



ICAO

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**Twelfth Meeting of the Asia/Pacific Air Traffic Flow  
Management Steering Group (ATFM/SG/12)**

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

### **BENEFITS OF IMPLEMENTING GDP OVER MINIT/MIT**

(Presented by Hong Kong China, Singapore and Thailand)

#### **SUMMARY**

This paper presents the benefits of using Ground Delay Programs (GDPs) as the preferred Air Traffic Flow Management (ATFM) solution for Demand-Capacity Balancing (DCB) as compared to Minutes-In-Trial/Miles-In-Trial (MINIT/MIT). The paper also highlights the need to provide clarity on the purposes of MINIT/MIT restrictions within the requirements notification.

## **1. INTRODUCTION**

1.1 The ICAO Global Air Navigation Plan (GANP) along with the Aviation System Block Upgrades (ASBU) methodology provides guidance for operational improvement to increase efficiency and enhance predictability. Network Operations (NOPS), one of the threads in ASBU, highlighted ATFM as the fundamental Concept of Operations (CONOPs) to regulate the flow of traffic in a way that minimizes delay and optimizes the use of the entire airspace and available capacity.

1.2 To guide States/Administrations to better manage the growing traffic and progress with ATM implementation in a harmonized manner, the APAC Seamless ANS Plan was developed, with one of the key focuses being the implementation of ATFM services within APAC to achieve ASBU NOPS-B0.

## **2. DISCUSSION**

### Background

2.1 Asia-Pacific Cross-Border Multi-Nodal ATFM Collaboration (AMNAC), initiated as an operational trial in 2015, is one example of Asia/Pacific's regional ATFM initiatives. Since its conception, there have been many occasions where ATFM measures were initiated by Air Navigation Service Providers (ANSPs) within the AMNAC network to address demand-capacity imbalance. The formulation of these ATFM measures were guided by the principles listed in the ICAO Manual on Collaborative ATFM (Doc 9971) and the ICAO Asia/Pacific Framework for Collaborative ATFM.

2.2 The majority of the ATFM measures conducted by AMNAC ANSPs were in the form of GDPs, with the aim of resolving demand-capacity imbalance at a specific airport or a volume of airspace while providing operational predictability for stakeholders involved.

2.3 There were also instances where AMNAC ANSPs utilized GDP to better manage MINIT/MIT flow restrictions imposed by downstream ANSP. While providing better predictability, this method of having an intermediate ANSP convert MINIT/MIT restrictions to GDPs may not be as optimal and straightforward compared to if the GDPs were to be implemented by the ANSP originating MINIT/MIT restrictions in the first place.

#### Comparison of GDP vs MINIT/MIT to regulate traffic flow

2.4 In section 4.5 of Part II of the ICAO Doc 9971 (3<sup>rd</sup> Ed.), various ATFM measures are defined as techniques to achieve the desired outcome of ATFM. These techniques are – inter alia – GDP, Ground Stop (GSt), MINIT, MIT, Minimum Departure Interval (MDI) and Re-routing.

2.5 It should be noted that certain ATFM measures, when implemented excessively and/or repeatedly, may create unintended consequences. For example, MINIT and MIT, as elaborated in Doc 9971, come with a caveat that *‘The workload associated with its compliance falls on the air traffic controller because of potential upstream network effects. As such, regular usage of MINIT or MIT may indicate that more appropriate ATFM measure should be used in their places’*. It should also be noted that a 10 MINIT interval may be inadvertently multiplied into a much larger interval such as 20, 40, or 80 minutes.

2.6 Apart from additional workload and operational complexity for upstream ANSPs associated with the excessive use of MINIT/MIT, it also offers very little operational predictability to stakeholders and lacks optimisation of the available airspace capacity. As such, a regular use of MINIT/MIT should be discouraged and instead, when the demand/capacity imbalance issue is known well in advance, consider replacing them with more predictable ATFM measures that can manage the traffic earlier in a flight’s lifecycle, e.g., GDPs or published rerouting scenarios.

2.7 GDPs involve the use of Calculated Take-Off Time (CTOT) and/or Calculated Time Over (CTO) to regulate traffic flow into a constraint airspace or aerodrome. These calculated times are issued to flights in advance and provide early awareness of potential delays which aids stakeholders in their resource planning. CTOTs/CTOs are also accompanied with a tolerance window (equivalent to the compliance window) to account for real-time operational variability, thus enabling compliance without jeopardizing safety of ATS provision.

#### Example of converting MINIT into GDP to enhance operational predictability

2.8 As mentioned in para 2.3, when MINIT are imposed by downstream ANSP, some of the upstream ANSP / ATFMU may initiate GDPs to provide predictability to their stakeholders. This is illustrated through the following example.

2.9 In this example, ANSP ‘A’ initiates a ‘20-minutes’ MINIT requirement at the boundary waypoint for flights on ATS route X due to weather over their en-route airspace, limiting the capacity to approximately 3 flights per hour. ANSP B, one of the upstream ANSPs that is impacted by the flow restriction, decides to convert the MINIT into a GDP with the aim of providing predictability to stakeholders as high delays are anticipated. Aircraft on the affected ATS route are regulated at a flow rate of 20-minute interval with an assumed tolerance window of -5/+5 mins. (See Table 1 below)

Sequence of aircraft on affected ATS route X	Assigned CTO (at boundary waypoint)	Actual Time Over (ATO) boundary waypoint	Actual Time difference with preceding aircraft, at	CTO difference with preceding aircraft	Required separation minima based on LOA

	using 20mins interval		the boundary waypoint		
Aircraft A	0100	0104	-	0	20NM
Aircraft B	0120	0115	11 mins	20 mins	20NM
Aircraft C	0140	0135	20 mins	20 mins	20NM
Aircraft D	0200	0201	26 mins	20 mins	20NM

*Table 1: Example of converting '20mins' MINIT requirement to a GDP with a tolerance window of -5/+5mins*

2.10 From the table above, although traffic flow on ATS route X has been regulated (by the GDP after conversion from MINIT requirements) to be 20 minutes apart at the boundary waypoint during the pre-tactical phase using CTOs, the actual times over boundary waypoint between successive aircraft may vary – with the end result not being 20 minutes apart due to the allowances in the tolerance window. The objective of flow regulation is still achieved, and aircraft are regulated at 3 flights per hour over the boundary waypoint. The variances in actual intervals between aircraft do not pose separation issues as the required separation minima per the LOA – 20NM in this case – is still fulfilled.

2.11 This conversion provides greater predictability to stakeholders than the initial MINIT requirement, although it is made possible under the assumption that the MINIT requirement is used for the purpose of managing traffic demand rather than as a required separation restriction. The discussion on the difference between using MINIT/MIT for demand-capacity balancing and for aircraft separation is discussed subsequently.

#### MINIT/MIT for Purposes Other Than for Flow Regulation

2.12 ATFM measures are typically implemented for the purpose of regulating aircraft into a constraint or congested airspace or aerodrome. Their primary objectives are to address demand capacity imbalance rather than to achieve separation between two aircraft. It is with this understanding that the tolerance window for GDPs (as described in para 2.9) is allowed. Deviation from the assigned ATFM measure such as a CTOT/CTO should not automatically result in loss of separation issues and ATC should still be expected to ensure required separation minima through tactical ATC intervention.

2.13 Contrary to GDP, MINIT/MIT can be perceived either as an ATFM measure to balance demand and capacity, or as a tool to fulfill a desired separation between aircraft. With the varying purposes of MINIT/MIT, a clearer distinction on whether it is used for the purpose of demand-capacity balancing or to fulfil a desired separation minima between aircraft should be ensured, through a provision of clarity in the requirements notification. This will help provide better understanding for the upstream ANSPs on how to facilitate compliance to the MINIT/MIT while better utilizing their airspace capacity.

#### Conclusion

2.14 ATFM measures should be used for the purpose of managing traffic flow to address demand-capacity imbalance rather than a tool to ensure aircraft separation. As such, tolerance window with ATFM measures should be provided to account for tactical variations rather than applying the measures with a rigidity of an aircraft separation minima requirement.

2.15 GDP should be considered a preferred ATFM measure to optimally address demand-capacity imbalance, as it provides better predictability to stakeholders and reduces ATC's workload and operational complexity.

2.16 MINIT/MIT can also be used as an ATFM measure to manage demand-capacity imbalance. When it is used as such, clarity should be provided in the notification to minimize the mistaken perception that the requirement is used for aircraft separation. The initiating ANSP should then also be aware of the aircraft traversing many FIRs and factor in the allowances for possible tactical variations.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) note the benefits of using GDPs over MINIT/MIT to resolve DCB issues; and
- c) consider adopting the practice of providing clarity on the intended use of MINIT/MIT.

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