*International Civil Aviation Organization*

**The Ninth Meeting of System Wide Information Management Task Force (SWIM TF/9)**

*Bangkok, Thailand, 14 – 17 May 2024*

Agenda Item 5: Updates on the assigned tasks by task leads/contributors including progress report and issues

**d) Technical Architecture**

- Task 4: Development and Maintenance of Regional Information Exchange Models

# UPDATE ON THE ASIA/PACIFIC FIXM VERSION 4.2 EXTENSION

(Presented by Thailand and USA)

**SUMMARY**

This paper presents the APAC FIXM version 4.2 Extension analysis results of the FIXM Development Team under the FIXM Change Control Board. Recommendations and feedback provided by the FIXM Development Team as well as the next steps to improve the Extension for the next version are also discussed.

## 1. INTRODUCTION

1.1 Flight Information Exchange Model (FIXM) was introduced and has been utilized to deliver flight information to support future Air Traffic Management (ATM). Its extensibility allows users to deliver more specific information used in their operations.

1.2 It was specified in the Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management (ATFM), version 4 (October 2022), developed by the Asia/Pacific ATFM Steering Group (ATFM SG) that FIXM version 4.2 (or later), extended where necessary to accommodate additional requirements, was the agreed ATFM information exchange model for exchanging ATFM data between ATFM systems in the region.

1.3 Based on the operational requirements obtained from ATFM SG and the operational scenarios developed for the Multi-Regional TBO (Trajectory-Based Operation) Demonstration, a set of data attributes was derived and examined against FIXM version 4.2 Core. With the finding that the data fields, identified necessary to support the requirements and the conduct of scenarios aforementioned, were not included in FIXM version 4.2 Core, the FIXM version 4.2 Extension was developed to include these data fields.

1.4 In December 2023, the FIXM version 4.2 Extension was adopted by APANPIRG/34 (Conclusion APANPIRG/34/9) to be the Asia/Pacific (APAC) FIXM version 4.2 Extension for use by Asia/Pacific States/Administrations to support the cross-border ATFM information exchange and the ATFM/A-CDM integration. This APAC FIXM Extension was also uploaded to the ICAO Asia/Pacific Regional Office website. Moreover, the Extension was forwarded to the FIXM Change Control Board (CCB) for review before publishing on the FIXM official website for use by other stakeholders.

## 2. DISCUSSION

2.1 A review of the APAC FIXM version 4.2 Extension was completed by the FIXM Development Team of the FIXM CCB in March 2024. The analysis resulted in several optional recommendations for data modeling and technical considerations. Appendix A shows the FIXM Development Team's detailed recommendations and feedback ranked by priority, together with the discussion results between the FIXM Development Team and the Extension Development Team.

Summary of Recommendations

2.2 The recommendations/feedback consist of several topics, including:

- schema imports;
- class to extend for particular data elements;
- the modeling suggestion to use sequence instead of choice structure; and
- clarifications on the types of positions that would be captured in the Extension.

All of the recommendations/feedback are optional and this APAC Extension does not require any changes to be made at this time.

2.3 One of the recommendations worth highlighted is about Schema (XSD) Imports, specifically about importing a particular namespace only one time each. It was echoed that some XML parsers have an issue where only the first <xs:import> for a particular namespace will be processed while all further imports will be ignored. The APAC FIXM version 4.2 Extension currently imports from a single namespace multiple times and this could potentially cause parser problems. The recommendation was to adjust the schema to only import the package-wide to include files for Base and Flight to avoid this potential problem. However, based on the technical tests conducted so far, the imports as being done in the Extension are unlikely to pose an issue at this time. Therefore, this suggestion could be incorporated when the Extension is updated from FIXM version 4.2 to FIXM version 4.3.

2.4 For other recommendations such as modeling design decisions, additional coordination between the FIXM Development Team and the Extension Development Team may be required.

Next Steps

2.5 The review resulted in no immediate required changes for the APAC Extension and it will be presented to the FIXM CCB for awareness among members. Several items identified by the FIXM Development Team will certainly be taken into account for improvement for the next version of the Extension. Additionally, the teams will coordinate further to address several areas specified, including conceptual areas such as the usage of the actual trajectory as well as technical considerations of modeling decisions.

2.6 In particular to the actual trajectory data elements, the teams will continue to discuss their usage. Based on the outcome of coordination so far, these elements could be recommended as a candidate for inclusion in the next version of FIXM Core. For the technical-related matters, the teams will continue to coordinate to determine the most appropriate modeling to accomplish the use cases intended for the APAC Extension. Any changes would be targeted for the FIXM version 4.3 update to the Extension.

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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# Appendix A

## FIXM version 4.2 APAC Extension Recommendations and Feedback

1. Schema (XSD) Imports
   Some XML parsers have an issue where they will only process the first <xs:import> for a particular namespace and ignore all further imports. This is why FIXM produces its so-called "package-wide include files", so that one import can be used to get all files that might be needed for a particular namespace in one step and avoid this problem. Include all the schema files in two namespaces, so this change should avoid the potential parser issue.

   | This item is expected to be implemented in the APAC Extension when the extension is updated for FIXM version 4.3 Core. |
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2. ApacActualTrajectoryType
   Adding a container element called "actual" under the RouteTrajectoryGroupContainer would better align with the existing style used by FIXM, similar to existing container elements such as "desired" and "agreed".

   | The FIXM Development Team and the APAC Extension Development Team will discuss this item to ensure that the use case is well understood, and then determine whether it would be in the updated extension or a candidate for the next version of FIXM Core. |
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3. ApacAircraftTrackType
   Positioning this field under "enRoute" and inheriting from the EnRouteExtensionType would better align with the FIXM organization.

   | After discussion between the teams, it is found that this currently fits the intended use of the data, it will therefore be left as-is. |
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4. ApacAircraftTrackSpeedChoiceType
   To align with the FIXM Core v.4.3.0 modeling approach, we recommend using a sequence instead of a choice structure. While the current APAC Extension approach provides better validation, developers have encountered issues with this approach using JAXB. Specifically, JAXB requires users to make use of its ".getContent()" catchall when dealing with this sort of structuring.

   | For this reason, FIXM Core v4.3.0 applies the simpler sequence approach throughout the model. This item requires additional technical discussion to determine the technical limits of a sequence in the model. |
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5. ApacAircraftTrackType
   Can the "position" element be a GeographicalPositionType, rather than a SignificantPointChoiceType? In our experience, current tracks are typically conveyed via the latitude/longitude of the aircraft. If this is appropriate for the APAC use case, using GeographicalPositionType would be more compact.

   | After discussion between the teams, it is best to continue the use of SignificantPoint for now. |
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