



# ICAO

*International Civil Aviation Organization*

**The Seventh Meeting of System Wide Information Management Task Force (SWIM TF/7)**

*Bangkok, Thailand, 09 – 12 May 2023*

Agenda Item 3: Updates on the assigned tasks by task leads/contributors including progress report and issues

## **INTRODUCING USE CASES OF A SWIM SERVICE FOR SURVEILLANCE DATA IN REPUBLIC OF KOREA**

(Presented by ROK)

### **SUMMARY**

This paper introduces use cases of a SWIM service for surveillance data in ROK. It describes how SWIM can contribute to improving the useability of surveillance data for stakeholders, who couldn't receive surveillance data before, can improve the efficiency of their work.

## **1. INTRODUCTION**

1.1 ROK strictly limits access to surveillance data guaranteed by the government to air traffic control purposes. One of the reasons is that the legacy system wasn't designed to provide surveillance data to multiple external stakeholders in an efficient manner.

1.2 To overcome the limitations mentioned in section 1.1, since the beginning of the SWIM R&D, ROK has been interested in sharing surveillance data in the SWIM environment. Scope of surveillance data covered includes not only Automatic Dependent Surveillance-Broadcast (ADS-B) data but also other surveillance data from other sources, such as Air Route Surveillance Radar (ARSR), Airport Surface Detection Equipment (ASDE), Multilateration system (MLAT) and so on.

1.3 ROK has actively tried to share research findings and lessons learned in the technical aspect. At the first SWIM workshop in 2021, ROK presented "[ROKs SWIM Journey : SWIM Service Implementation for Flight/Surveillance Information](#)", and in 2022 and 2023, at the SURSG meetings, ROK presented WPs about "[Implementation of FF-ICE Interoperability using GUF1 in SWIM](#)" and "[Lessons Learned in Sharing Surveillance Data using SWIM Information Service](#)".

1.4 This paper introduces some use cases of a SWIM service for surveillance data. It provides how stakeholders, who can't access surveillance data before, in a trial operation, utilize surveillance data for their work and how surveillance data could be useful to the aviation community.

## **2. DISCUSSION**

### **Background**

2.1 ROK SWIM testbed collects surveillance data in All Purpose Structured Eurocontrol Surveillance Information Exchange (ASTERIX) format from different sources as shown in Table 1.

Where	Type	Format	Category
Air Traffic Control (ATC), Incheon	(EnRoute) SMR	ASTERIX	CAT 62
Gimpo Int'l Airport	ASDE		CAT 10
	MALT		CAT 20
	ADS-B		CAT 21
Jeju Int'l Airport	ASDE		CAT 10
	MALT		CAT 19, 20
	ADS-B		CAT 21, 23
Incheon Int'l Airport	ASDE (A-SMGCS)		CAT 11

Table 1

2.2 A SWIM information service for surveillance data in ROK SWIM testbed supports two message exchange patterns: request/response or publish/subscribe. The former is implemented using a web service based on Representational State Transfer (REST)-ful Application Programming Interface (API) while the latter is implemented using a messaging service based on AMQP.

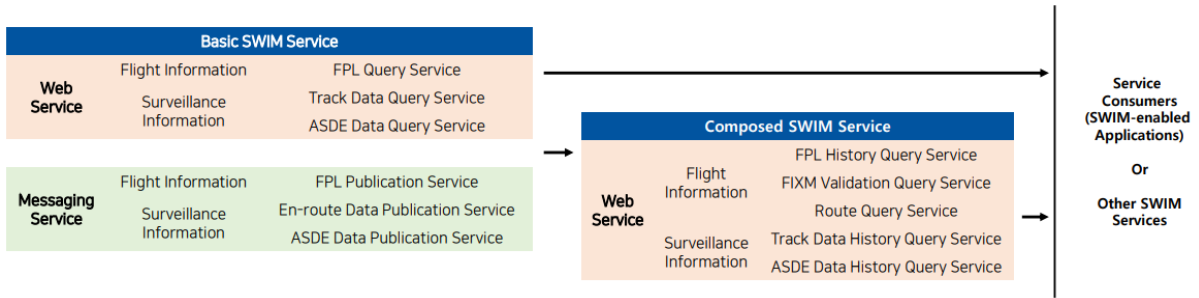


Figure 1

2.3 Trial operation with SWIM stakeholders is in progress. In the aspect of surveillance data, participants consume surveillance data through SWIM information service as follows:

Stakeholder	Service	Format
DATM Center, National Information Resources Service	Messaging Service	ASTERIX
Korea Aerospace Research Institute	Messaging Service	ASTERIX, JSON
Air Traffic Center, Daegu	Web Service	JSON
Air Traffic Center Regional Office, Incheon	Web Service	JSON
NAVAIDS Business Center, Seoul Regional Aviation Administration	Web Service	JSON
Korea Airports Corporation - Operations Control Center (HQ) - Airside Control Tower, Gimpo Int'l Airport - Airport Operation Control Center, Gimpo Int'l Airport - Instrument Landing System (ILS) Department, , Gimpo Int'l Airport	Web Service	JSON

Table 2

Use cases

2.4 Digital Air Traffic Management (DATM) Center, National Information Resources Service is a big-data platform (or data warehouse) that collects information from ATM stakeholders and conducts Extract, Transform, Load (ETL), and analysis. It provides a visualization tool and a portal to deliver an analyzed result to the users. DATM receives en-route surveillance data in Incheon

Flight Information Region (FIR) and surface movement data of Gimpo and Jeju international airport. Surveillance data is delivered in ASTERIX format using an AMQP messaging service.

2.5 Korea Aerospace Research Institute (KARI) is a government-funded research institute in charge of aerospace science and technology research. Aviation Research Institute, KARI conducts a Research and Development (R&D) of CTFMS (Collaborative Tactical Flow Management System). KARI's CTFMS receives Flight Plan (FPL) in FPL 2012 format, en-route surveillance data in Incheon FIR, and surface movement data of Gimpo and Jeju and Incheon Intl Airport in ASTERIX format using an AMQP messaging service. And meteorological information from Korea Aviation Meteorological Administration (KAMO) via a SWIM testbed in ICAO Weather Information Exchange Model (IWXXM) 2.0 format using web service.

2.6 Navigational Aid (NAVAID) business center monitors NAVAID facilities in ROK. The center receives FPL, en-route surveillance data in FIR, surface movement data of Gimpo, Jeju and Incheon international Airport, and meteorological information (e.g., Meteorological Terminal Aviation Routine Weather Report (METAR), Significant Meteorological Information (SIGMET), Airmen's Meteorological Information (AIRMET), Terminal Area Forecast (TAF), Automated Meteorological Observation System (AMOS) using web service in custom JSON format. Information is displayed using the 3D map application.

2.7 Operations control center, Headquarter(HQ), Korea Airports Corporation (KAC) manages airport operations plan and airport slot. Timestamping of a journey of an aircraft at an airport for key milestones and archiving data provides a rational foundation for airport slot analysis. The center receives surface movement data of Gimpo and Jeju Intl Airport in custom JSON format using an AMQP messaging service, conducts timestamping, data-izes it to bigdata for future analysis.

2.8 Airside control tower, Gimpo international airport controls traffic in the airside area. Traditional systems for traffic control are deployed, but to advertise the efficiency of SWIM (i.e., information integration and sharing with a single point of network), a individual client, that receives information and displays it to the 3D map application, same as mentioned in section 2.6, is installed.

2.9 Airport operation control center, HQ, Korea Airports Corporation (KAC), monitors 13 airports in ROK. The center receives information and displays it to the 3D map application, same as mentioned in section 2.6.

2.10 Instrument Landing System (ILS) department, Gimpo international airport operates Localizer (LZZ), Distance Measuring Equipment (DME), and Glide Path (GP). A client that receives information and displays it to the 3D map application, same as mentioned in section 2.6, is installed to monitor the movement of abnormal aircraft in the approach control area.

### 3. CONCLUSION

3.1 SWIM service can contribute to providing surveillance data and using surveillance data for daily operations, especially for stakeholders who couldn't receive surveillance data before.

3.2 Messaging service provides an efficient way to distribute surveillance data once the data originator (e.g., Air Traffic Control and Airport System (ARTS)) has the capability to publish surveillance data to SWIM natively or using a broker.

3.3 Local or regional governance and technical group should be established to define a topology, an information model to convey surveillance information (e.g., ASTERIX or high level of representation format such as JSON)) and discuss any other consideration.

### 4. ACTION BY THE MEETING

4.1 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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