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

SWIM Implementation Pioneer Group Progress Report

(Presented by SIPG)

SUMMARY

This paper gives a summary of the work that the SWIM Implementation Pioneer Group (SIPG) has done to progress the implementation of an Asia-Pacific SWIM since the last SWIM Task Force meeting.

1. INTRODUCTION

1.1 The SWIM Implementation Pioneer Group was proposed and formed at the 7th meeting of the SWIM Task Force (SWIM TF/7).

1.2 The terms of reference as presented in flimsy 02 (SWIM TF/7 – Flimsy 02) states that the first deliverable of the SIPG is to build a SWIM Technical Infrastructure prototype according to the architecture as decided by the SWIM task force using the CRV as the IP based network.

1.3 This paper presents the work done so far to achieve the above deliverable.

2. DISCUSSION

2.1 It was decided at the SWIM Task Force 7 meeting the SIPG should use the SWIM over CRV and Surveillance Sharing over SWIM joint event as the target for the construction of the APAC SWIM prototype.

2.2 This is because the Joint Event is the nearest SWIM demonstration event to the Task Force 7 meeting that involved the most number participants in the Asia – Pacific Region.

2.3 To achieve this goal, the SIPG held a total of 12 meetings prior to the SWIM Task Force 9 meeting. All the meetings were done via virtual means.

2.4 The SIPG deliberated on the appropriate SWIM architecture to use for the demonstration based on the decisions reached during the task force meetings and it was decided that further elaboration was necessary to make the architecture useable for the purpose of the Joint Event.

2.5 The result of the deliberation is a hierarchical SWIM architecture. This is illustrated in the figure below:

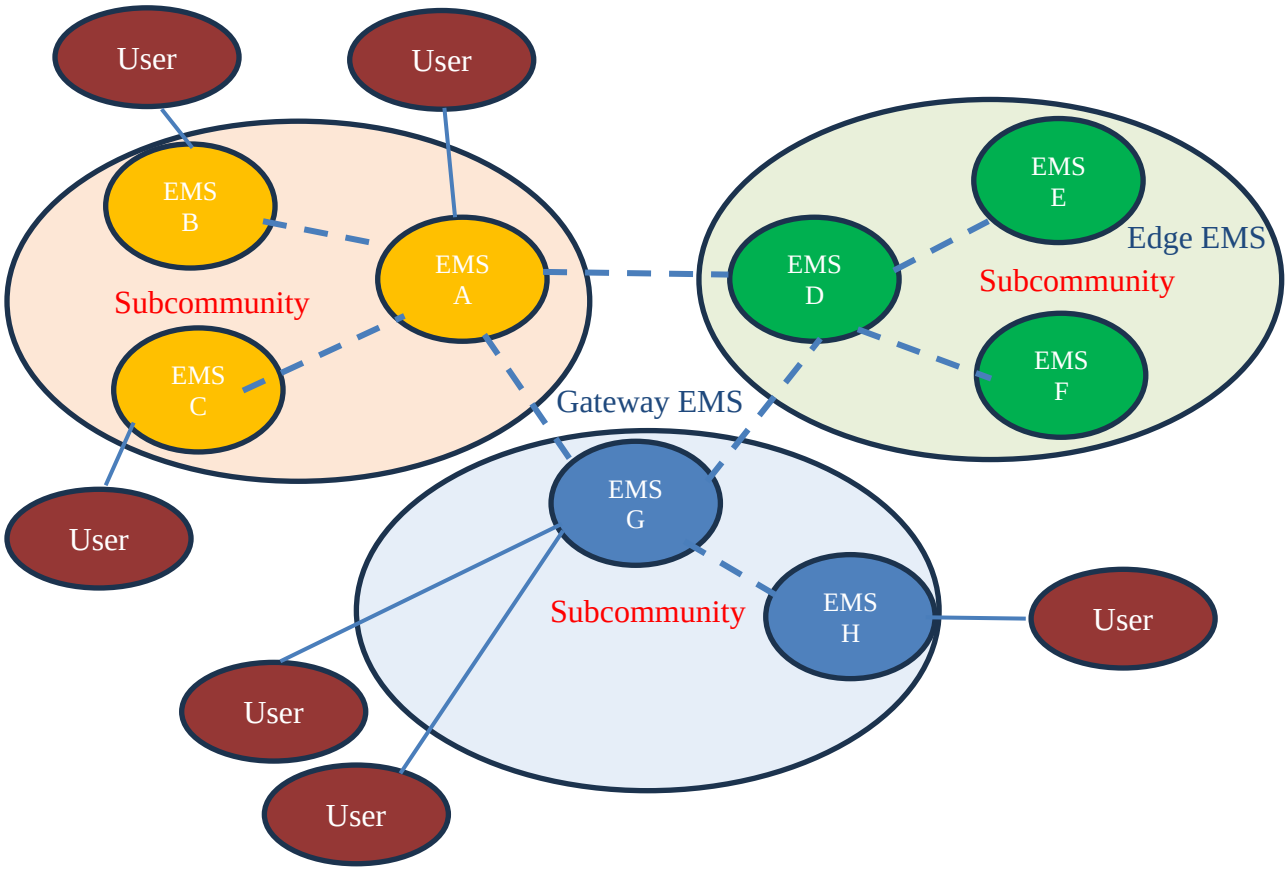

Figure 1: Hierarchical SWIM Architecture

2.6 The SIPG arrived at this design after deliberating over several others that would also fit into the model decided at the SWIM Task force level. This design offers the best compromise between connectivity and simplicity.

2.7 To facilitate message transmission within this architecture, it is necessary to use metadata to route messages, especially between edge EMS of different subcommunities. To this end, the SIPG developed a set of metadata to be used for routing messages during the Joint Event. The metadata file is found in appendix A.

CURRENT STATUS

2.8 For the Joint Event, the EMS providers are organized into 4 gateway EMS with 5 corresponding edge EMS to form the 4 subcommunities. They are as follows

a) China as gateway EMS with Republic of Korea as edge EMS
b) Hong Kong – China as gateway EMS with Japan and PCCW as the edge EMS
c) Singapore as gateway EMS with Malaysia as edge EMS
d) Thailand as gateway EMS with India as edge EMS.

2.9 As of the writing of this paper, all the gateway EMS are now interconnected with each other, and messages exchange has been successfully tested.

2.10 Edge EMS to edge EMS testing has been successfully completed between Republic of Korea and Malaysia through the China and Singapore gateway EMS.

2.11 It is expected that the edge-to-edge testing between the remaining pairs of edge EMS will be completed before the end of April 2024 and that scenario testing will be completed before the SWIM Task Force 9 meeting.

2.12 With the above status, it is foreseen that the demonstration portion of the Joint Event will still be able to be completed successfully as all the contributors are connected and communicating.

2.13 With regard to the surveillance sharing portion, it is expected that this portion will also be able to progress without any hinderance.

SUBSEQUENT WORK AFTER THE JOINT EVENT

2.14 The SIPG will need to carry on its work post event to document the lessons learnt from the setup and operation of this hierarchical SWIM architecture.

2.15 There is a need to measure the amount of bandwidth used during the demonstration and trial from which we will estimate the potential required bandwidth needed to support an operational Asia-Pacific SWIM.

2.16 The SIPG will also study the strengths and weaknesses of the implemented SWIM architecture. There may be a need to explore different SWIM architectures because of this work and further trials may be proposed.

2.17 The SDS team demonstrated the possibility of interconnecting registries to allow for service discovery. The SIPG should expand on that work to interconnect the registries within the above SWIM architecture. The EMS providers should ensure the interconnections and interactions between the different SWIM Registries are facilitated and supported.

2.18 The Trust Framework Panel has produced some guidance material trusted message exchange. The guidance material makes reference to the Public Key Infrastructure (PKI) and the use of certificates to protect the messages being transferred. The SIPG plans to study this material and to implement a version of it in the SWIM architecture.

2.19 The SWIM task force, through two separate surveys, have identified several common SWIM information services. The SIPG will investigate these services to identify several that could be implemented. It is important that there are use cases to support the implementation of the services.

2.20 As the SWIM architecture continues to evolve there may be other states and parties that may want to be onboarded as an edge EMS or gateway EMS in the architecture. Part of the continuing work of the SIPG would be to aid these states

and parties to complete the onboarding and help confirm the connection and message routing.

2.21 The SIPG should also look to other groups within the ICAO Asia-Pacific Regional Office that are working on topics closely related to SWIM, e.g. FF-ICE and TBO for opportunities to collaborate.

2.22 These activities are the proposed work plan for the SIPG for the next twelve months.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss the proposed plan; and

c) discuss any relevant matter as appropriate

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Message Headers and Metadata for S3TIG Demonstration

Header Name	Values	Descriptions	Mandatory / Optional	Data Type	Notes
APAC_SOURCE	VH_HKCAD	Hongkong ASP (Contibutor & Consumer)	Mandatory	String	ATM Service Providers
	RJ_JCAB	Japan ASP (Contibutor & Consumer)			
	WM_CAAM	Malaysia ASP (Contibutor & Consumer)			
	RK_KAC	ROK ASP (Contibutor & Consumer)			
	WS_CAAS	Singapore ASP (Contibutor & Consumer)			
	VT_AEROTHAI	Thailand ASP (Contibutor & Consumer)			
	VA_AAI	India (Contributor & Consumer)			
	RJ_JAL	Japan Airlines			Airspace Users
	VH_PCCW	PCCW			Service Provider
APAC_RECIPIENT_LIST	ZB_ATMB	China ASP (Observer)	Mandatory	String	with EMS
	VH_HKCAD	Hongkong ASP (Contibutor & Consumer)			
	RJ_JCAB	Japan ASP (Contibutor & Consumer)			
	WM_CAAM	Malaysia ASP (Contibutor & Consumer)			
	RK_KAC	ROK ASP (Contibutor & Consumer)			
	WS_CAAS	Singapore ASP (Contibutor & Consumer)			
	VT_AEROTHAI	Thailand ASP (Contibutor & Consumer)			
	VA_AAI	India (Contributor & Consumer)			
	WI_CAI	Indonesia ASP (Observer)			without EMS
	VL_LPDR	Laos ASP (Observer)			
	NZ_AIRWAYS	NZ ASP (Observer)			
	OP_CAAPK	Pakistan ASP (Observer)			
	RP_CAAP	Philippines ASP (Observer)			
	YM_ASA	Australia (Consumer)			
	NF_FIJI	Fiji (Consumer)			
	RJ_JAL	Japan Airlines			Airspace Users
	VH_PCCW	PCCW			Service Provider
APAC_CATEGORY	FIXM	All FIXM Messages	Mandatory	String	
	AIXM	All AIXM Messages			
	IWXXM	All IWXXM Messages			
	ASTERIX	Surveillance Messages			
	GEOJSON	Meteorological Report Messages			
	JSON	Surveillance Messages in JSON Format			
APAC_CATEGORY_VERSION	FIXM_4_1	FIXM v4.1.0	Mandatory	String	
	FIXM_4_1_APAC	FIXM v4.1.0 APAC Extension			
	FIXM_4_2	FIXM v4.2.0			
	FIXM_4_2_FF_ICE	FIXM v4.2.0 (for FF-ICE R1 and R2)			
	FIXM_4_2_APAC	FIXM v4.2.0 APAC Extension			
	AIXM_5_1	AIXM v5.1			
	IWXXM_2_0	IWXXM v2.0			
	IWXXM_3_0	IWXXM v3.0			
	ASTERIX_CAT021	ASTERIX ADS-B Data Category			
	GEOJSON_4	GEOJSON v4.0			
	JSON_1	JSON v1.0			
	Values	**Descriptions**	**Format Type**		

APAC_MESSAGE_TYPE	PRELIMINARY_FLIGHT_PLAN	Preliminary Flight Plan	FIXM_FF-ICE R1	Mandatory	String	
	FILED_FLIGHT_PLAN	Filed Flight Plan	FIXM_FF-ICE R1			
	SUBMISSION_RESPONSE	Submission Response	FIXM_FF-ICE R1			
	FILING_STATUS	Filing Status	FIXM_FF-ICE R1			
	PLANNING_STATUS	Planning Status	FIXM_FF-ICE R1			
	FLIGHT_PLAN_UPDATE	Flight Plan Update	FIXM_FF-ICE R1			
	FLIGHT_ARRIVAL	Arrival	FIXM_FF-ICE R1			
	FLIGHT_DEPARTURE	Departure	FIXM_FF-ICE R1			
	FLIGHT_CANCELLATION	Flight Plan Cancel	FIXM_FF-ICE R1			
	TRIAL_REQUEST	Trial Request	FIXM_FF-ICE R1			
	TRIAL_RESPONSE	Trial Response	FIXM_FF-ICE R1			
	FLIGHT_DATA_REQUEST	Flight Data Request	FIXM_FF-ICE R1			
	FLIGHT_DATA_RESPONSE	Flight Data Response	FIXM_FF-ICE R1			
	TRACK_RAW	Track Raw Data	ASTERIX Binary Data			
	TRACK_JSON	Track JSON Message	ASTERIX JSON Data			
	Values	**Descriptions**	**Format Type**			
	TRACK	Track Message	FIXM APAC Extension			
	CTOT	Calculated Take Of Time	FIXM APAC Extension			
	Values	**Descriptions**	**Format Type**			
	NOTAM	Notices to Airmen	AIXM			
	SAA	Special Activity Airspace	AIXM			
	Values	**Descriptions**	**Format Type**			
	METAR	Aviation Routine Weather Report	IWXXM			
	SPECI	Special weather report	IWXXM			
	TAF	Terminal Area Forecast	IWXXM			
	SIGMET	Significant Meteorological information	IWXXM			
	AIRMET	Meteorological Information	IWXXM			
	VAA	Volcanic Ash Advisory	IWXXM			
DEP_AIRPORT	4 Letter ICAO Code	Departure Airport (used for flight identification)		Optional	String	
ARR_AIRPORT	4 Letter ICAO Code	Arrival Airport (used for flight identification)		Optional	String	
AIRLINE	Use ICAO Airline	Name of Airline		Optional	String	
ACID	FIXM-defined format for ACID	Aircraft Identification		Conditional Mandatory	String	Mandatory For Tracks and Flight Plans.
GUFI	GUFI from message	Globally Unique Flight Identifier		Optional	String	
EOBT	EOBT from message	Estimated off-block time (used for flight identification)		Optional	String	
FFICE_PHASE	PRELIM	Preliminary phase of FF-ICE		Optional	String	
	FILED	Filed phase of FF-ICE (Filed Flight Plan has been sent)		Optional	String	
APAC_TIMESTAMP	epoch time	Timestamp of the message out or in the system. The time is to be appended to this field when ever the message is posted into a message queue. This field is delimited with commas E.g. JAL_OUT:1675213637251, JCAB_IN: 1675213638200		Mandatory	comma delimited string of 64-bit signed integer represting the number milliseconds since Jan 1, 1970 00:00:00.000 UTC	Need to match the timestamp to a more specific location. E.g. there may more one EMS node per location. We may want to may have to determine what the granularity we want. Down to message Q?