International Civil Aviation Organization

THE FIFTH MEETING OF THE SURVEILLANCE STUDY GROUP (SURSG/5)

(Bangkok, Thailand 23-24 March 2026)

Agenda Item 3: States' experience with Surveillance data sharing

RECAP OF KEY OUTCOMES AND LESSONS LEARNT FROM THE JOINT EVENT

(Presented by Hong Kong China)

SUMMARY

This paper recaps the outcome and lessons learnt from the Joint Event of SWIM over CRV Demonstration and Surveillance Data Sharing in SWIM Trial, conducted by Surveillance Sharing in SWIM Trial Implementation Group (S3TIG).

1. INTRODUCTION

1.1 The Joint Event had been successfully conducted in Hong Kong China, from 28 – 29 May 2024, with the 1st day for system setup and rehearsal and the 2nd day the actual event day.

1.2 Various States/Administrations have participated in the preparation of the Joint Event including 7 States/Administrations (Hong Kong China, India, Japan, Malaysia, Republic of Korea, Singapore and Thailand) as Data Contributors and/or Consumers and 10 States/Administrations (Australia, China, Fiji, Indonesia, Laos PDR, New Zealand, Pakistan, Philippines, Sri Lanka and Vietnam) as Observers.

1.3 A total of over 100 participants from various States/Administrations, industrial leaders, airlines, data service providers, CRV provider attended the Joint Event in-person.

2. DISCUSSION

Outcome from the Joint Event

2.1 SWIM Services

For Joint Event, several potential SWIM services were devised and demonstrated, covering the full spectrum of existing SWIM data exchange models and the proposed surveillance data exchange models as follows:

#	Data Exchange Model	Data Version	Data Contributor
1	FIXM	FIXM_4_1_APAC	Hong Kong China, Singapore and Thailand
2	FIXM	FIXM_4_2	Japan, Malaysia and Thailand
3	IWXXM	IWXXM_2_0	Republic of Korea
4	IWXXM	IWXXM_3_0	Hong Kong China, Malaysia and Thailand
5	AIXM	AIXM_5_1	Japan

6	ASTERIX	ASTERIX_CAT021	Hong Kong China, Japan, Malaysia, Republic of Korea, Singapore and Thailand

2.2 Operational Scenarios

To showcase the operational benefits brought by SWIM, S3TIG identified the following operational scenarios with higher probability of realization as SWIM use cases for demonstration:

#	**Scenario**	**Involved Parties**
1	ATFM & Surveillance Data Sharing	Hong Kong China, Singapore and Thailand
2	FF-ICE	Japan and Thailand
3	MET	Republic of Korea

2.3 Network Infrastructure

A Pseudo-CRV network of the Joint Event was constructed by PCCWG, the CRV provider. A dedicated and segregated CRV-network with the same hardware setup, the Pseudo-CRV operated in the same way as the operational CRV. Similar to operational CRV, dedicated network interface devices were installed at site for each participant with an EMS. SIM cards were also provided for internet connection through PCCWG's Console Connect platform. The network infrastructure used in the Joint Event is illustrated in Figure 1 below.

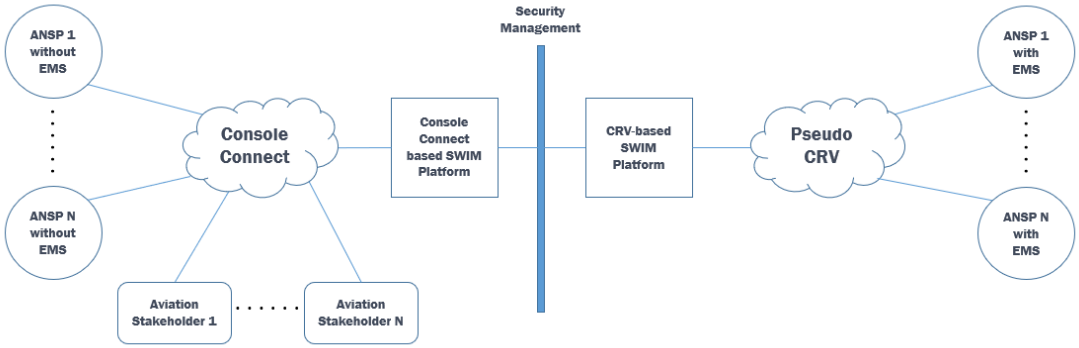

Figure 1 – Network Infrastructure for the Joint Event

2.4 EMS Architecture

A 2-tier hierarchical architecture as proposed by SWIM Implementation Pioneer Group (SIPG) was adopted for the Joint Event. In the hierarchical architecture, participants were divided into sub-communities and one representative from each sub-community would act as the gateway for message exchange among all sub-communities ("the Gateway EMS"). Participants under each sub-community with EMS provision would act as the EMS provider ("the Edge EMS") for their local downstream users. This approach could effectively reduce the number of GRE tunnels required under the CRV provision. For participants without EMS, PCCWG would act as the 3rd party EMS provider to provide network-based EMS services for them. Figure 2 below shows a schematic diagram of such EMS architecture.

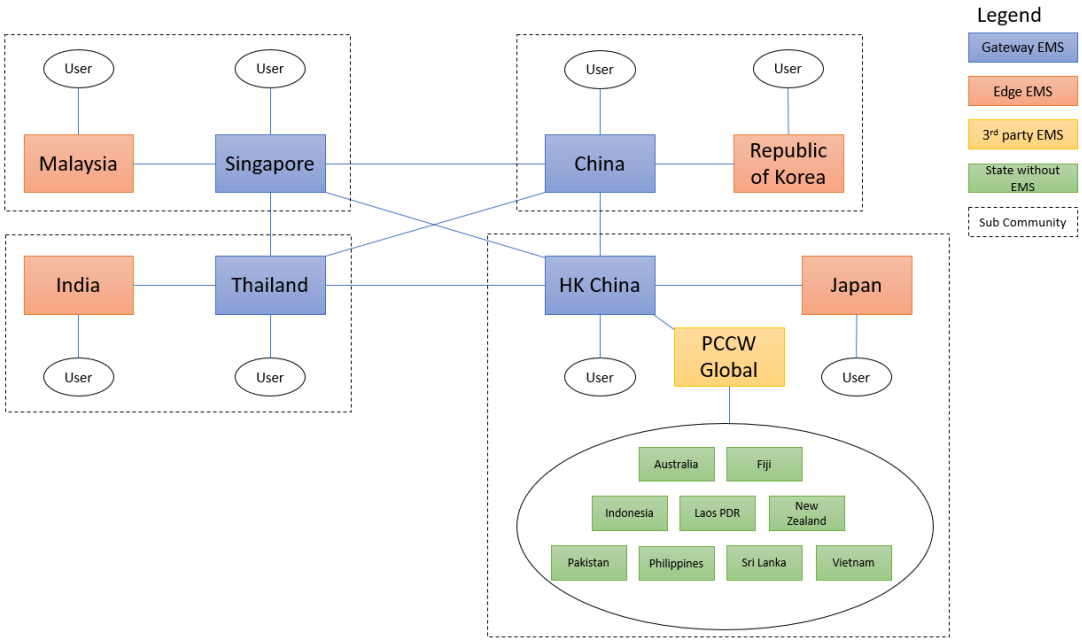

Figure 2 – EMS Infrastructure for the Joint Event

Note: It should be highlighted that the development of the EMS architecture for APAC region is still ongoing. States/Administrations should refer to the latest development status as published by SIPG from time to time.

2.5 Data Format

S3TIG had designed the following data exchange models for surveillance data to be shared over SWIM and the corresponding message headers. (Please refer to "Guidance Materials for the sharing of surveillance data in SWIM" under SURSG/5-WP/XX for the latest development of the detailed data structures)

a) JSON Structure for Surveillance Data with Flight Plan Information (TRACK_JSON + FPL);

b) JSON Structure for Surveillance Data Only (TRACK_JSON); and

c) ASTERIX CAT 21 Raw Data (TRACK_RAW).

Lesson Learnt from the Joint Event

2.6 From SWIM Perspective

a) Message headers/metadata, including the names of the fields and format of the contents must be properly considered and standardized to maintain interoperability within the region and across different regions.

b) Some participants had expressed doubts on whether the hierarchical architecture is the appropriate architecture for the APAC region. There were several observations with this architecture identified during the preparation of the Joint Event, such as specific configuration required for different brands of EMS, potential message loop back if source and recipient checking was not implemented properly, combining "byte

message" and "text message" into a single queue, single point of failure of the current architecture, etc.

c) There was some confusion between the use of AMQP Topics and Queues by participants which needs to be further examined for using them in a more efficient way.

d) The Push and Pull approach for message consumption needs to be standardized to maintain interoperability.

e) The common CRV bandwidth of 2Mbps that has been adopted for most States/Administrations would not be sufficient to support surveillance data sharing given an update rate of 1 report per second for busy FIRs.

2.7 From CRV Perspective

a) With reference to the AMQP surveillance messages carrying both ADS-B data and FPL information, 32 data fields comprising 14 fields for message header and 18 fields for message body were the highest number of data items contained in one message. The size of such message is around 1.1K bytes, which is nominally the largest size among all types of surveillance messages.

b) For the network packets captured, it was observed that around 8% of network traffic was attributable to transmission overhead. With overhead included, the size required for transmitting such message increases to around 1.2K bytes.

c) Based on the figure observed from the messages above, further analysis was conducted with traffic level based on Hong Kong's operational environment of approximately 300 received ADS-B targets during peak hours within Hong Kong FIR. Total bandwidth required for transmission of these messages would be around 360K bytes (300x1.2K) per second, i.e. 2.88Mbps.

d) It should be noted that the 2Mbps bandwidth tentatively offered for each State/administration in the pseudo-CRV was not sufficient to carry surveillance data sharing with a 1s data rate for some States/Administrations depending on their FIR traffic volume and their role in sharing/consuming ADS-B surveillance data in the SWIM environment in future, necessitating subscription to a higher CRV bandwidth.

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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