



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**TWENTY FIFTH MEETING OF THE
ASIA/PACIFIC AIR NAVIGATION PLANNING AND
IMPLEMENTATION REGIONAL GROUP (APANPIRG/25)**

Kuala Lumpur, Malaysia, 8 – 11 September 2014

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

3.2: ATM

PRESENTATION OF THE MINI-GLOBAL DEMONSTRATION

(Presented by the United States of America)

SUMMARY

This paper provides an update on the Mini-Global Demonstration, and the collaborative efforts between the US Federal Aviation Administration, the Civil Aviation Authority of Singapore, the Japan Civil Aviation Bureau, NAV Canada, the Republic of Korea, AEROTHAI, Airservices Australia, and European partners, to ensure it is a successful program. The main goal of Mini Global is to demonstrate the use of SWIM and established standards in a seamless transfer of data between air navigation service providers to ultimately promote more efficient operations across multiple Flight Information Regions (FIRs). The Mini-Global Demo also fully supports the validation of ICAO Flight and Flow-Information for a Collaborative Environment (FF-ICE). The Demonstration is planned for September 2014.

1. INTRODUCTION

1.1 The Mini-Global Demonstration continues to be a mechanism for Air Navigation Service Providers (ANSPs) to test systems and processes, in order to enhance efficiencies in the air traffic system. The Mini-Global project is aimed at developing seamless information sharing across Flight Information Regions (FIRs), and involves collaboration amongst service providers and others from the United States, Singapore, Canada, Australia, the Republic of Korea, Thailand, Japan, and European partners. The Mini-Global Demonstration is scheduled to be held in September 2014, and will help participants observe the benefits of using standardized information exchange models of communication to transmit data, paving the way for a more efficient air traffic management system. It also aims to reduce the use of antiquated flight plan formats. Many ANSPs have committed to participating, while others will observe the full demonstration. Full participants with technological capabilities will link in from various global locations, while observers are invited to participate at the NextGen Test Bed (FTB) in Florida or at a full participant's site in order to observe the demonstration.

2. DISCUSSION

2.1 The Mini-Global Demonstration will work to increase global interoperability and decrease inefficiencies, in support of the goals of the Global Air Navigation Plan (GANP) and the Aviation System Block Upgrades (ASBUs). The Mini-Global Demonstration will seek to advance collaborative information exchanges amongst operators and other ANSPs worldwide. The Demonstration supports the ultimate goals of seamless interoperability and harmonization.

2.2 To date, several air navigation service providers (ANSPs) and operators have committed to participating in or observing the Mini-Global Demonstration, including those discussed in this paper.

2.3 To prepare for the September 2014 Mini-Global Demonstration, several ANSPs held a Risk Mitigation Demonstration (RMD) on March 5, 2014, at the NextGen Test Bed in Florida. The RMD allowed for the identification of associated risks and challenges that need to be addressed prior to the full Mini-Global Demonstration. The results generated from the RMD are being used to update the Mini-Global architecture, demonstration scenarios, and methodologies prior to the September demonstration. Additionally, successful technical interchange meetings were held in Europe and Asia in March and April with Mini-Global partners.

2.4 The full Mini-Global Demonstration will provide scenarios using simulated and live flight data in support of the concept of a seamless global sky. The demonstration capabilities that will be included in the Mini-Global Demo include flight plan submission, boundary coordination, dangerous goods, fleet prioritization, and common viewer. Additionally, Globally Unique Flight Identifier (GUFI) will be a major component of the program.

2.5 Also, as previously noted, the Mini-Global Demonstration will show support for FF-ICE in its description of how flight information should develop for airspace users to reach and maintain the benefits as articulated in ICAO documents.

2.6 Many partners have committed to participate in the Demonstration. Airservices Australia are a Mini-Global Level 4 participant, meaning that Airservices will both produce and consume flight information, and manage the flight information (including allocation of GUFIs for flights that originate in Australian airspace). Information received by the Airservices platform includes flight plan and related ATS messages over the AFTN, flight progress updates and position reports (radar and ADS-B) from the Airservices ATM platform, and a restricted set of oceanic position reports. The flight information sources are fused with the information received via the Mini-Global gateway, and cause flight information to be published to the Mini-Global platform. Airservices plans to provide information not just on flights between the United States and Australia, but also for flights to regional partners involved in Mini-Global (such as JCAB). This will allow regional partners early access to flight information through the Mini-Global platform for flights heading to their airspace from Australia. Airservices will subscribe to flight information for flights to Australia from the regional partner if that partner is able to publish such information.

2.7 NAV CANADA will also participate in the Mini-Global Demonstration as a Level 3 participant. As a participant, NAV CANADA will produce flight data based on ICAO4444 messages, convert it to FIXM V2.0 format, and publish it on an Enterprise Service Bus (ESB) for access by the NextGen Test Bed during the Mini-Global Demonstration. NAV CANADA will create a GUFI for each message and provide it in FIXM format, as required by the MG demonstration. NAV CANADA will also produce meteorological data based on the current SIGMET, METAR, and SPECI products, convert it to WXXM V1.1 format, and publish it on the ESB for access by the FTB. Other objectives include validating XML transactions, the NAV CANADA ESB prototype, and the potential use of Mini-Global and/or similar platforms for SWIM data sharing. NAV CANADA will not produce/deliver AIXM data nor provide a flight object management service function at this time. NAV CANADA will subscribe to data from Mini-Global only for viewing on the MG viewer and does not intend to consume any data from the demonstration for use by its internal systems/applications.

2.8 Singapore is participating in the Mini-Global Demonstration at Service Level 3, meaning that Singapore will produce and consume flight information in FIXM format. A demonstration platform (consisting of a data processor and databases) that communicates with Mini-Global Enterprise Messaging Service (EMS) using JMS and SOAP Web Service protocols has been

implemented. The platform allows Singapore to contribute towards the demonstration of SWIM Global Interoperability with the capability to establish a VPN connection over the Internet to the EMS, and to request for GUF1 from the EMS GUF1 service. Singapore will also demonstrate FF-ICE/1 mixed mode and filing provisions by translating flight information from FPL2012 format into FIXM format (correlated with the requested GUF1 from EMS). The FIXM format Flight Plan will then be published to the EMS to allow subscription and sharing among interested participants.

2.9 The Japan Civil Aviation Bureau (JCAB) is also participating as a Mini-Global Level 3 participant. Real-time data on operational use will be utilized in the Mini-Global Demonstration for the distribution of flight data. Concerning the governance of security issues for real-time data, JCAB will deliver the flight data delayed by five minutes, and it will be internationally-scheduled flight information related to airports in the United States and Australia. The real-time data will be converted to the data elements of FIXM version 2.0 with GUF1, which is generated by FIXM version 1.1. Also, several scenarios which are verified to the interference between the constraint area and a traffic route, utilizing the standardized format, will be demonstrated while cooperating with other members. JCAB is currently developing the environment for this demonstration together with the Electronic Navigation Research Institute (ENRI).

2.10 The Republic of Korea (ROK), AEROTHAI, and European partners will also participate in the Mini Global Demo.

2.11 During the APANPIRG Meeting, a joint interactive Mini Global presentation with participating Asian partners will be presented. Screen captures/video clips will be used to showcase partners' capabilities and contributions. The Mini Global Viewer will also be used to display FIXM data from the Florida NextGen Testbed during the symposium.

2.12 In support of global harmonization and interoperability, Mini-Global will also be part of ICAO's Block Upgrade Demonstration Symposium & Showcase (BUDSS), scheduled for May 2015 in Montreal.

2.13 After the successful completion of Mini-Global, the FAA plans to move forward with the next iteration of the program, Mini-Global II. This demonstration will focus on the "Green Cloud" infrastructure - the connectivity and data sharing between multiple Enterprise Messaging Services (EMS) – and continue to support the validation of FIXM/AIXM/WXXM standards by using additional datasets for complex use cases, and address the backwards compatibility of these global exchange standards. Global policies, protocols, security, and business sensitivity requirements will be identified, and mediation between diverse EMSs will be demonstrated in an effort to provide an infrastructure for future applications/services to benefit Global ATM. Broader collaboration with existing and new partners is anticipated under this program, including collaboration with IATA/airlines for active participation, and a wider base of participation from Europe, Asia, the Middle East and the Western Hemisphere. Mini Global II will also assess opportunities to collaborate with the European Global SWIM effort. At the conclusion of this demonstration, a final demonstration report will include an assessment of the global ATM interoperability/harmonization options and provide considerations for future global adoption.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information provided in this Working Paper, comment about experiences with demonstrations, and prepare for participation in the Mini-Global Demonstration, if applicable.

Addendum 1 Mini-Global Scenario Use Cases

The Mini-Global project will demonstrate the exchange and applicability of FIXM, WXXM, and AIXM. Two demonstrations will be held as part of the Mini-Global program: the Risk Mitigation Demonstration (RMD) and the Final Demonstration.

Realistic operational scenarios, each encompassing a set of use cases, will illustrate how the Mini-Global concept could be used to support the sharing of data in international air traffic operations. The operational scenarios provide a high-level description of how a variety of capabilities are enabled using Mini-Global. The use cases within the scenarios provide a much greater level of detail, and will be further refined in collaboration with international partners. The purpose of each use case is to highlight a specific capability within the operational scenario, and describe how each capability could be implemented using the Mini-Global infrastructure.

To demonstrate this data exchange and its potential use to enable international collaboration and interoperability, three operational scenarios are being considered for the two demonstrations:

- Scenario 1: International Flight Coordination and Harmonization
- Scenario 2: Arrival and Surface Management
- Scenario 3: Surface and Departure Management

For the Mini Global RMD, a select set of the Scenario 1 Use Cases was utilized (see Figure 1, below).

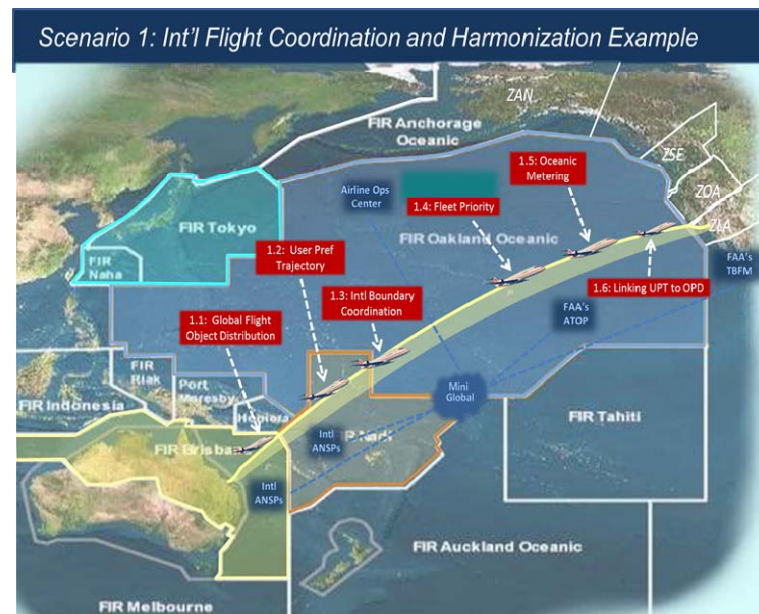


Figure 1: International Flight Coordination and Harmonization Scenario

The following provides a brief description of the Mini-Global Scenario 1 Flight Coordination and Harmonization Uses Cases. The Use Cases considered for the Mini-Global RMD are noted with an “**”.

- Capability 1: Global Flight Object Distribution**

This set of Use Cases, one for an international inbound and another for an international outbound flight, illustrates the data exchange required prior to flight departure, including all stakeholders involved and all means of transmission required, and the data exchange required in order to share FIXM, AIXM, and WXXM data among stakeholders. Another Use Case within this set demonstrates the data exchange and access for Dangerous Goods information as a flight progresses from pre-departure through arrival.

- Capability 2: User Preferred Trajectories (UPT)

In this Use Case, the flight operator requests a route change that involves multiple Flight Information Regions. This request, as well as the subsequent negotiation, evaluation, collaboration, and approval are conducted without voice communication.

- Capability 3: International Boundary Coordination**

This Use Case illustrates the data exchange required by the transferring Air Navigation Service Provider (ANSP) to identify and resolve conflicts before handing off an aircraft to the receiving ANSP.

- Capability 4: Fleet Prioritization

This Use Case illustrates the data exchange required for the utilization of flight operator prioritization of an international flight during an arrival metering program.

- Capability 5: Oceanic Metering

In this Use Case, arrival metering programs have early information on oceanic flights, and incorporate this information into the metering program. This allows the constraint at the airport to be met with minimal airborne holding, or other large trajectory modifications.

- Capability 6: Linking User Preferred Trajectories (UPT) to Optimized Profile Descent (OPD)

This Use Case will illustrate the optimal flight profile afforded by combining all of the previous five capabilities, and will link that to the OPD.

Addendum 2 Mini-Global Service Levels

Service Level 1 – Consumer

Service level 1 is a consumer only by participation and does not require partners to publish information. Data can be consumed through traditional file transfer means, such as email and secure FTP. Additionally, a secure VPN connection may be established to access the Mini-Global enterprise messaging infrastructure and services to request data directly from participating data providers. To ensure that observers receive the full benefits of the Mini Global program, representatives of the observer organization must be present for the Mini Global Demonstration at the NextGen Test Bed in Florida, or at a location of a Service level 2, 3, or 4 Participant.

Service Level 2 - Native System Consumer & Producer

Service level 2 participation involves producing and consuming flight information using the participant's native system formats. The data transmitted and received by the participant will be exchanged in its legacy system formats. A FIXM conversion service will be provided by a Mini-Global enterprise messaging service provider for each participant. Please note that only ICAO 2012 related content will be converted into FIXM format. Data consumed from the Mini-Global enterprise will be in AIXM, WXXM, or FIXM formats. ICAO 2012 content may be converted back to legacy format depending on requirements of the participant.

Service Level 3 - AIXM/WXXM/FIXM Consumer & Producer

This service level produces and consumes data using standardized exchange models AIXM, WXXM, and FIXM. Globally Unique Flight Identifier (GUFID) services may be provided either by the participant or via the Mini-Global GUFID Service. The GUFID is a unique identifier assigned to each unique flight. It is assumed this participant will not be providing a Flight Object Manager (FOM) function.

Service Level 4 - AIXM/WXXM/FIXM Flight Object Manager

This service level produces and consumes data using standardized exchange models AIXM, WXXM, and FIXM. Connection can be made via an existing Mini-Global service provider or an ANSP's Global SWIM service connected to the Mini-Global enterprise messaging infrastructure. The rules for SWIM connections are defined by the FAA "SWIM Service Compliance Requirements" document. A Flight Object Manager (FOM) service must be provided by the participant to manage Flight Object governance and validation policies.