INTERNATIONAL CIVIL AVIATION ORGANIZATION

TWENTY SEVENTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/27)

Bangkok, Thailand, 5 to 8 September 2016

Agenda Item 3: **Performance Framework for Regional Air Navigation Planning and Implementation**

3.4: **CNS**

MINI GLOBAL DEMONSTRATION PARTICIPATION TO ENHANCE AIR TRAFFIC MANAGEMENT WITH SEAMLESS INFORMATION SHARING

(Presented by Japan, Singapore, and Thailand)

SUMMARY

This paper presents the participation of Japan, Singapore, and Thailand in the Mini Global Demonstration project led by USA, to foster the seamless information sharing and global interoperability based on SWIM (System-Wide Information Management) concept, in support of ICAO GANP (Global Air Navigation Plan). The paper details the activities carried out in the project, including the global and Asia/Pacific regional demonstration held in April and May 2016, respectively, as well as the lessons learnt during the development of technical support systems

Strategic Objectives:

B: ***Air Navigation Capacity and Efficiency****—Increase the capacity and improve the efficiency of the global aviation system*

1. INTRODUCTION

1.1 Mini Global Demonstration is the project led by FAA (Federal Aviation Administration) to exhibit the globally interoperable systems designed based on SWIM (System-Wide Information Management) concept and the use of internationally standardized information exchange models, i.e. FIXM (Flight Information Exchange Model), AIXM (Aeronautical Information Exchange Model), and IWXXM (ICAO Meteorological Information Exchange Model). The project demonstrates how Air Navigation Service Providers (ANSPs) and other aviation stakeholders are able to collaboratively make decisions by utilizing the information seamlessly shared within and across regions in order to improve ATM (Air Traffic Management) performance as envisaged in the ICAO Global ATM Operational Concept and Global Air Navigation Plan.

1.2 In September 2014, the Mini Global I Demonstration (MG I) held at the Florida NextGen Test Bed at Embry-Riddle Aeronautical University was conducted successfully. FAA, JCAB (Japan Civil Aviation Bureau), CAAS (Civil Aviation Authority of Singapore), and AEROTHAI (Aeronautical Radio of Thailand Limited), together with other ANSPs and aviation industries showcased the possible architecture for global SWIM and performed the demonstration of operational use cases which mainly focused on the exchange of FIXM and AIXM messages. With the remarkable

accomplishment of MG I, the Mini Global II Demonstration (MG II), built on the lessons learnt from MG I, was executed in April 2016 where the extended global SWIM architecture and more complex use cases including the exchange of IWXXM messages were presented.

1.3 Furthermore, the demonstration of operational scenarios that were of particular interest to the participating partners in the Asia/Pacific (APAC) region was performed during the ICAO SWIM workshop held at the ICAO Bangkok Regional Office in May 2016, to promote awareness among States in the APAC and MID (Middle East) regions on the feasibility of early SWIM implementation and importantly to illustrate the possible operational benefits enabled by SWIM infrastructure.

2. DISCUSSION

2.1 The objectives of the MG II were as follows:

- To demonstrate the Global Enterprise Messaging Services (GEMS) interoperability as one potential solution to realize the global network to connect local and regional SWIMs;
- To establish messaging standards, governance, and interoperability business rules in order to support regionally diverse EMS providers;
- To extend international partnerships;
- To develop and execute complex use cases;
- To demonstrate new applications and services to benefit global aviation.

2.2 Based on technological capability, participants in MG II can be divided into four service levels as follow:

- Service Level 1 – Consumer, i.e. the participant is only able to consume data from MG but not able to publish any data back;
- Service Level 2 – Native System Consumer & Producer, i.e. the participant is able to consume and produce FIXM/AIXM/IWXXM messages using the Mini Global adapter provided;
- Service Level 3 – FIXM/AIXM/IWXXM Consumer & Producer, i.e. the participant is able to consume and produce FIXM/AIXM/IWXXM messages using his own system; and
- Service Level 4 – FIXM/AIXM/IWXXM Flight Object Manager, i.e. the participant is able to consume and produce FIXM/AIXM/IWXXM messages using his own system having Flight Object Manager capability.

For the involvement of APAC States in MG II, Japan participated at Service Level 4, while Singapore and Thailand participated at Service Level 3.

2.3 The operational use cases which were of particular interest to APAC States participating in MG II demonstration can be categorized into two groups, namely the cross-border Air Traffic Flow Management (ATFM) and the international information exchange.

2.4 By using the GEMS architecture as one possible representation of a global network and standardized information exchange model-based messages (i.e. FIXM and AIXM messages), the Distributed Multi-Nodal ATFM operation was demonstrated. It was recognized that the information flow and the CDM (Collaborative Decision Making) among stakeholders were obviously improved by utilizing the SWIM architecture that in turn helped enhance the predictability as well as the optimization of traffic flow to accommodate the airport and airspace constraints.

2.5 For the international information exchange, several operational use cases concerning the Civil-Military Air Traffic Management Coordination and the weather-constrained situation were presented by using the exchange of FIXM/AIXM/IWXXM messages. It was clearly seen that the advance notice of military airspace usage and weather condition helped improve the optimization of flight operations and the airspace utilization.

2.6 Besides the cross-border ATFM and the international information exchange, the assignment and the handling of Globally Unique Flight Identifiers (GUFIs) for transit flights, where the same aircraft is used for both legs of the flight with a short turn-around time, was explored.

2.7 Moreover, the management of data governance by the GEMS providers, where the partners are able to determine the recipients of the data that they distribute, was investigated. It was found that, with the data governance put in place, the sharing of sensitive data such as surveillance track data among partners was efficiently controlled and consequently resulted in the reduction of network bandwidth required for information exchange.

2.8 Some of the aforementioned operational scenarios helped prove the possibility to perform translation between FIXM and ICAO 2012 format. It is important as there would be a period of time where both FIXM and ICAO 2012 formats need to be supported concurrently, while ANSPs start transiting to Flight and Flow Information for a Collaborative Environment (FF-ICE) concept.

2.9 However, one of the crucial lessons learnt during the development of technical support system was the limitation of using ATS message-based system in the future operational environment. For example, use of FIXM for non-traditional transaction, e.g. Calculated Take-Off Time (CTOT), needed to be agreed upon beforehand.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

a) note the information contained in the Paper;

b) discuss how the experiences gained from MG II would be able to support the APAC Seamless ATM Plan;

c) discuss any relevant matters as appropriate.

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