International Civil Aviation Organization

The Fourth Meeting of the Surveillance Study Group (SURSG/4) and the Third Meeting of Surveillance Sharing in SWIM Trial Implementation Group (S3TIG/3)

(Hong Kong China, 30-31 May 2024)

Agenda Item 4: Progress update of Surveillance Sharing in SWIM Trial Implementation Group (S3TIG) and Outcome of SWIM over CRV Demonstration and Surveillance Data Sharing

UPDATES FROM S3TIG FOR THE JOINT EVENT

(Presented by Hong Kong China)

SUMMARY

This paper presents the works achieved by S3TIG for the joint event of SWIM Demonstration over CRV and Surveillance Data Sharing in SWIM Trial

1. INTRODUCTION

1.1 After the endorsement at the Third Meeting of the Surveillance Study Group (SURSG/3) and the Seventh Meeting of System Wide Information Management Task Force (SWIM TF/7) to conduct the SWIM Demonstration over CRV and surveillance data sharing in SWIM trial as a joint event ("the Joint Event'), the preparation works for the Joint Event was then commenced.

1.2 A survey questionnaire prepared by SURSG/3 was shared with States/Administrations by ICAO APAC office on 12 Jun 2023 on interest in and modes of participation such as data contributor, data consumer and observer in the Joint Event.

1.3 Various states/Administrations have registered participation in 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.

1.4 Surveillance Sharing in the SWIM Trial Implementation Group (S3TIG) monthly meetings had been held with the participating States/Administrations since 26 Jun 2023 to discuss the technical issues and keep track of the progress of the preparation works for the Joint Event. The latest (i.e. the 11th) S3TIG monthly meeting was held on 22 Apr 2024.

1.5 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.

2. DISCUSSION

Deliverables of the Joint Event

2.1 Three scenario scenario-based demonstrations had been prepared and demonstrated with real time data exchange among involved parties in the Joint Event and showcased the operational benefits brought by SWIM. A summary of the scenario details is listed below.

Scenario	FIXM Version	IWXXM Version	Surveillance Data	Involved Parties
ATFM & Surveillance Data Sharing	4.1	v3.0, 2023-1	ADS-B ASTERIX CAT 21	HK China, Singapore and Thailand
FF-ICE	4.2	N/A	N/A	Japan and Thailand
MET	N/A	2.0	N/A	Republic of Korea

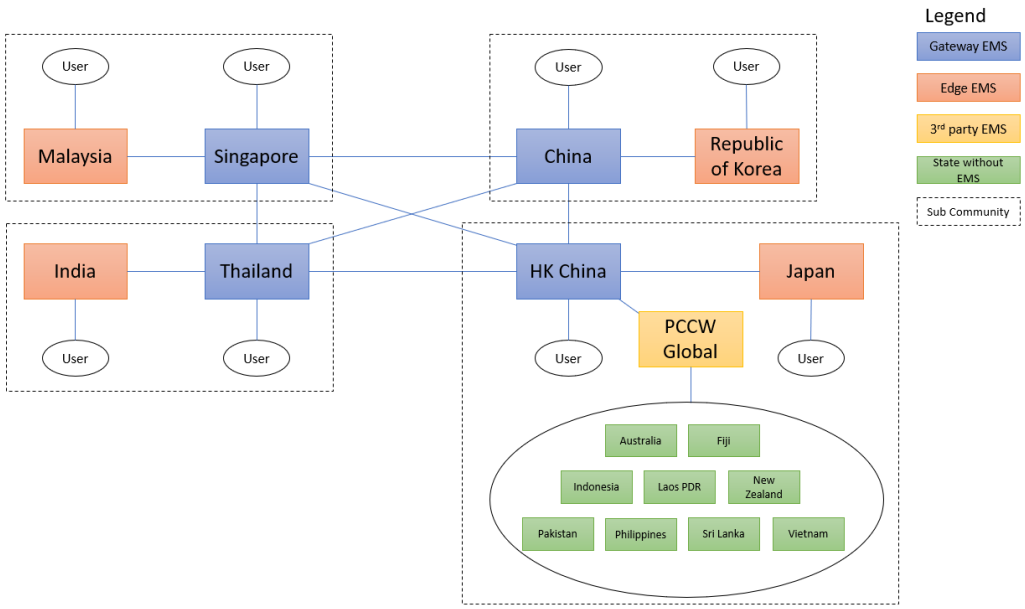
2.2 S3TIG had jointly designed the following data exchange model for surveillance data to be shared over SWIM and the corresponding message headers. (Please refer to Appendix 1 for the detailed data structures)

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).

2.3 A Pseudo CRV network was established among States/Administrations acting as Gateway EMS and Edge EMS in according to the SWIM technical infrastructure proposed by SWIM Implementation Pioneer Group (SIPG) under SWIM TF, and a console connect environment was established among States/Administrations acting as Observers. This architecture included both CRV-based SLA guaranteed network and internet-based network. A schematic diagram was shown as below.



2.4 Each participating States/Administrations had developed the SWIM services in supporting the scenario-based demonstrations and surveillance data sharing. A summary of SWIM services is listed below.

States / Administrations	**SWIM services developed for the Joint Event**
Hong Kong China	FIXM (including ATFM), IWXXM and TRACK_RAW
Japan	FIXM (including FF-ICE) and TRACK_RAW
Malaysia	FIXM, IWXXM and TRACK_JSON
Republic of Korea	IWXXM, TRACK_RAW and TRACK_JSON
Singapore	FIXM (including ATFM), IWXXM and TRACK_JSON
Thailand	FIXM (Including ATFM and FF-ICE), IWXXM, TRACK_RAW and TRACK_JSON

2.5 A series of testing had been conducted in different stages, including network connectivity test, EMS server connectivity test, message exchange test and scenario dry run, to ensure a smooth and successful demonstration.

Post Event Appreciation

2.6 After the completion of the Joint Event, the current setup will be accessible for a period of 1-month until end June 2024 for participants to appreciate the SWIM environment and system HMI.

Follow-up Works

2.7 S3TIG will further communicate via email with members for any adjustment of the data structure for surveillance data sharing on SWIM, and the relevant documentation (lesson learnt, outcomes, etc.) to support SURSG, and hold ad-hoc web meeting as on need basis.

2.8 Members would further:

a) Review the adopted message structure in the Joint Event and make necessary adjustment for improvement.

b) Consolidate lesson learnt and provide inputs to SURSG in drafting the report to be submitted to SURICG.

2.9 The S3TIG (as a supporting role) could be dissolved after the completion of remaining deliverables under SURSG.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) provide support on the follow-up works; and

c) discuss any relevant matter as appropriate

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Proposed JSON Structures and Message Headers for S3TIG Joint Event (Issue 1 - Rev 1, 19 Apr 2024)

1. JSON Structure for Surveillance Data with Flight Plan Information
2. JSON Structure for Surveillance Data Only
3. Message Header for Surveillance Data with Flight Plan Information
4. Message Header for Surveillance Data Only

1. JSON Structures for Surveillance Data with Flight Plan Information

Field Name	Type	CAT21 Data Item Reference	Values	Descriptions
GUFI	String	N/A	0248982c-4384-49f4-bdb3-7956bd553383	Globally Unique Flight Identifier
ACID	String	N/A	TLM912	Aircraft Identification
ADEP	String	N/A	VTBS	Departure Aerodrome
ADES	String	N/A	ZGGG	Destination Aerodrome
ARCTYPE	String	N/A	A339	Aircraft Type
WKTRC	String	N/A	H	Wake Turbulence Category
LAT	Double	I021/130 or I021/131	18.6701799113899	Latitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
LONG	Double	I021/130 or I021/131	103.180853652939	Longitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
FL	Double	I021/145	310	Flight Level
GS	Double	I021/160	498	Ground Speed (Knot) Use I021/160 x 3600 because I021/160 provides Ground Speed in NM/s

HEADING	Double	I021/152 or I021/160	34.2773437344	Heading (Degree) Use I021/152 If I021/152 does not exist, use I021/160 null, if both not exist.
ARCADDR	String	I021/080	883031	Aircraft Address
SSRCODE	String	I021/070	5035	Mode 3A Code
DT	String	I021/071 or I021/073 or I021/075	2022-09-13T15:41:3	Date and Time (Date from server date and Time from packet) Use I021/073 If I021/073 does not exist, use I021/075 If I021/075 does not exist, use I021/071 I021/071, I021/073 and I021/075 are time only value. Publishers have to add date themselves.
QITYPE	String	I021/090	NUCp or NIC	NUCp = Navigational Uncertainty Category for Position NIC = Navigational Integrity Category
QI	Integer	I021/090	6	Range is 0-11 for NIC and 0-9 for NUCp
SAC	Integer	I021/010	78	Data Source Identification (SAC)
SIC	Integer	I021/010	29	Data Source Identification (SIC)

2. JSON Structures for Surveillance Data Only

Field Name	**Type**	**CAT21 Data Item Reference**	**Values**	**Descriptions**
LAT	Double	I021/130 or I021/131	18.6701799113899	Latitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
LONG	Double	I021/130 or I021/131	103.180853652939	Longitude (Degree)

				Use I021/131. If I021/131 does not exist, use I021/130
FL	Double	I021/145	310	Flight Level
GS	Double	I021/160	498	Ground Speed (Knot) Use I021/160 x 3600 because I021/160 provides Ground Speed in NM/s
HEADING	Double	I021/152 or I021/160	34.2773437344	Heading (Degree) Use I021/152 If I021/152 does not exist, use I021/160 null, if both not exist.
ARCADDR	String	I021/080	883031	Aircraft Address
SSRCODE	String	I021/070	5035	Mode 3A Code
DT	String	I021/071 or I021/073 or I021/075	2022-09-13T15:41:3	Date and Time (Date from server date and Time from packet) Use I021/073 If I021/073 does not exist, use I021/075 If I021/075 does not exist, use I021/071 I021/071, I021/073 and I021/075 are time only value. Publishers have to add date themselves.
QITYPE	String	I021/090	NUCp or NIC	NUCp = Navigational Uncertainty Category for Position NIC = Navigational Integrity Category
QI	Integer	I021/090	6	Range is 0-11 for NIC and 0-9 for NUCp
SAC	Integer	I021/010	78	Data Source Identification (SAC)
SIC	Integer	I021/010	29	Data Source Identification (SIC)

Remarks: In the JSON message, “Field Name” shall be mandatory while “Values” could be empty for the Joint Event.

3. Message Header for Surveillance Data with Flight Plan Information

Header Name	**Values**	**Descriptions**
APAC_SOURCE	RJ_JCAB	Name of message publisher
APAC_RECIPIENT_LIST	RJ_JAL,VT_AEROTHAI	Name list of recipients (comma delimited)
APAC_CATEGORY	ASTERIX	Name of information exchange model (ASTERIX)
APAC_CATEGORY_VERSION	ASTERIX _CAT021	Version of information exchange model (Data Category of ASTERIX)
APAC_MESSAGE_TYPE	TRACK_RAW or TRACK_JSON	Message type of information exchange model • TRACK_RAW for binary data • TRACK_JSON for JSON data
DEP_AIRPORT	RJAA	Departure Airport
ARR_AIRPORT	VTBS	Arrival Airport
AIRLINE	JAL	Name of Airline
ACID	JAL707X	Aircraft Identification
GUFI	0248982c-4384-49f4-bdb3-7956bd553383	Globally Unique Flight Identifier
EOBT	2023-02-01T03:00:00Z	Estimated Off-Block Time
APAC_TIMESTAMP	JCAB_OUT:1675213637251	Timestamp of the message out or in the system

4. Message Header for Surveillance Data Only

Header Name	**Values**	**Descriptions**
APAC_SOURCE	RJ_JCAB	Name of message publisher
APAC_RECIPIENT_LIST	RJ_JAL,VT_AEROTHAI	Name list of recipients (comma delimited)
APAC_CATEGORY	ASTERIX	Name of information exchange model (ASTERIX)
APAC_CATEGORY_VERSION	ASTERIX _CAT021	Version of information exchange model (Data Category of ASTERIX)
APAC_MESSAGE_TYPE	TRACK_RAW or TRACK_JSON	Message type of information exchange model • TRACK_RAW for binary data • TRACK_JSON for JSON data
ACID	JAL707X	Aircraft Identification
APAC_TIMESTAMP	JCAB_OUT:1675213637251	Timestamp of the message out or in the system

Remarks: In the Message Header, “Header Name” shall be mandatory while “Values” should be **“NIL”** if no values can be given for the Joint Event.

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