International Civil Aviation Organization

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

Video Teleconference, 13 – 16 September 2022

Agenda Item 5: Regional ATFM Framework and Guidance Material

UPDATE ON INFORMATION EXCHANGE MODEL DEVELOPMENT TO SUPPORT ATFM OPEARTIONS, ATFM/A-CDM INTEGRATION, AND FF-ICE/TBO IN ASIA/PACIFIC REGION

(Presented by Japan, Singapore, Thailand, and USA)

SUMMARY

This paper presents the update on FIXM version 4.2 Extension development to support the ATFM information exchange required for cross-border ATFM operations, ATFM/A-CDM integration, and FF-ICE/TBO in the Asia/Pacific Region. It also provides a list of data attributes included in the FIXM version 4.2 Extension developed and tested. Moreover, it gives the update on the possible usage of FLXM to support the exchange of ADP.

1. INTRODUCTION

1.1 It is specified in the Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management (ATFM), version 3 (August 2017), developed by the Asia/Pacific ATFM Steering Group (ATFM SG) that FIXM (Flight Information Exchange Model) version 3.0 (or later), extended where necessary to accommodate additional requirements, is the agreed ATFM information exchange model for exchanging ATFM data between ATFM systems in the Asia/Pacific Region.

1.2 Under its Terms of Reference (TOR), the Asia/Pacific SWIM Task Force (SWIM TF) is required to support APANPIRG Working Groups and Task Forces regarding information exchange models and examine if any extension to the existing information exchange models, i.e. AIXM (Aeronautical Information Exchange Model), FIXM, and IWXXM (ICAO Meteorological Information Exchange Model), and/or the new information exchange model(s) are required for the Asia/Pacific regional operational requirements.

1.3 In 2017, based on the operational requirements for ATFM data exchange, including the detailed interaction among related stakeholders involving in the cross-border ATFM operation, obtained from ATFM SG, a set of ATFM data attributes was derived and examined against FIXM version 4.0. With the finding that the Calculated Take-Off Time (CTOT) and Calculated Landing Time (CLDT) fields considered necessary to support the cross-border ATFM operations were not included in the FIXM version 4.0 Core, the FIXM version 4.0 Extension including CTOT and CLDT was developed. A system-to-system interconnection test between Singapore and Thailand to validate the exchange of developed FIXM version 4.0 Extension was successfully conducted in August 2017 using the CTOT Distribution and CTOT Cancellation use cases designed based on the Web Services (HTTP) messaging protocol.

1.4 With the release of FIXM version 4.1 in December 2017, a set of required ATFM data attributes was re-examined and it was still found that both CTOT and CLDT fields were not part of the FIXM version 4.1 Core. The FIXM version 4.1 Extension with CTOT and CLDT included was therefore

developed and the validation of developed FIXM version 4.1 Extension was completed in the end of April 2018.

1.5 Based on the operational scenarios developed for the SWIM in ASEAN Demonstration, additional data attributes required to be exchanged among stakeholders involving in A-CDM (Airport-Collaborative Decision Making) operation and to support the integration between ATFM and A-CDM were identified. Consequently, the FIXM version 4.1 Extension was further developed to include these data attributes. In November 2019, the FIXM version 4.1 Extension aforementioned was adopted by APANPIRG/30 to be the Asia/Pacific FIXM version 4.1 Extension for use by Asia/Pacific States/Administrations to support the cross-border ATFM information exchange. This Asia/Pacific FIXM Extension was also uploaded to the ICAO Asia/Pacific Regional Office website. Moreover, the Asia/Pacific FIXM Extension was forwarded to the FIXM Change Control Board (CCB) for review and it was published on the FIXM official website for use by other stakeholders as well. **Table 1** shows the list of data attributes included in the Asia/Pacific FIXM version 4.1 Extension.

Estimated	Calculated	Target	Actual
		TOBT	AOBT
		TSAT	
	CTOT	TTOT	
ETO	CTO		ATO
ELDT	CLDT		
Other			
Trajectory		**Aircraft Track**	
• ETO • CTO • ATO • Flight level or Altitude • Waypoint		• Ground speed • Bearing • Flight level or Altitude • Position (Designator or Latitude/Longitude or Relative Point) • Time over position	

Table 1: Asia/Pacific FIXM version 4.1 Extension Data Attributes

1.6 It is worth mentioning that the Asia/Pacific FIXM version 4.1 Extension was used to support the conduct of operational scenarios regarding cross-border ATFM operations and ATFM/A-CDM integration during the SWIM in ASEAN Demonstration in November 2019. The demonstration results illustrated that, with the SWIM infrastructure and related information services designed and developed for the demonstration, the Asia/Pacific FIXM Extension could be utilized for the efficient information sharing among stakeholders in the distributed ATFM network environment.

2. DISCUSSION

2.1 With the release of FIXM version 4.2 in February 2021, the Asia/Pacific FIXM version 4.1 Extension have been updated to version 4.2. Based on the operational scenarios developed for the Multi-Regional TBO (Trajectory Based Operation) Demonstration Phase 1 and Phase 2A during 2020 and 2022, additional data attributes required to support A-CDM, traffic synchronization, FF-ICE (Flight and Flow Information for a Collaborative Environment), and TBO were identified. FIXM version 4.2 Extension was therefore developed to include these data attributes in addition to the data attributes included in the Asia/Pacific FIXM version 4.1 Extension.

2.2 However, after the thorough examination of FIXM version 4.2 Core, it was found that FIXM version 4.2 Core can support the exchange of some data attributes originally included in the Asia/Pacific FIXM version 4.1 Extension. The list of data attributes included in FIXM version 4.2 Extension, compared to the Asia/Pacific FIXM version 4.1 Extension, is presented in Appendix.

2.3 A system-to-system interconnection test among Japan, Singapore, and Thailand to validate the exchange of developed FIXM version 4.2 Extension was successfully conducted during the Multi-Regional TBO Demonstration Phase 2A (Lab Demonstration) in May 2022 using simulated operational scenarios, involving the following use cases:

- Exchange of trajectory parameters;
- Sharing of aircraft trajectory information;
- FF-ICE/R2 post-departure (airborne) trajectory negotiation and revision;
- ATFM/AMAN (arrival management) integration;
- Sharing of traffic sequence information; and
- Exchange of A-CDM milestones and the FF-ICE/R1 & A-CDM integration.

2.4 During the Multi-Regional TBO Lab Demonstration aforementioned, the exchange of ATFM Daily Plan (ADP) using the Flow Information Exchange Model (FLXM) version 2.0a, which is the information exchange model developed to support the sharing of ATFM-specific information, was also tested. It was found that this version of FLXM may not be able to support the exchange of all information contained in the Asia/Pacific regional ADP format. However, this issue may be solved by additionally defining the possible usage of current data attributes in the data dictionary of this FLXM version.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) provide the additional operational requirements, if any, to use FIXM version 4.2 Extension to support the cross-border ATFM and ATFM/A-CDM integration in Asia/Pacific region, and submit the consideration to SWIM TF in order to have Extension developed in due course if deemed necessary; and

c) discuss any relevant matter as appropriate.

– – – – – – – – – – – – – –

Appendix

FIXM version 4.2 Extension Data Attributes

Data Attribute	FIXM version 4.2
Originally included in the Asia/Pacific FIXM version 4.1 Extension	
ETO (Estimated Time Over)	Core
ELDT (Estimated Landing Time)	Core
CTOT (Calculated Take-Off Time)	Core
CTO (Calculated Time Over)	Core
CLDT (Calculated Landing Time)	Core
TOBT (Target Off-Block Time)	Extension
TSAT (Target Start-up Approval Time)	Extension
TTOT (Target Take-Off Time)	Extension
AOBT (Actual Off-Block Time)	Extension
ATO (Actual Time Over)	Extension
Trajectory • ATO • Flight level or Altitude • Position (Designator or Latitude/Longitude or Relative point)	Extension
Aircraft Track • Ground speed • Flight level or Altitude • Bearing • Position (Designator or Latitude/Longitude or Relative point) • Time over position (Report time)	Extension
Newly identified	
EIBT (Estimated In-Block Time)	Core
TIBT (Target In-Block Time)	Extension
TTO (Target Time Over)	Extension