – Observe Trial (includes Level 0)

- Participate in CDM/ATFM Meetings
- Participate in Operational Trial Planning process

Level 2 – Facilitate CTOT for Departures (includes Level 0 and 1)

- Receive CTOT for departure to other Demand-Capacity imbalance airports
- Facilitate airline operator CTOT compliance for departing flights

Level 3 – Demand-Capacity Balancing Capability (includes Level 0,1 and 2)

- Evaluate Traffic Demand
- Evaluate and update Airport Acceptance Rate (AAR)
- Distribute CTOT to airline operators and ANSPs

Annex B

Tiered Participation Level for Aircraft Operators

Level 1 – Participate in the Observe Trial

- Receive CTOT for departure to other Demand-Capacity imbalance airports
- Manage flight operations and coordinate with ATCs and Airport Operators to achieve CTOT compliance for departures
- Participate in the ATFM / CDM Operational Trial Project and Focus Group meetings
- Participate in the Operational Trial planning process

Level 2 – Slot Swapping and CTOT User Inputs (includes Level 1)

- Optimize flight operations through slot swapping and CDM process
- Provide CTOT User to ATFM portal (advanced Operational Trial – later phase)
- Evaluate and update on outcomes of ATFM measures
- Refine CDM process for optimized flight operations

Annex C

Draft ATFM Operational Trial Scenario

1) Demand-Capacity Balance Impact Situation

Typhoon is passing at 150 NM south of Hong Kong from East to West, strong crosswind affecting Hong Kong International Airport (VHHH)

2) Impacting Time

a. Impacting Time: 1100-1500UTC

b. Applicable Event Forecast: 0300UTC

3) Impact Estimation and ATFM Measure Required

a. AAR reduced from 29 movements/hour to 24 movements/hour during the event

b. Ground Delay Program using CTOT required for arriving flights due to excessive demand anticipated from Flight Plan received