International Civil Aviation Organization

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

PROGRESS UPDATES FROM ASIA-PACIFIC CROSS-BORDER MULTI-NODAL ATFM COLLABORATION

(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. Formerly known as the Distributed Multi-Nodal ATFM Network Project, the project is a collaborative effort to implement cross-border ATFM in the Asia-Pacific region. This paper discusses recent updates from the project in the past year, including key observations from network-wide post-operations analysis effort and several new developments. Included as part of the new development is a re-branding of the project to **Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC)**.

1. INTRODUCTION

1.1 The Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (formerly Distributed Multi-Nodal ATFM Network Project) has been ongoing since 2015, laying down the foundation for cross-border ATFM in the region under the concept of Distributed Multi-Nodal ATFM Network. The concept, accepted into the Asia/Pacific Regional Framework for Collaborative ATFM as a viable solution for the region, is based on a network of *ATFM Nodes* responsible for demand-capacity balancing within their domain (e.g. country or FIR boundary) 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 In this project, the main focus has been on building infrastructure – information exchange network and common operating procedure – for member States/Administrations to be able to use **Ground Delay Program (GDP)** to balance traffic demand and resource capacity under distributed ATFM environment. To enable participation by member States/Administrations of varying readiness levels, the project has adopted tiered level participation model for the work 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, Singapore, Thailand*
Level 2	▪ Able to comply with CTOTs from all Level-3 ATFM Nodes *Current members:* ▪ *Indonesia, Malaysia, Myanmar, the Philippines, Viet Nam*

Tiered Level	Capabilities
Level 1	▪ Observe and participate in the project progress *Current members:* ▪ *Lao PDR*

Table 1: Multi-Nodal Tiered Level of Participation and Members

1.3 Core member States/Administrations (project core team) has been reporting project progress at various forums over the years, including the regular meeting of Air Traffic Flow Management Steering Group (ATFM/SG). This working paper continues the tradition of reporting the project progress, focusing on recent operational and strategic developments in the past year as well as open challenges to be addressed.

2. DISCUSSION

Progress Updates

Operational Implementation Progress: ATFM as Routine Operations

2.1 Initially set out to address demand-capacity imbalances in 2 main phases – addressing airport constraints and addressing airspace constraints respectively, the project has made significant progress over the years. With a Common Operating Procedure developed, validated, and adopted, cross-border ATFM process introduced by the project has now become a part of routine ATM operations by the project core team with wide support from other project members in the region. From activating GDPs only during planned airport outages in the early years, core ANSPs have now activated GDPs for emergency disruptions, weather-induced constraints, and general traffic congestions both at the arrival airports and in the airspace.

2.2 The widespread application of GDPs in the region is a sign that the initiative has achieved significant progress, and that the region is now able to use distributed cross-border ATFM process as one tool to address the ever-increasing traffic demand.

2.3 The road ahead for the project will be to continually improve the process, implement better information exchange infrastructure, and widen the support and engagement with other members to progressively improve ATFM capabilities of States/Administrations in the region.

Key Observations from 2019 Network Post-Operations Analysis

2.4 With the ATFM process becoming more widely adopted and more frequently used in the region, the project core team recognized the importance of having a network-view of the impact and performance of GDPs activated. Starting in 2019, the project core team developed a network post-operations analysis portal to track the impact of and compliance to GDPs activated over time. The aim of the portal is not to "name and shame" members who did not achieve the desired level of performance, but more importantly to quantitatively identify problem areas to be addressed.

2.5 The network post-operations analysis portal is web-based and will be updated based on data submitted by Level-3 ANSPs every 3 months. The portal is maintained by Thailand and can be accessed at **http://bit.ly/mn-network-poa**.

2.6 Based on the analysis in 2019, several key observations can be made:

(1) Majority of the GDPs were activated in response to traffic congestions in the airspace of Bangkok and Sanya FIRs, primarily initiated by Thailand (Bangkok ATFMU) and China (Sanya ATFMU). Those GDPs impacted *more flights* but with *less overall*

ATFM delays, as proportionally compared to GDPs activated in response to airport disruptions.

(2) Overall CTOT compliance rates by flights departing from Level-3 and Level-2 ATFM nodes were 73% and 70% respectively; continually increased levels of compliance are encouraged. There is room for improvement, as compliance from some ATFM nodes continues to be low. This is an ongoing issue that the project core team still has to address through widened engagement with members and support from CANSO and IATA.

(3) With more States/Administrations upgrading their ATFM capabilities over the years, the majority of flights included in the GDPs are departing from Level-3 and Level-2 ATFM nodes. This is a promising sign of ATFM development in the region and shows that States/Administrations are striving to comply with performance expectations set out in the Asia/Pacific Regional Framework and the ASEAN ATM Master Plan.

2.7 Separate from the network post-operations analysis, Thailand – with a large number of domestic traffic being captured under *airspace GDPs* – conducted their own post-operations analysis. One facet of the analysis is the comparison of *estimated airborne delays* between CTOT-compliant flights and non-compliant flights. Based on 2019 data with more than 50,000 flights, CTOT-compliant flights did see *on average less airborne delays* than non-compliant ones. The difference was most pronounced between compliant flights and those that departed more than 20 minutes before their CTOTs (large-early non-compliant), with the large-early ones seeing *significantly more airborne delay on average*. This result *may* speak to the effectiveness of GDPs and its benefit in terms of reducing airborne delays for CTOT-compliant flights.

Technical Development

2.8 As previously reported, the technical subgroup of the project is established to address cross-border ATFM data communication challenges. The recognition came early that the most viable and effective solution to achieve high-efficiency ATFM data communication in a distributed environment is through System-Wide Information Management (SWIM) technology. Consequently, one of the technical subgroup's core tasks is to chart the path toward *ATFM-on-SWIM* for the region. This is to be done by developing or identifying, inter alia, information exchange models, SWIM technical specifications and technical infrastructure required to support ATFM service; and the subgroup has been making significant progress in the past year.

2.9 Recognizing that ATFM-on-SWIM is a vision that requires a long-term development towards realization, the subgroup had also been tasked to find ways to leverage existing solutions to enable (semi-) automatic processing of ATFM messages – especially CTOT assignment – for the time being. The solution agreed upon was the use of AFTN/AMHS to exchange a set of common-format ATFM messages. The technical subgroup consequently started to develop the *Technical Interface Control Document* (ICD) to guide ANSPs' ATFM system procurement/development. The subgroup also steered the testing of message exchange among core ANSPs, enabling a widening use of AFTN/AMHS-based ATFM messages in the region.

2.10 Detailed discussions on the technical subgroup's progress in the development on ATFM system-to-system information exchange is provided in a separate working paper.

Common Operating Procedure Revision

2.11 To ensure relevance and feasibility of the operational procedure, the project core team has continually reviewed and revised the *Common Operating Procedure* (COP). The COP provides a common framework for high-level ATFM process flow to be used in the network. In the most recent

round of procedure review, an important change was made in **Section 4 (para. 4.28)** of the document to resolve the ambiguity relating to CTOT revision. The intention is to ensure that the revised CTOT issued by the Initiating ATFMU is not too early as to render stakeholders unable to react to it. **Figure 1** captures the revised section from the COP.

4.28 A revision of CTOT should also take into consideration the operational restrictions airspace users and airport operators are subjected to. To mitigate disruptions from insufficient reaction time for the processing of revised CTOT, stakeholders should lodge CTOT revision request as soon as practicable. In issuing a revised CTOT, Initiating ATFMU should ensure that the revised CTOT is not too early as to render stakeholders unable to react to it. **Table 9** specifies conditions for the revised CTOT.

Changes Initiated by	Earliest Revised CTOT Allowable	
	Revised CTOT is **EARLIER**	Revised CTOT is ***LATER***
Airspace User	Current time + [max STT* + Buffer] **New CTOT > Current time + 30 minutes**	N/A
Initiating ATFMU	Current time + [reaction time] **New CTOT > Current time + 45 minutes**	

Table 9 - Lead Time Requirement for CTOT Revision Processing

**Max STT refers to maximum standard taxi-out time used in CTOT calculation among the airports in the network: for current operations, the maximum STT is 20 minutes*

Figure 1: Revised Procedure on CTOT Revision from COP

2.12 The revised COP, marked as v4.0, is included as **Attachment 1** to this paper. The revised COP will come into effect from 1 May 2020 onward.

New Developments

Interoperability with other ATFM groups

2.13 The project core team has been participating in the discussions to harmonize and interoperate with the Northeast Asia Region ATFM Harmonization Group (NARAHG) through ICAO ATFM Information Requirement Small Working Group (ATFM-IR/SWG). A separate working paper submitted by the project core team sets out to discuss the efficacy of this SWG.

2.14 Notwithstanding the outcomes from ATFM-IR/SWG, the project core team has been exchanging ATFM Daily Plans (ADPs) with Japan and Republic of Korea (ROK) on a regular basis to a satisfactory outcome. Information from the ADPs can be forwarded to local stakeholders with relevant flights to/from Japan and ROK for appropriate planning. No ATFM measure, apart from the occasional Miles-/Minutes-in-Trail, has been used with this traffic flow.

ATFM and COVID-19 Pandemic

2.15 During the most recent (virtual) meeting of the project core team, IATA and CANSO had invited the group to discuss ATFM's and the group's role during and following COVID-19 pandemic, specifically in preparing for possible capacity reductions due to infection-related understaffing and incidents and for the eventual recovery of traffic demand post-outbreak.

2.16 Noting the project's arrangement for close coordination at a regional level, the project core team agreed that the existing bi-weekly planning web-conferences could serve as a platform for updates on ATM-related impact due to the COVID-19 situation. The updates will be focused on possible ATFM support that may be required in the coming weeks. Insofar as possible, a short summary following the discussion will be distributed to ensure all members are aware of the possible support that may be required.

Re-Naming of the Project

2.17 Noting the project's achievements in moving cross-border ATFM operations in the region from paper concept through operational trials toward effective operational implementation, and recognizing the scale of dedication and collaboration among member States/Administrations, the project core team has proposed to rename the project from the existing name of *Distributed Multi-Nodal ATFM Operational Trial/Project*. The renaming also serves to better delineate between the group's implementation work and the regionally agreed concept of *Distributed Multi-Nodal ATFM Network*.

2.18 The proposed new name of the project is **Asia-Pacific (APAC) Cross-Border Multi-Nodal ATFM Collaboration (AMNAC)**. **Table 2** describes the nomenclatures chosen and their significance.

Nomenclatures	**Significance**
Asia-Pacific (APAC)	Identifying with the region this group is operating in
Cross-Border	Signifying the area of ATFM operation this group is focusing on
Multi-Nodal ATFM	Signifying the mode of ATFM operation that has been adopted, in line with the concept published in the APAC Regional Framework
Collaboration	Stressing the necessity and importance of active participation and cooperation by member States/Administrations to enhance and refine cross-border ATFM operations in the region

Table 2: Nomenclatures and Significance of AMNAC

2.19 Despite the new name, the governing philosophy and core vision of the project remains the same; that of successfully and collaboratively implementing effective cross-border ATFM operations for Asia-Pacific. The project will continue on its long road ahead and will continually improve the operations to ensure an ATFM process that works best for all members in the region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) note the revised Common Operating Procedure (COP) on the requirement for revised CTOTs;

c) discuss the role of ATFM and regional collaboration during and after COVID-19 pandemic;

d) note the proposal for the new project's branding of **Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC)**;

e) encourage States/Administrations to continue supporting and actively participating in the project; and

f) discuss any relevant matters as appropriate.

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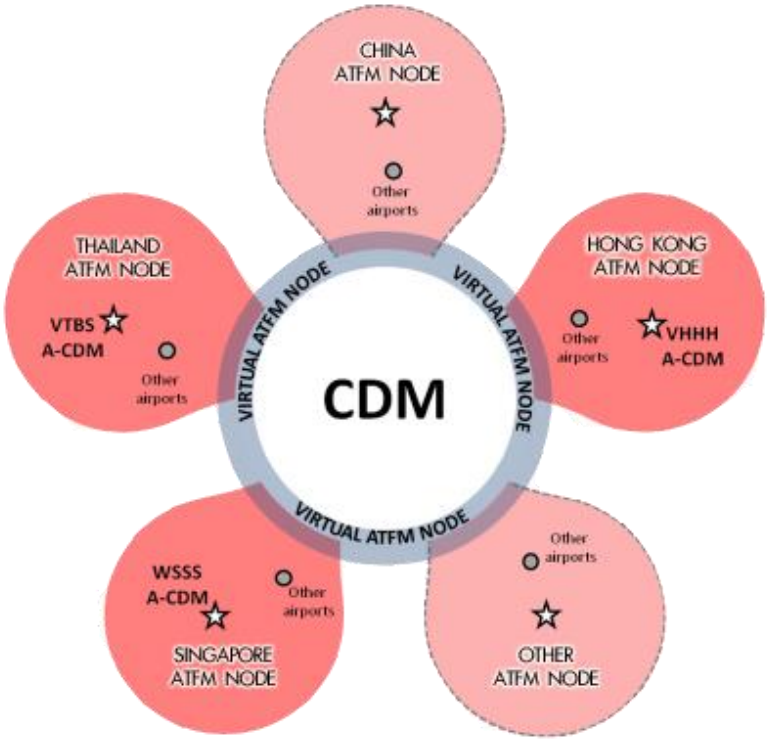
v4.0
Effective: 1 May 2020



DISTRIBUTED MULTI-NODAL ATFM NETWORK COMMON OPERATING PROCEDURE

This document provides an essential framework, details of procedure, rules and requirements applicable for cross-border Air Traffic Flow Management (ATFM) operations under the Distributed Multi-Nodal ATFM Network Project

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Document Change Record

The following table records the complete history of the successive editions of the document.

Version Number	Effective Date	Reason for Change	Pages Affected
1.0	12 Jul 2016	Original release version	All
2.0	14 Oct 2016	Amendments arising from MN/11	All
3.0	1 May 2019	Amendments arising from recent developments and implementation activities, along with major formatting revision	All
4.0	1 May 2020	Revise criteria for issuing revised CTOT to ensure stakeholders have enough time to respond	21

Document Administration

This document has been co-authored by members of the Distributed Multi-Nodal Air Traffic Flow Management (ATFM) Network Project. Comprising members from the participating Air Navigation Service Providers (ANSPs), stakeholders, and international organizations; this document aims to provide a framework, details of procedures, rules and requirements applicable for cross-border ATFM operations based on the Distributed Multi-Nodal ATFM Network concept. This document will continue to evolve as the project matures from the operational trial stages to the eventual implementation of ATFM.

The following Air Navigation Service Providers (ANSPs) shall be jointly responsible for the administration and maintaining of this document. The administrative duties should be untaken by ANSPs on annual rotational basis. Amendments to this manual will be issued on a quarterly basis unless circumstances dictate otherwise.

ANSPs	Administrative Details
Aeronautical Radio of Thailand (AREOTHAI)	Tel: +66 2287-8024 / +66 2287-8025 / +66 8-1829-5256 Fax: +66 2287-8026 / +66 2287-8027 Email: atfmu@bobcat.aero ATFM Web Portal: http://atfm.aerothai.aero or http://202.57.133.148 AFTN Address: VTBBZDZX
Civil Aviation Administration of China (CAAC)	Tel: + 86 898 65751743 Fax: +86 898 65751741 Email: SANYAATFMU@GMAIL.COM / MULTINODAL@gmail.com ATFM Situation Portal: 157.0.28.62:99 ATFM Web Portal: 111.205.41.49 AFTN Address: ZJSYZQZX, ZJSYZRZX
Civil Aviation Authority of Singapore (CAAS)	Tel: +65 64227001 Fax: +65 65461790 Email: caas_atfmu@caas.gov.sg ATFM Web Portal: www.atfm.aero AFTN Address: WSJCZQZX
Civil Aviation Department (CAD) of Hong Kong	Tel: +852 2910 6859 Fax: +852 2910 1655 Email: atmdflm@cad.gov.hk / hkatfmu@cad.gov.hk ATFM Web Portal: Refer to email alerts for web link AFTN Address: To be advised

Reference Materials

1. Chapter 3 paragraph 3.7.5 (Air Traffic Flow Management) of Annex 11 to the Chicago Convention — Air Traffic Services (15th edition — July 2018, incorporating amendment No 51)
2. Chapter 3 (ATS Capacity and Air Traffic Flow Management) of ICAO Doc 4444, Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM) (16th edition — 2016)
3. ICAO Doc 9971 (3rd edition) – Manual on Collaborative Air Traffic Flow Management
4. ICAO Asia/Pacific Regional Air Traffic Flow Management Concept of Operations version 1
5. ICAO Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management version 3

Note on ATFMU Nomenclature

In the distributed ATFM environment, there is not a centralized ATFM unit responsible for the entire network. Rather, the ATFM unit responsible for the constrained / congested resource(s) will initiate GDP for other ATFM nodes to follow. To avoid confusion, the following ATFMU nomenclature is adopted for this Common Operating Procedure:

(a) ***Initiating ATFMU*** *denotes the ATFMU responsible for the constrained / congested resources and thus has to implement ATFM measures.* The Initiating ATFMU is so named for the task of "initiating" the ATFM measure to manage traffic arriving into the areas. Generally this refers to ATFMU located in the arrival FIR but is not necessarily so. An ATFMU managing intermediate airspace for which the affected flights have to overfly will also be referred to as Initiating ATFMU.

(b) ***Facilitating ATFMU*** *denotes the ATFMU responsible for the facilitation of traffic departing / flying in compliance to ATFM measure issued by Initiating ATFMU.*

Distributed Multi-Nodal ATFM Common Operating Procedure (COP)

1. Introduction

1.1 The Asia Pacific region has experienced rapid increase in air traffic demand in the recent years with majority being cross-border flights within the region. ANSPs and Airspace Users are continuously exploring means to increase airspace and airport capacity to match the increasing demand, there is a need for systematic method to balance demand and capacity in order to allow a sustainable growth in traffic demand in the near future.

1.2 ***Air Traffic Flow Management (ATFM)*** is a means to address demand and capacity imbalance. ATFM is a service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that air traffic control capacity is utilized optimally, and that the traffic volume is compatible with the capacities declared by the ANSP.

1.3 Regulating air traffic flow through the application of ATFM measures such as Ground Delay Programs (GDP) is a known operational concept. This is typically carried out by a single entity within a region or independently applied within the domestic boundaries of an ANSP. However, there is an increasing need to apply ATFM measures to facilitate cross-border flight operations especially with the growth of international traffic movements. The concept of applying ATFM measures on cross-border traffic by different control authorities can be achieved through the Distributed Multi-Nodal ATFM Network concept.

1.4 Through a research collaboration led by Civil Aviation Authority of Singapore (CAAS) and Airbus ProSky, with participation from AEROTHAI, Air Traffic Management Bureau of Civil Aviation Administration of China (CAAC ATMB), Department of Civil Aviation Malaysia (DCAM), and Hong Kong Civil Aviation Department (HKCAD), along with other relevant stakeholders. The effort resulted in the ***Distributed Multi-Nodal ATFM Network*** concept. ***The concept relies on independent ATFM Nodes connected via information sharing network and operating on the same principle.*** The concept was adopted by ICAO Asia Pacific ATFM Steering Group (ATFM/SG) as the foundation for cross-border ATFM in the Asia-Pacific Regional Framework for Collaborative ATFM document, which was developed to outline key performance enhancements needed for the region.

1.5 The concept has since undergone several rounds of validation through the conduct of operational trial. The operational trial also includes the development and refinement of processes and procedures to enable cross-border ATFM service based on the provision of Calculated Take-Off Time (CTOT) for efficient pre-flight operations.

1.6 The progress made by the various ANSPs to operationalize the distributed multi-nodal ATFM concept would pave the way for the widespread implementation of ATFM throughout the Asia-Pacific region. Beyond the ANSPs that embark to carry out the operational trials, the ICAO ATFM/SG would be the suitable platform to propagate participation and implementation of ATFM. The ICAO ATFM/SG, recognizing the need and the challenges of implementing cross-border ATFM, has adopted the distributed multi-nodal ATFM concept and a viable option to address the imbalance and ensure smooth flow of air traffic across the region.

1.7 This document outlines key principles and requirements for all stakeholders involved in the distributed multi-nodal ATFM network. The document establishes the ***Common Operating Procedures*** for stakeholders to use as a reference and guidance when establishing their local procedures to participate in the ATFM network. The document also provides individual ANSPs the basis for publishing their respective AIP Supplement which would contain the specific details and procedures for cross-border multi-nodal ATFM operations in their area of service. It is foreseeable that the procedures established in this document will be used as a foundation to harmonize cross-border ATFM procedures for the wider aviation community in the Asia-Pacific region. It is recommended that this document be read in conjunction with ICAO Doc 9971 – Manual on Collaborative Air Traffic Flow Management.

2. Distributed Multi-Nodal ATFM Network Concept Overview

2.1 Asia-Pacific airspace is characterised by several FIRs and low transit times for flights. Independent local ATFM measures implemented in isolation within one FIR tend to have knock-on effect on downstream FIRs. Previously, existing ATFM frameworks operated fundamentally on centralized management of air traffic flow, which adequately addressed domestic ATFM needs. However, a distributed solution for cross-border ATFM was essential to meet the needs of Asia-Pacific. CAAS and Airbus ProSky, with inputs from other industry partners, developed a ***Distributed Multi-Nodal ATFM Network*** concept as an alternative solution to implement cross-border ATFM in this region.

2.2 **The concept involves each ANSP leading and operating an independent ATFM node supported by interconnected information sharing framework. The flow of air traffic will be managed based on a common set of agreed ATFM measures and principles among participating stakeholders**. In the case of a Ground Delay Program (GDP), an ATFM measure chosen as the primary means for cross-border ATFM in APAC, an ATFM Node comprising ANSP and associated airports manages demand and capacity through adjustments in aircraft Calculated Landing Time (CLDT) and Calculated Take-Off Time (CTOT) distributed to aircrafts prior to departures. The calculation and distribution of CTOT will be based on agreed principles and information exchange platform. **Figure 1** illustrates this concept.

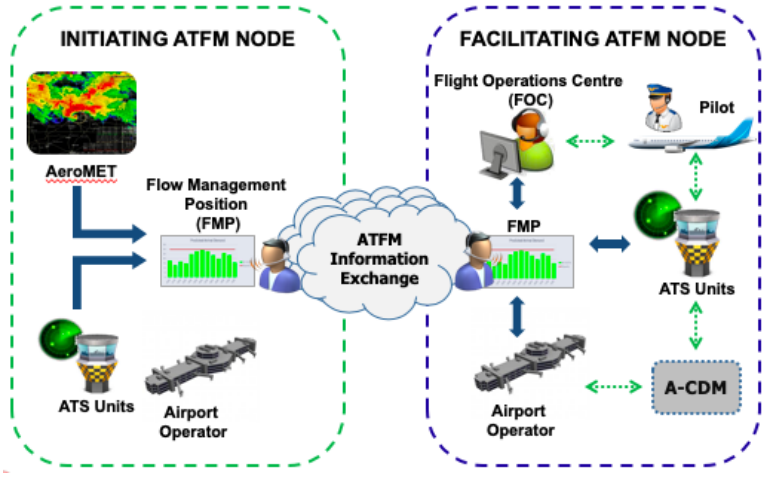

Figure 1 - Distributed Multi-Nodal ATFM Network Concept

2.3 The choice of GDP as a basis for ATFM in the region came from predictability problem faced due to frequent use of Miles-in-Trail (MIT) and Minutes-in-Trail (MINIT) to regulate traffic across several borders. Both MIT and MINIT, while effective for the regulation of air traffic from immediate neighboring FIR, tend to get expanded as the restrictions traverse across several FIRs in Asia-Pacific. The result is unpredictable, and sometimes excessive, airborne holdings being imposed on flights as the ATS units have to ensure the required spacing between them. With collaborative use of GDP; flights will be given specific departure slots, allowing them to absorb the required ATFM delays on the ground – sometimes with engine shut off – in a more predictable manner. **Figure 2** illustrates the idea.

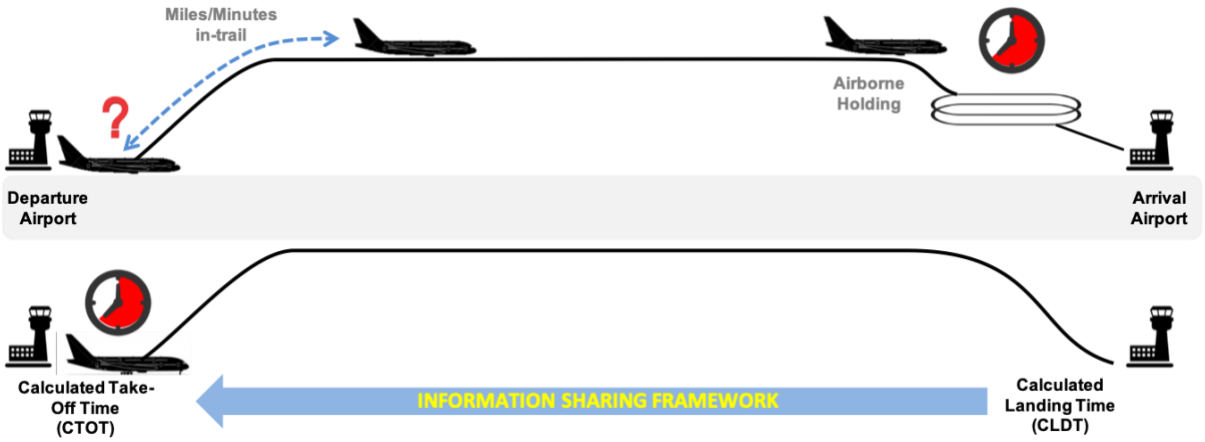

Figure 2 - GDP in a distributed ATFM environment

2.4 Airspace Users can play a fundamental role in ***Collaborative Decision Making (CDM)*** by specifying delay absorption intent and additional information regarding the flights indicating the capability of compliance to CTOTs. Additionally, being involved in the ATFM operations, Airspace Users will be able to receive advance CTOT information, which will in turn allow for improved flight operations and optimization of available resources.

2.5 Airport Operators contribute to CDM by providing accurate and updated airport infrastructure capacity and maximum allowable gate delay based on the airport's operational demand and capability to manage it. The maximum gate delay component could be considered in the appropriate issuance of CTOTs during ATFM implementation.

2.6 ***In summary, common core principle, efficient interconnected information sharing platform, and effective CDM chain with comprehensive stakeholder participation form the basis of Distributed Multi-Nodal ATFM Network concept.*** The concept in turn forms the most viable ATFM solution that can better manage the cross-border flow of traffic in Asia-Pacific region.

3. Operational Trial: A Phased Approach with Tiered Participation

3.1 The Operational Trial aims to validate the Distributed Multi-Nodal ATFM Network concept leading toward implementation. To enable timely commencement and to provide room for continuous development and expansion, the Operational Trial would first focus on addressing Demand-Capacity Balancing (DCB) at individual airports by regulating inbound flights with GDP through distribution of CTOT. Subsequently the project would focus on DCB within airspace volumes managed by participating ANSPs as well as looking into flow management of long-haul inter-regional flights. The focus in this latter phase will still be on the use of GDP/CTOT, though possibly in a combination with other ATFM measures.

3.2 To methodically work toward the goal of the Operational Trial, the project adopts a multi-stage, multi-phase approach as follows:

Phase 1 – Balancing Demand and Capacity at Arrival Airports		
Stage 1	**Stage 2**	**Stage 3**
• Communication Linkage and Protocols • Information Dissemination	• Demand Prediction Validation • Local Table-Top Exercises • Cross-Border ATFM Procedure Development and Validation through Demonstration Flights	• Limited-Scope Operational Service: Providing ATFM service for planned and ad-hoc events; introduction of Combined ATFM Measure
Phase 2 – Balancing Demand and Capacity in the Airspace		
Stage 1	**Stage 2**	**Stage 3**
Capability development for airspace demand prediction and capacity assessment	Procedure development and trial/implementation for single-constraint demand-capacity balancing	Procedure development and trial/implementation for multi-constraint demand-capacity balancing

Table 1 - Phased Approach to Operational Trial

3.3 Participating stakeholders form individual ATFM Nodes for each respective FIR. A node would comprise the ANSP as the Node leader and local Airspace Users and Airport Operators as members. As an example, a typical Singapore ATFM Node would consist of CAAS as the Node Leader, Changi Airport Group (CAG) and local Airspace Users as members. This approach provides a coherent linkage among individual stakeholders within the same FIR and ensures harmonized capability development across the industry.

3.4 In order to encourage more participation from regional states, the Operational Trial adopts a tiered participation level approach to provide the opportunity for stakeholders to participate based on their readiness and capability. The different participation levels also aims to provide an avenue for ATFM Nodes to upgrade to a higher level as members become more ready and capable. The participation levels and their associated capabilities are as follows:

Participation Level	Expected Capabilities
Level-3 ATFM Nodes	- Able to generate, deliver, and receive CTOTs; - Able to comply with CTOTs from all Level-3 ATFM Nodes
Level-2 ATFM Nodes	- Able to comply with CTOTs from all Level-3 ATFM Nodes
Level-1 ATFM Nodes	- Observe and participate in the trial progress

Table 2 - Tiered Participation to Operational Trial

3.5 Participation in the Operational Trial in the 3 levels is included in **Annex A** with their operational contacts listed in **Annex B**

3.6 With the rapid and sustained air traffic increase in the region, it is recommended that ATFM nodes endeavor to be at Level 3 to implement ATFM for constrained resources when required. Recognizing the importance of ATFM nodes making appropriate preparations to upgrade their participation level, a ***Readiness Checklist*** has been developed as a guideline for the required personnel, procedures, support system and stakeholder awareness, with the view that Node Leaders will ensure stakeholders readiness appropriately. The checklist can be found in **Annex C**.

4. Cross-Border ATFM Common Operating Procedures

General Procedure

General

4.1 To achieve effective DCB through cross-border ATFM measures, it is important that ATFM stakeholders adhere to the ***Common Operating Procedures (COP)*** during the Operational Trial and subsequent implementation. This will ensure a common understanding of process, procedures and outcomes.

4.2 For the COP, "common" is intended to address the high level process flow (e.g. demand prediction, slot allocation, slot dissemination, and slot management) and not details with respect to individual ANSP's ATFM operational concepts (e.g. CTOT generation algorithms, slot substitution workflow). The autonomy of ANSPs to determine appropriate operational concepts within the common high level process flow is understood and accepted under this COP.

4.3 In line with the provision of Annex 15, ANSP should publish AIP Supplement with regards to ATFM operations/activities in a timely manner. It is the responsibility of the Airspace Users and Airport Operators to keep current with the latest relevant AIP Supplements before conducting their operations. Additionally, the planning, coordination, and execution of ATFM measures by the stakeholders referred to in para. 4.4 shall comply with the ICAO provisions specified in the Annex 11.

4.4 This document lays down the common requirements in order to optimize available ATM resource capacity of the ATFM Nodes for:

(a) Airspace Users,
(b) Airport Operators,
(c) Air Traffic Service (ATS) Units,
(d) Other flow management positions (FMPs),
(e) ATFM Units,
(f) Slot coordinators of coordinated airports, and
(g) All other organizations and individuals involved in ATFM operations.

ATFM Measure Principles

4.5 ATFM measures *should*:

(a) Prevent excessive air traffic demand compared with effective operational capacity of ATM resources (aerodrome, enroute sector, etc.);
(b) Use resource capacity to the maximum extent possible in order to optimize the efficiency and minimize adverse effects on operators;
(c) Support the management of critical events.

4.6 ATFM measure *should not* be a substitute for effective capacity enhancement efforts by ANSPs. It should, on the contrary, be used to manage available capacity while enhancement efforts to cope for future growth are under way.

Stakeholders' Responsibilities

4.7 ANSPs play a key role as Node Leaders in the Operational Trial. Accurate traffic demand prediction and ATM resource outlook, effective issuance of ATFM measures, and coordination of CDM web/teleconference are important elements provided by ATFM Units and ATS Units within each ANSP. The following tables outline responsibilities on the part of ANSPs at various participation levels.

Level 3 ANSPs	
Responsibilities	**Descriptions**
General ATFM Responsibilities	
Demand-Capacity Prediction and Monitoring	• Predict traffic demand at ATM resources within the node through a range of data sources including schedules, airport slots, flight plans (FPLs) and ATS messages or other forms of flight progress updates • Predict capacities at ATM resources within the node • Assess demand-capacity imbalance • Monitor the accuracy of demand and capacity predictions
Local CDM Conference	• Host scheduled CDM conference with local stakeholders to prepare ATFM measures
Cross-Border CDM Conference	• Host or participate in cross-border CDM conference with other node leaders
ATFM Daily Plan (ADP)	• Generate ADP to outline ATM situation for the day
ATFM Measure Execution	• Ensure the effective implementation / revision / cancellation of ATFM measures in collaboration with local FMP/ATS units • Provide information on ATFM in a timely manner to relevant stakeholders in accordance to the cross-border procedures developed
ATFM Measure Effectiveness Monitoring	• Monitor ATFM measure effectiveness and revise as appropriate to the developing situations
ATFM Post-Operations Analysis	• Lead the collaborative effort to perform post-operations analysis after each round of ATFM program
Responsibilities Specific to GDP	
CTOT Distribution	• Generate CTOTs and distribute via appropriate channels preferably no less than 90 minutes before Estimated Off-Block Time (EOBT) to support stakeholder's advance planning
Slot Management	• Provide platform or protocol for slot management process (change, swap, remove, add)
Adherence to CTOT in departure management	• Manage departure traffic in adherence to CTOT within the CTOT compliance window
	• Include CTOT information as part of the air traffic control clearance when a given flight is subject to CTOT *Ref: ICAO Doc 9971, 3rd Ed., Part II, Chapter 6*
	• Ensure that local ATC procedures and CDM processes facilitating compliance with received CTOT are implemented

Table 3 - Level-3 ANSP Responsibilities

Level 2 ANSPs	
Responsibilities	**Descriptions**
General ATFM Responsibilities	
Cross-Border CDM Conference	• Participate in cross-border CDM conference with other node leaders
ATFM Post-Operations Analysis	• Participate in the collaborative effort to perform post-operations analysis by providing information from departure side
Responsibilities Specific to GDP	
Adherence to CTOT in departure management	• Manage departure traffic in adherence to CTOT within the CTOT compliance window
	• Include CTOT information as part of the air traffic control clearance when a given flight is subject to CTOT *Ref: ICAO Doc 9971, 3rd Ed., Part II, Chapter 6*
	• Ensure that local ATC procedures and CDM processes facilitating compliance with received CTOT are implemented

Table 4 - Level-2 ANSP Responsibilities

Level 1 ANSPs	
Responsibilities	**Descriptions**
General ATFM Responsibilities	
Participation in Project Updates	• Participate in regular project meetings to keep up to date with latest developments
ATFM Education	• Educate local stakeholders and personnel on ATFM in preparation for capability upgrade
ATFM Information Distribution	• Distribute information about ATFM initiatives to local stakeholders, e.g. information about an active ATFM measure in the region, to ensure stakeholders are aware of the project progress and implementation elsewhere
Planning for Capability Upgrade	• Study the concept of ATFM and Distributed Multi-nodal ATFM operations • Assess the needs and plan for capability upgrade, especially if supplying traffic to FIRs serviced by Level-3 ANSPs

Table 5 - Level-1 ANSP Responsibilities

4.8 Other stakeholders' participation is crucial to the success of the project and of an ATFM operation. Timely sharing of information, operational planning, and participation in the CDM chain are all important elements provided by Airport Operators and Airspace Users. The following tables outline responsibilities on the part of these stakeholders.

Airport Operators	
Responsibilities	**Descriptions**
General ATFM Responsibilities	
Provision of Updated Flight Information	• Provide updated flight information to ATFMU for accurate demand prediction
Provision of Airport Capacity Constraints Information	• Notify ATFMU of events that may impact capacity at airports
Local CDM Conference	• Actively participate in local CDM conference to provide input on ATFM measures
Receipt of ATFM Information	• Participate in ATFM communication flow and ensure capability to receive ATFM information in a timely manner
ATFM Post-Operations Analysis	• Participate in the collaborative effort to perform post-operations analysis by providing information from airport side
A-CDM Linkage	• If A-CDM process is deployed or planned, ensure it is able to integrate or coordinate with ATFM process, especially in terms of data / information exchange

Table 6 - Airport Operator Responsibilities

Airspace Users	
Responsibilities	**Descriptions**
General ATFM Responsibilities	
Flight Schedule Information	• Where possible, advise ATFMU of changes to schedules prior to submission of FPL
Special Circumstance Information	• Where applicable, advise ATFMU of special or extenuating circumstances that would impact the ability to comply with ATFM measures
Flight Plan (FPL) Management	• Ensure updated FPLs are filed at least 3 hours prior to EOBT
DLA /CHG Message	• Submit DLA or CHG messages via AFTN for delay of more than 15 minutes. **Do not update EOBT as a result of ATFM measure**
Local / Cross-Border CDM Conference	• Actively participate in CDM conference to provide input on ATFM measures
Monitoring of ATFM Alerts and Receipt of ATFM Measure Information	• Monitor ATFM Daily Plan (ADP) for ATFM alerts and receive ATFM information for operational planning
Critical Operational Concerns	• Highlight significant operational concerns during CDM conference
Post-Ops Analysis	• Provide feedback and information on ATFM operations in the Post-Ops Analysis effort

Airspace Users	
Responsibilities Specific to GDP	
CTOT Compliance Management	• Plan the affected flights such that they will be ready for start-up / pushback at appropriate time to comply with CTOT at the runway, considering taxi-out time
Slot Revision / Substitution Management	• Request or process revisions to CTOTs / ATFM slots when the flights are unable to comply with assigned CTOTs

Table 7 - Airspace User Responsibilities

Information on ATFM Measures

4.9 Information on ATFM will be distributed by the node leaders. This information includes ADPs, alerts/notifications on ATFM measures, CDM web conference/ helpdesk and CTOT dissemination

(a) ATFM Daily Plan (ADP)
The ADP will provide a summary of planned ATFM measures for the 24 hours period. ADP is normally distributed one day before operations, with a revised version issued on the day of operations when necessary. A sample of an ADP template can be found in **Annex D**.

For the purpose of the Operational Trial and a testing of automated ADP processing, ADP should be sent by the Initiating ATFMU as a PDF file attached to an E-Mail with the following specifications:
- ***Subject: ADP_[FIR Name]_[Effective Date, yyyyymmdd]_[Version number]***
- ***PDF File Name: ADP_[FIR Name]_Effective Date, yyyymmdd]_[Version number]***
- ***Example: ADP_VTBB_20181207_1***

(b) Alerts / Notifications on ATFM Measures
Alerts and notifications on ATFM measures will be disseminated through the various means of communications established by the Operational Trial such as email, web portal, AFTN, direct line, instant message applications, etc. Examples on alerts/notifications of ATFM measures can be found in **Annex E**.

(c) Collaborative Decision Making (CDM) Web Conferences
Collaborative Decision-Making (CDM) allows all members of the ATM community to participate in the ATM decision-making process. Node leaders will arrange and lead the CDM web conferences, where the ADP will be presented and discussed to provide further information on identified constraints. This platform will also provide opportunities for all stakeholders to participate in the decisions marking process which may have a potential impact on their operations.

For the purpose of the Operational Trial, planning CDM web conferences will be conducted bi-weekly on Thursdays at 0800 UTC. The focus of discussion will be on the outlook of possible constraints and ATFM measures for the upcoming 2 weeks. The call is intended to be participated by ATFMUs and/or ATFM planning teams from all ATFM Nodes.
Schedule for the bi-weekly conferences is included in Annex F.

Flight Plans and ATS Messages

4.10 In order to ensure that ATFM can balance demand and capacity effectively, up-to-date flight information is required to anticipate the traffic demand. Air traffic demand can be determined from sources such as airport flight schedules/slots, airline schedules, flight plans, and ATS messages through the Aeronautical Fixed Telecommunication Network (AFTN).

4.11 The submission of timely flight plans together with ATS messages such as DLA, CNL, CHG and DEP helps ensure accuracy in demand prediction. This also allows ATFM units to derive an effective ATFM measure when required. The transmission of DEP messages provides ATFM operations with accurate updates of the predicted demand and facilitates the verification of ATFM measure adherence for the arrival ATFM unit, as well as allowing statistical analysis for post operations review.

4.12 In view of the above, Airspace Users should adhere to the following:

(a) Except where necessary for operational or technical reasons, FPL should be submitted not less than 3 hours before EOBT;

(b) DLA message should be originated when the departure of an aircraft, for which basic flight plan data (FPL or RPL) has been sent, is delayed by 15 minutes of more after the EOBT contained in the basic flight plan;

(c) CHG and CNL message are promptly originated in accordance with the provision of ICAO Doc 4444 Procedures for Air Navigation Services (PANS-ATM) 11.4.2.2; and

(d) DEP message to be transmitted in accordance with the provision of ICAO Doc 4444 Procedures for Air Navigation Services (PANS-ATM) 11.4.2.2.

Exemption of Flights from ATFM Measure(s)

4.13 States/Administrations and their ATFMUs may choose to prioritize or exempt certain classes of flights from ATFM measures. Examples of such flights include, inter alia:

(a) Flights experiencing an emergency, including aircraft subjected to unlawful interference;
(b) Flights in search and rescue or firefighting missions;
(c) Urgent medical evacuation flights specifically declared by medical authorities where flight delays would put the life of patients at risk;
(d) Flights with “Head of State” status; and
(e) Other flights specifically identified by appropriate authorities.

4.14 Additionally, considerations should be given to aircraft status and the feasibility of complying to the ATFM measure at the time it is initiated, with exemption granted appropriately. As an example, subjecting airborne aircraft or aircraft on taxi to a GDP is not feasible and thus should either be granted exemption from CTOT or given alternative ATFM measure instead.

ATFM Performance Assessment

4.15 Level 3 ANSPs, with the activation of ATFM measure(s), shall ensure that post-operations analysis reports are produced indicating the quality of the ATFM program used. The report should include, inter alia, the following detail:

(a) Cause(s) of the ATFM measure(s);
(b) Impact of the ATFM measure(s);
(c) Adherence to the ATFM measure(s); and
(d) ATFM measure effectiveness.

Failure of the ATFM System

4.16 In the event of an ATFM system failure during the active ATFM period, the ATFMU responsible for the ATFM measure shall advise relevant stakeholders of the cancellation of active ATFM program and of any alternative ATFM measures to be activated. If no other ATFM measures are activated, Airspace Users should be advised to operate based on their normal schedules.

Safety Management System for ATFM Implementation and Operations

4.17 The introduction of ATFM may introduce changes to existing procedures for Stakeholder. ANSPs should evaluate the need to apply safety management system process when implementing ATFM in line with existing provisions in PANS-ATM. SMS process includes identification of hazards during ATFM operations. Hazards identified by stakeholders during the ATFM operations should be raised to the ATFMU concerned for follow up actions in accordance to the safety management policies of the respective ATFMUs.

Ground Delay Program (GDP) Procedure

4.18 Currently the Distributed Multi-Nodal ATFM Network concept focuses mainly on the use of ***Ground Delay Program (GDP)*** at departure points to regulate the flow of inbound traffic into constrained resources (airports and airspace). This is done by allocating departure (ATFM) slots or Calculated Take-Off Time (CTOT) to flights. The allocation of CTOT shall give priority to flights according to the order of their expected entries into the location at which the ATFM measure will apply

4.19 The effectiveness of GDP to address demand-capacity imbalance relies on stakeholders fulfilling their roles and responsibilities in accordance to the agreed common procedures. When a GDP is in place, stakeholders shall adhere to the procedures described in this section.

ATFM Daily Publication and CDM Conference

4.20 The GDP process would be triggered by the ***Initiating ATFMU***. Having determined that a GDP needs to be put in place to regulate arriving traffic (into either airport or airspace volume), the Initiating ATFMU shall communicate the intention via ADP per specification in para. 4.9. When possible (e.g. with enough lead time to the program), a tactical CDM conference shall be conducted to provide clarification and detailed information on the planned ATFM measures. The CDM conference will also provide Initiating ATFMU with a better understanding on other constraints stakeholders may be experiencing.

CTOT Dissemination and Publication

4.21 After the CDM conference is completed, the Initiating ATFMU ***shall publish CTOTs not less than 90 minutes before the flight's initial EOBT.*** To provide better predictability and minimize disruption to stakeholders' operations, however, the ATFMU *should* make best attempt to deliver CTOTs at least 2 hours before the flight's initial planned EOBT. To cater for the different ATFM support system and processing criteria, distribution of CTOT information can be done in batches according to arrival times or points of departure or be delivered singularly to individual flights. See **Annex G-1** for the diagram of the process.

4.22 Stakeholders, on receipt of CTOT, shall trigger follow-up actions accordingly:

(a) ***Arrival Airport Operator***, having noted that arriving flight(s) with CTOT would have different landing and in-block times from schedule, may make adjustments to gate allocation if necessary;

(b) ***Facilitating ATFMU*** shall inform ATC at the departure airports (if located at the departure FIR) / affected sectors (if located at the intermediate FIR) of relevant CTOTs.

(c) ***Departure Airport Operator***, having noted the CTOTs, shall adjust their gate planning accordingly, taking into account the possible delayed push-back due to CTOT compliance attempt;

(d) ***Airspace Users***, on receiving their CTOTs, shall acknowledge the receipt and inform affected flight crews and relevant operational personnel of the ATFM delay required.

4.23 The Initiating ATFMU shall also notify the ATS units supporting arrival airports of the GDP in place. This would allow close coordination between the Initiating ATFMU and ATS units for the effective support of the GDP. See **Annex G-2** for details.

CTOT Information Delivery

4.24 In line with the distributed cross-border ATFM concept of operation, members can operate different ATFM systems and interfaces but collaborate and collectively share information necessary for the success of cross border ATFM operations. Members may select the desired/appropriate method of delivering CTOT information to other stakeholders, while keeping in mind of the compatibility and capability at the receiver's end. **Table 8** provides a description of how CTOTs originating from the

different Initiating ATFMUs are disseminated to the relevant stakeholders. Notwithstanding this, members may wish to explore other information delivery/exchange methods as appropriate.

Delivery Method	China	Hong Kong	Singapore	Thailand
Web Portal (User Management and Helpdesk)	✓		✓	✓
Email (+CTOT List)	✓+	✓	✓	✓+
Excel format on the Internet		✓		
AFTN (SAM, SRM, SRC)	✓			✓

Table 8 - CTOT Information Delivery

*AFTN message templates are included in **Annex H**, and are based on EUROCONTROL ATS Data Exchange Protocol (ADEXP).*

4.25 It is anticipated that the best means of information exchange will be based on System-Wide Information Management (SWIM) technology. The technical subgroup of the project core team is working toward ATFM system-to-system information linkage on SWIM-based technology by 2020.

CTOT Management and Lead Time Requirements

4.26 With the GDP activated and CTOT distributed, Initiating ATFMU shall maintain an open communication line to support enquiries and requests from stakeholders. The communication line can be phone, web/teleconference, or e-mails if equipped with appropriate alerting mechanism. The communication channels shall be announced to stakeholders, preferably in the distributed ADP, and shall be closely monitored while the GDP is active.

4.27 When the crew of a flight deemed they are unable to comply with CTOT, a series of coordination should be triggered to request a revised CTOT from the Initiating ATFMU:

(a) ***Flight Crew / Flight Operations / Ground Handler*** should coordinate per airline-specific coordination procedure to lodge a request for a revised CTOT to the Facilitating ATFMU, who will then coordinate with the Initiating ATFMU to obtain a revised CTOT and deliver back. A revised CTOT will be delivered to both Facilitating ATFMU and the airline's Flight Operations. Flight Crew can obtain the revised CTOT from either their Flight Operations or Facilitating ATFMU (possibly via ATC).

(b) ***Facilitating ATFMU*** shall acknowledge the request for change and coordinate with Initiating ATFMU on behalf of the airlines. Once the Initiating ATFMU has responded with the revised CTOT, the ATFMU shall acknowledge the change and inform ATCs and airport stakeholders of the change in departure time for the flight(s) concerned for their gate and resource planning. ATC shall facilitate departure of the flight(s) based on the revised CTOT.

(c) ***Initiating ATFMU*** shall assess the latest development in demand prediction and best facilitate the slot substitution request coordinated by Facilitating ATFMU. They shall update all relevant stakeholders with the latest CTOT information after the substitution had been made. The Initiating ATFMU shall also inform their local

stakeholders in the change of arrival timing for the flight(s) concerned for their gate and resource planning.

(See **Annex G-4** and **Annex G-5** for detail of the above procedure)

4.28 A revision of CTOT should also take into consideration the operational restrictions airspace users and airport operators are subjected to. To mitigate disruptions from insufficient reaction time for the processing of revised CTOT, stakeholders should lodge CTOT revision request as soon as practicable. In issuing a revised CTOT, Initiating ATFMU should ensure that the revised CTOT is not too early as to render stakeholders unable to react to it. **Table 9** specifies conditions for the revised CTOT.

Changes Initiated by	Earliest Revised CTOT Allowable	
	Revised CTOT is **EARLIER**	Revised CTOT is ***LATER***
Airspace User	Current time + [max STT* + Buffer] **New CTOT > Current time + 30 minutes**	N/A
Initiating ATFMU	Current time + [reaction time] **New CTOT > Current time + 45 minutes**	

Table 9 - Lead Time Requirement for CTOT Revision Processing

**Max STT refers to maximum standard taxi-out time used in CTOT calculation among the airports in the network: for current operations, the maximum STT is 20 minutes*

Revision and Cancellation of GDP

4.29 When the Initiating ATFMU determines that the current GDP is insufficient to balance demand and capacity or the projected capacity allows for a relaxation of the restriction at the ATM resource, the Initiating ATFMU shall issue a revision of the GDP. The Initiating ATFMU shall determine the revised AAR and GDP period. This information shall be disseminated, with the appropriate intention stated in the revised ADP to all stakeholders. The Initiating ATFMU shall then publish/distribute the revised CTOTs and inform all stakeholders involved to note the revisions. On receipt of the revision notification, stakeholders trigger the follow up action accordingly as depicted in para 4.22.

4.30 The Initiating ATFMU shall also notify the ATS units supporting arrival airports of the revision to allow close coordination in the revised ATFM measure support. See **Annex G-10** and **Annex G-11** for detail.

4.31 Upon assessment that a GDP is no longer required for demand-capacity balancing, the Initiating ATFMU shall inform the Facilitating ATFMU and stakeholders of the cancellation of the program. Upon receipt of the cancellation confirmation:

(a) ***Facilitating ATFMU*** shall acknowledge the cancellation and inform stakeholders on the departure side. Departure ATS units and airport stakeholders shall collaboratively facilitate based on normal operations, ensuring full utilization of ATC and departure airport capacity;

(b) ***Airspace Users*** shall acknowledge the cancellation and inform the flights previously affected by the GDP. Flight crews shall then plan their departures based on normal operation and work in collaboration with Departure ATS units for their clearance.

(c) ***Initiating ATFMU*** shall inform their local ATS units and stakeholders of the cancellation of GDP to allow reassessment and re-planning of resources.

(See **Annex G-6** for detail of the above procedure)

Re-Time of Flights

4.32 When a flight is expected to deviate from its initial flight plan, Airspace Users shall disseminate appropriate information to the Initiating ATFMU immediately, as the accuracy of demand prediction is dependent on the timely submission of flights plans and ATS messages. The Initiating ATFMU, on receipt of the FPL and ATS messages (change, delay or cancel), shall monitor changes in the demand prediction and, if necessary, publish a revised ATFM measure that best regulate traffic flow while maximizing capacity. See **Annex G-8** and **Annex G-9** for detail.

Multiple ATFM Measures

4.33 As far as practicable, individual aircraft should not be subject to more than one tactical ATFM measure. This is to ensure that a flight is not subjected to potentially unreasonable cumulative delay. Insofar as possible, Initiating ATFMU should attempt to conduct CDM conference prior to activation of every ATFM program to allow other ATFMUs to bring forward any potential issue and conflicting measure(s) for resolution prior to the publication of CTOTs.

4.34 Should a CDM conference not be possible, and a conflicting ATFM measure is detected by the Facilitating ATFMU, consideration should first be given to using CTOT compliance window in resolving the conflict. If utilizing the compliance window alone does not suffice and the conflict remains, the Facilitating ATFMU should coordinate with the Arrival ATFMU owning the least-restricting measure for an exemption.

(a) ***Facilitating ATFMU*** should coordinate with the Arrival ATFMU owning the least-restricting ATFM measure for an exemption.

(b) ***Initiating ATFMU***, upon receipt of a legitimate exemption request, shall exclude the particular flight from the GDP and not subject the flight to a conflicting restriction. If the request is received after the publication of CTOT and re-modeling of the GDP with the particular exclusion is not efficient, Initiating ATFMU shall inform ATS units of the scenario and manage the flight at the tactical level.

(c) ***Facilitating ATFMU***, following successful coordination to resolve conflicting ATFM measures, shall inform Airspace Users of the exemption and facilitate departures accordingly.

(See **Annex G-7** for detail of the above procedure)

4.35 As a general guideline, the comparison of ATFM measure severity should be based on the ATFM delay incurred. An ATFM measure with higher ATFM delay is generally associated with a more restrictive constraint. Conventionally, an ATFM measure to regulate flights into an arrival airport tends to be more restrictive and thus takes priority; however, variance from this can occur in different parts of the world. In Asia-Pacific, it is conceivable that an airspace congestion / constraint may take precedence due to the geographical nature of the region (small FIRs). Collaboration during this process could result in a flight being included in the less "severe" ATFM measure as per agreement with stakeholders.

GDP Coordination Language Guidance

4.36 To assist in the communication between ATFMUs, airspace users, and airport operators for GDP coordination, a guideline on the language use and a sample list of basic phrases that can be used in most key actions relating to GDP facilitation can be found in **Annex I**. The list is not exhaustive and cannot cover all possible nuances in the tactical management and negotiation of an ATFM measure, but provide a harmonized guideline on which communication can be based.

Compliance Management

4.37 Flight's adherence to CTOT is a shared responsibility between Airspace Users and departure ATS units. Airspace Users should plan their flights to be ready for take-off (conventionally at the RWY holding point) ***at the assigned CTOT***. However, operational variance in airport ground conditions and ATC capabilities are allowed and accounted for in the ***CTOT compliance window***.

4.38 For the operational trial, CTOT compliance windows are defined as:

(a) ***-5 / +10 minutes*** for CTOTs assigned in response to ***constrained arrival airports***;

(b) ***-5 / +5 minutes*** for CTOTs assigned in response to ***constrained airspace volumes***.

The defined compliance windows are in accordance to conclusion from ICAO Asia-Pacific ATM Sub-Group (Conclusion ATM/SG/6-2: Recommended CTOT Compliance Window) and are to be used for the purpose of operational trial. Compliance windows may be revisited as the regional implementation matures.

4.39 ANSPs are encouraged to develop and implement local procedures to facilitate and ensure compliance to CTOT at an airport of departure as described above.

(Placeholder for other ATFM measure)

4.40 (placeholder)

5. (Placeholder for other sections)

5.1 placeholder

5.2 placeholder

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