



ICAO

*International Civil Aviation Organization***First Meeting of the Surveillance Study Group (SURSG/1)**

(Video Teleconference, 20– 22 April 2021)

Agenda Item 4: Issues in surveillance data sharing**SURVEILLANCE EXCHANGE MODEL FRAMEWORK**

(Presented by Hong Kong China)

SUMMARY

This paper presents some key considerations leading to a proposal of ANSP's collaboration scheme in sharing and enriching surveillance coverage for the region to benefit the aviation community. Through the discussion of the key consideration factors, this paper intends to elicit members' views and consensus towards a unified approach in sharing surveillance data for the region.

1. INTRODUCTION

1.1 The importance and benefits of surveillance cannot be overstated for safer and effective air traffic control and more efficient air traffic flow management. The sharing of surveillance data is expected to benefit the aviation industry in the APAC region given a more comprehensive and much wider map of surveillance coverage in the region. For instance, extended surveillance would enable ANSPs to see traffic further ahead, facilitating the planning and implementation of ATFM planning and measures.

2. PROPOSAL

2.1 This working paper explores ANSP's surveillance data sharing collaborative approach to expand surveillance coverage.

3. EXCHANGE MODEL FOR SURVEILLANCE DATAInfrastructure - Data Contribution and Dissemination

3.1 There are three infrastructure models as potential implementation in the region:

- a) Distributed model – each ANSP operates its own Enterprising Message Services System (EMS) that interconnects with other EMSes in the region, through which the ANSP can publish (upload) or subscribe (download) data;
- b) Centralized model – a third party may host EMS services available to subscribers such that qualified States/Administrations/Stakeholders may subscribe or publish surveillance data irrespective of their geographical locations but insofar as they can access the data sharing cloud; and

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- c) Hybrid model – the co-existence of ANSPs operating their own EMSes (Distributed Model) and ANSPs accessing data exchange services in the Centralized Model.

3.2 The sharing of surveillance data could be implemented in any of the three infrastructure models above.

Unified Data Format

3.3 For ANSPs, surveillance data usually comprises data from conventional radar (primary, secondary mode A, C, S), surface movement radar (airport coverage), MLAT data (with relatively limited coverage) and ADS-B data.

3.4 All Purpose Structured Eurocontrol Surveillance Information Exchange (ASTERIX) is common data format for different surveillance categories and usages. The adoption of unified data format would save data conversion, reduce data distribution of multiple formats, and facilitate homogenous data processing.

Infrastructure – Surveillance Central Data Processor

3.5 It is essential to serve users with their interested surveillance data only. The Surveillance Central Data Processor (SCDP) filters and collates surveillance data feeds from contributing ANSPs and outputs user-selectable data streams as advertised in the service registry. This SCDP would have to host the service registry and exercise any governance rules if they exist. From system perspective, the SCDP will be designed with redundancy and resilience in mind to achieve high availability. And the SCDP would also be served with high-bandwidth links to be able to receive and serve surveillance data to other ANSPs.

3.6 Whereas individual ANSPs could be sharing surveillance data among themselves without the need for centralized SCDP services for various reasons or considerations, there could be multiple SCDPs operating at some of such ANSPs.

4. DISCUSSION

4.1 Without the loss of generality, a deployment for sharing surveillance data is illustrated in Figure 1 below. EMSes C and D are typical SWIM service providers (as indicated by their possession of high capacity links to a data sharing infrastructure in red colour). EMSes A and B are contributing ANSPs by publishing and subscribing the associated SWIM surveillance services over that a data sharing infrastructure with or without SCDPs. EMSes E, F and G are sole subscribers of surveillance data. Some practical considerations in the implementation are discussed in the following paragraphs.

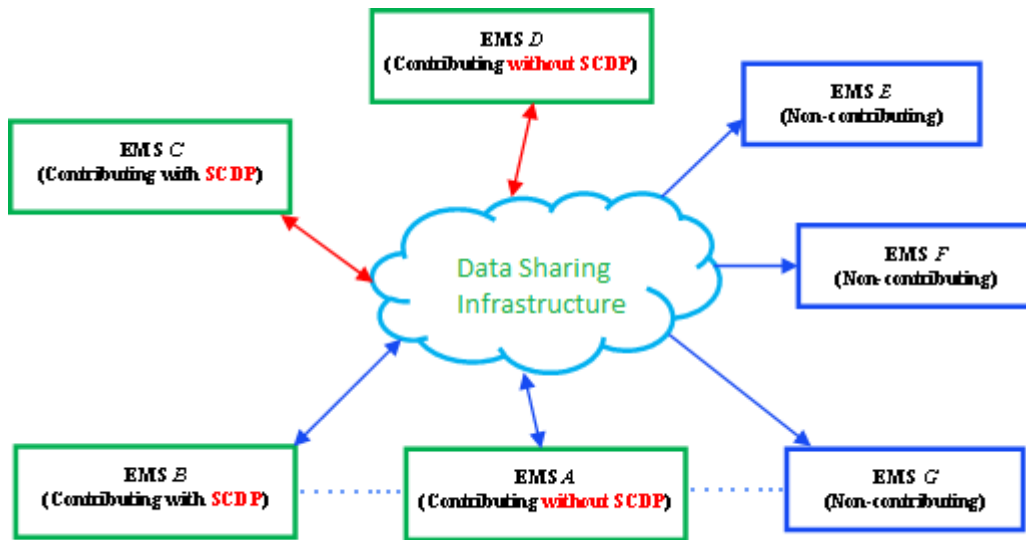


Figure 1 - Deployment of Surveillance Data Sharing in SWIM with SCDPs

4.2 The EMS and SCDP are tightly coupled components and they should be connected by high speed data network to eliminate potential bottlenecks in data flows and processing regardless they are provisioned by single service provider or not.

4.3 The SWIM surveillance data services over the data sharing infrastructure should allow contributing ANSPs to use multicast data sources. This is to allow sustainable traffic growth due to demand for new surveillance data only.

4.4 If it is not possible for off-cloud distributed EMS (e.g. EMSes A and B) to use multicast data sources directly, should they choose to tunnel their surveillance sources to one of the in-cloud EMS (e.g. EMSes C and D) for multicast their surveillance data over the network.

4.5 To achieve the timely delivery of surveillance data, the surveillance data should be prioritized strictly over all other traffic in the data sharing infrastructure (except voice over IP whose bandwidth is 100% reserved). This should not impact other traffic significantly as the transmission of ASTERIX format data is not considered bandwidth intensive on average.

4.6 Given that surveillance data originated from different surveillance sensors and fused outputs of the combined sensors would not be identical, but when they are considered approximately close, could be considered as backup to each other as defined in their service registry.

4.7 The above paragraphs discussed the SWIM surveillance data sharing services over CRV. At the service level, SWIM in its full implementation would entail service registry, governance, technical and service agreements among states/administrations/stakeholders to harmonize the provision and consumption of SWIM services meeting some minimum requirements, not to mention commitment of resources to provide EMSes for participants who have opted for their own EMS services (Distributed Model). Therefore, SWIM deployment could be a timely and possibly evolving process. For SWIM in the context of surveillance data sharing applications, there could be interim or express solutions to speed

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up the exchange of surveillance data. For instance, instead of starting off with a rather “complete” solution with elaborate technical infrastructure featuring the above-mentioned in the APAC region, it is worth considering a bottom-up, agile approach to exchange surveillance data by leveraging on the readily accessible CRV and adopting the common ASTERIX surveillance data format via some centralized and dedicated EMS and SCDP services provided by a business concern **and/or** with pioneering participants running their own EMSes to provide dedicated surveillance data sharing services and expand on the SWIM infrastructure to incorporate other services such as FIXM (for ATFM) , IWXXM (for MET) as SWIM continues to develop and evolve in the region.

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) consider and discuss technical issues of realising the sharing of surveillance data in the region.
