



ICAO APAC CNS SG/24

30 Nov- 4 Dec2020

Collaboration in Sharing of Surveillance Data in SWIM

Presented by Hong Kong, China and Singapore

Introduction

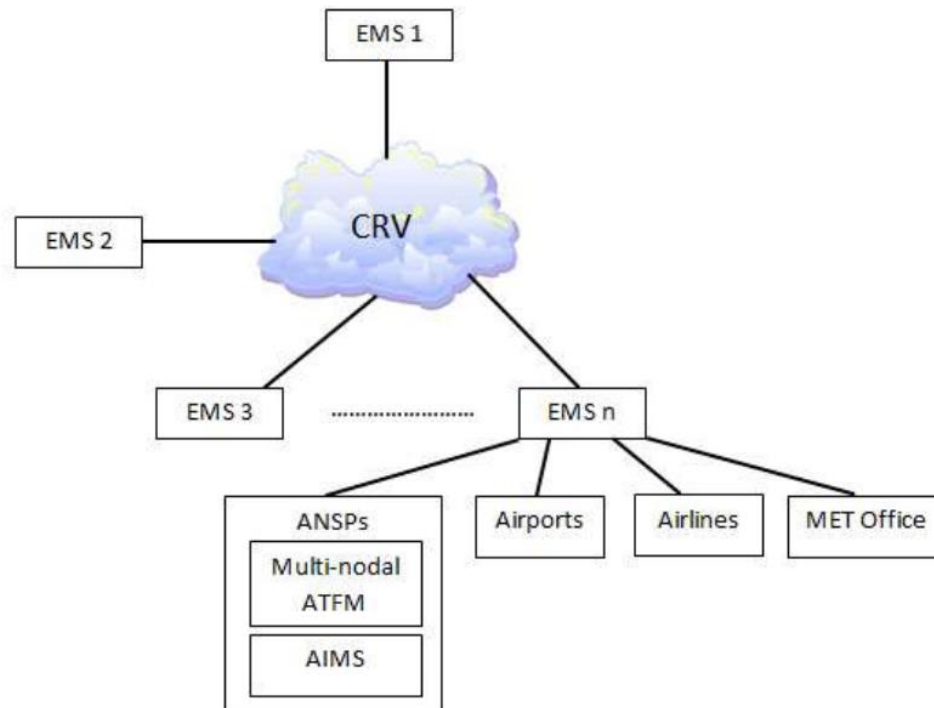
- 4 information exchange models defined in SWIM
 - Meteorological Information → IWXXM
 - Aeronautical Information → AIXM
 - Flight and Flow Information → FIXM
 - Surveillance Information → ??
- Sharing of surveillance data is expected to benefit aviation given a much wider map of surveillance coverage in APAC region

Discussion

- This paper:-
 - explores a Commercial-ANSP collaborative approach in surveillance data sharing as a SWIM service.
 - presents some major consideration factors of the pros and cons of the Commercial-ANSP approach vs the ANSP-ANSP collaborative approach
 - proposes establishment of a Study Group on surveillance data sharing

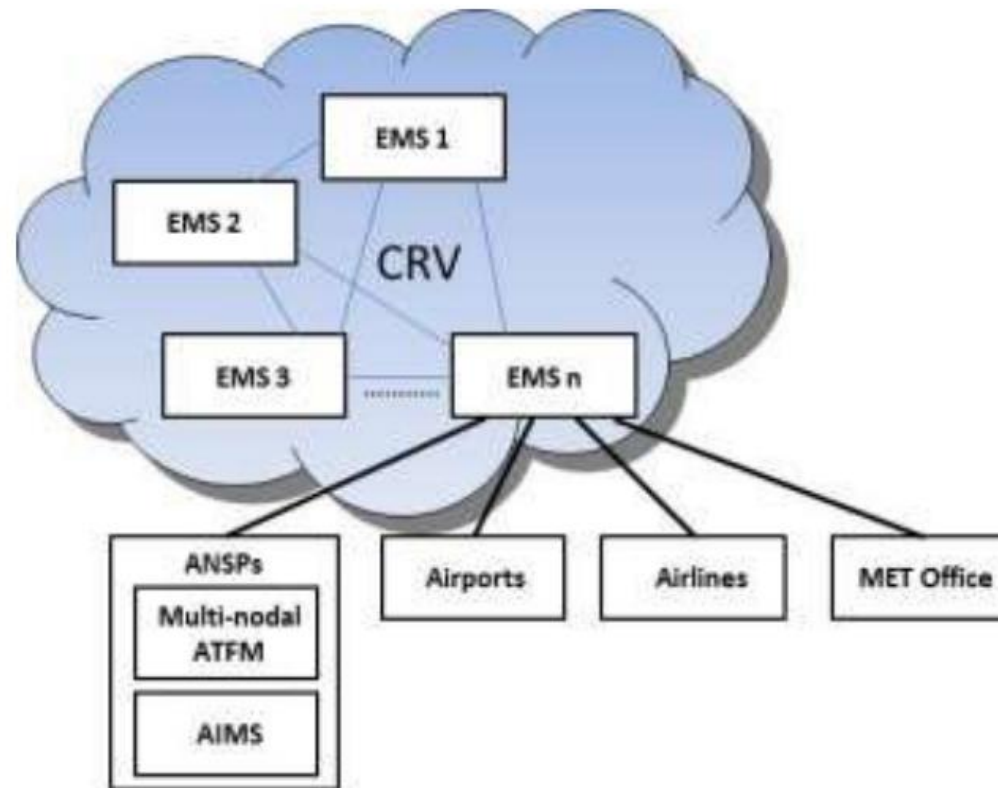
Re-cap – Infrastructure Models

- At CRV OG/5, Hong Kong China presented a WP on the following three infrastructure models as potential implementation of SWIM infrastructure in the region:
 - Distributed model – each ANSP operates its own Enterprising Message Services System (EMS) to publish (upload) or subscribe (download) data;



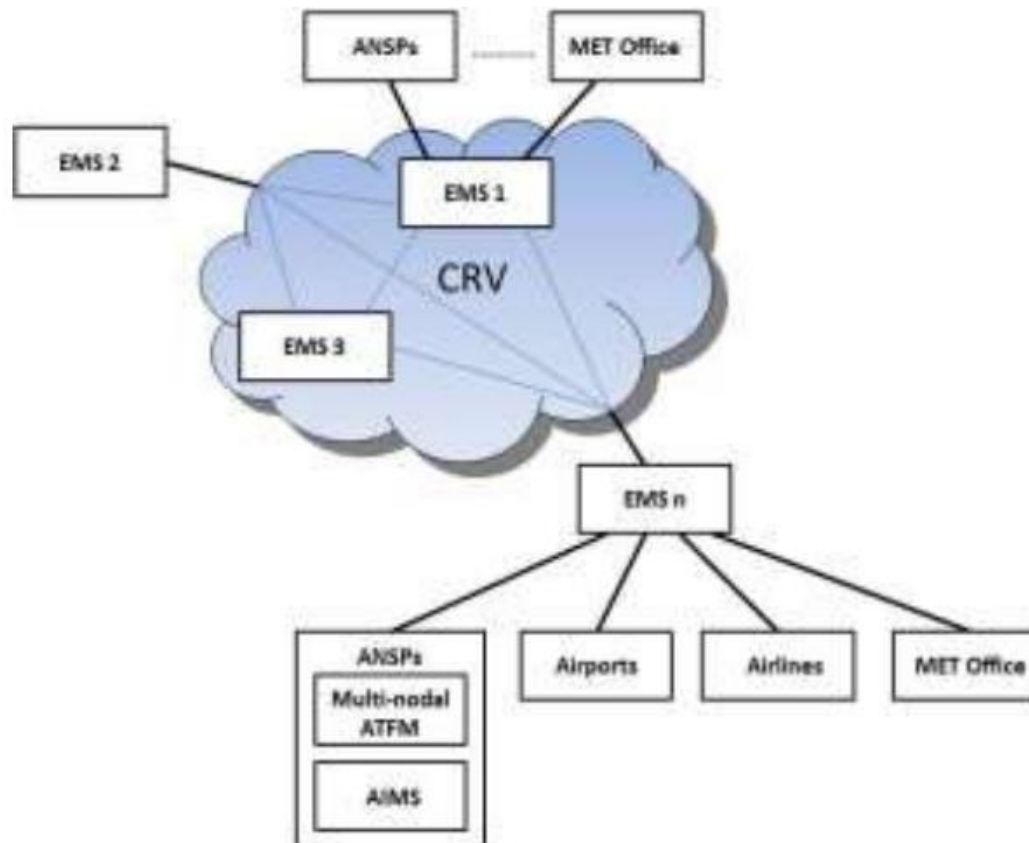
Re-cap – Infrastructure Models

- Centralized (not global) model – 3rd parties (ANSPs/Commercial concerns) hosting EMS services for States/other organizations who don't their EMSes



Re-cap – Infrastructure Models

- Hybrid model – the co-existence of ANSPs operating their own EMSes (Distributed Model) and ANSPs accessing SWIM services via 3rd parties (Centralized Model)



Consideration - Surveillance Data to be Shared

ADS-B Data a Prime Candidate for Sharing:

- Concern of sensitivity of surveillance data
 - Radar systems might return non-civil or sensitive surveillance data not normally shared to external parties.
- Ownership of data
 - ADS-B is self-initiated and broadcast to all by aircraft, there does not appear to be legal complexity arising from distribution and subsequent processing/manipulation of such data by member states.
- Accountability of correctness of data
 - An ANSP which distributes ADS-B data as received should not be held liable for the inaccuracy of the ADS-B since accuracy of ADS-B hinges on the on-board electronics and the constellation of GPS satellites visible to the aircraft with the assumption that a contributing ANSP does not alter the data that it is distributing except for specific circumstances.

Consideration - Commitment of a Contributing ANSP

- Consumers of shared surveillance data would become increasingly dependent on the unfailing data availability for their applications/ATC operations
- ANSP to meet a certain level of availability in supplying surveillance data. Likelihood or impact of data unavailability is mitigated since:
 - the ANSP's surveillance system is normally built with redundancy and therefore high availability
 - depending on the number of contributors and geographic separations, there could be overlapped coverage.
 - feeding of surveillance data from commercial participation could also form a map of basic coverage in the region

Consideration - Eligibility to Access Shared Surveillance Data

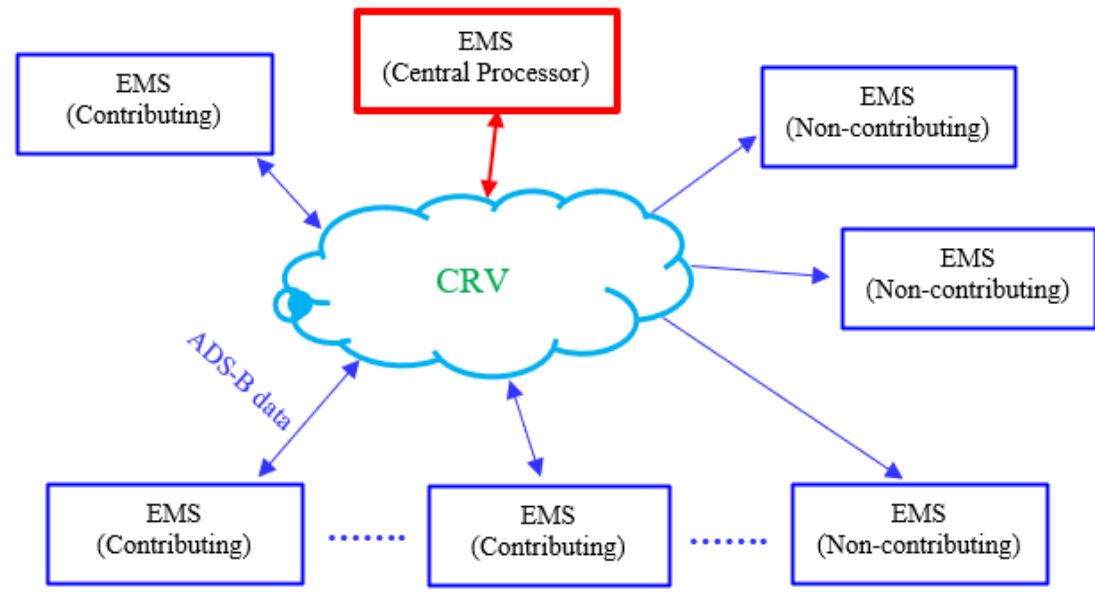
Suggestion: shared surveillance data available to contributing and non-contributing ANSPs

- General availability is desirable since:
 - Open access to would help quicken the expansion of CRV community and launch of SWIM services in line with the spirit of global connectivity and data sharing behind ICAO's ASBU initiatives
 - Consideration needs to be given to ANSPs who do not see immediate use of the shared data or immediate plans to install ADS-B ground systems as conventional radar data already serves their need.
 - For contributing ANSPs who already own their surveillance systems, the cost of uploading surveillance data for sharing should be small compared to capital cost or operation and maintenance (O&M) cost of their already operating surveillance systems. Nevertheless, some measures could be taken in addressing the continuous link cost suffered by contributing ANSPs

Infrastructure – ADS-B Surveillance Central Data Processor

Role of Surveillance Central Data Processor (SCDP) – Centralized Model

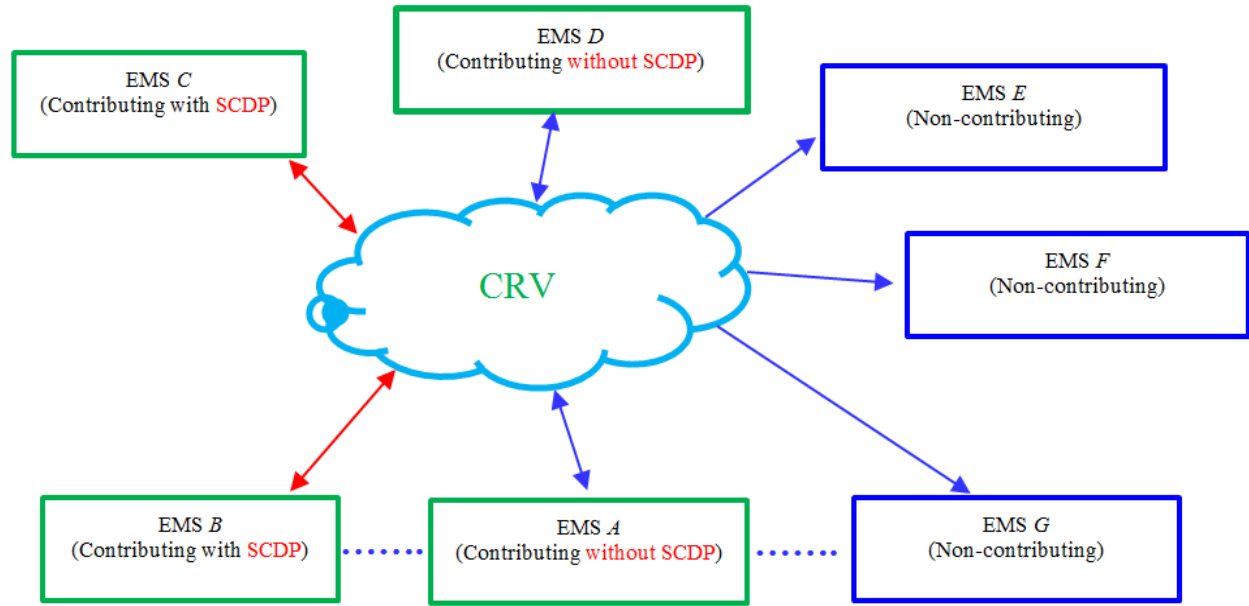
- The SCDP collates and filters data feeds from contributing ANSPs and outputs user-selectable data streams as advertised in the SWIM service registry.
- The SCDP may double up to host the service registry and exercise any governance rules if there is no centralized registry service
- The SCDP will be designed with redundancy and resilience and served with necessary high-bandwidth CRV links to receive and serve surveillance data. At its simplest, a single SCDP employed in surveillance sharing is illustrated below:



Infrastructure – ADS-B Surveillance Central Data Processor

Role of Surveillance Central Data Processor – Distributed Model

- Other than the single SCDP implementation, individual ANSPs could be sharing surveillance their own SCDP services for various reasons or considerations, illustrated below:



Business Model – ANSP(s) as SCDP Operator

- An ANSP that will be operating an SCDP likely will have to:
 - bear the costs from:
 - i. the setup and development of the SCDP;
 - ii. on-going system O&M; and
 - iii. on-going CRV subscription for the additional CRV bandwidth or CRV links.
 - commit resources to ensure high availability of SCDP services for long term
 - shoulder the burden of responding to reports of issues and their resolution.
- Even with party(ies) willing to provide SCDP services, ensuing discussion and coordination among members on the sharing scheme (data and costs), system and network provisions configuration, etc. from across the region would likely be a lengthy process.
- From perspectives of cost, commitment of resources and lead time in realizing the proposed data sharing, the business case for ANSP(s) to play the SCDP role might not be strong. On the contrary, some of such concerns could be addressed if there is commercial participation.

Business Model – Commercial Concern(s) as SCDP Operator with ANSPs' Collaboration

- There are commercial interests to provide ADS-B data originated from terrestrial or space-based ADS-B systems. In June 2020, CRV OG was reviewing Aireon's application to serve its Space-Based ADS-B data to PNG. With more SWIM services or services carried over CRV, the sooner a significant user base is built up, which will feed further momentum in launching more SWIM services.
- With a commercial concern(s) as SCDP operator and the assumption of subscription-based charges, the issues of commitment to resources, accountability and upfront costs could be shifted to the commercial provider while a shorter lead time to service availability is to be expected.
- Cost wise, however, service cost would be dependent on the availability of competition, the commercial concern's pricing strategy as well as the receptiveness of the aviation community in the region. Furthermore, the commercial concern could provide incentives to contributing ANSPs to offset its cost in sharing its data.
- Unless CRV OG and/or SWIM TF rules out such services, potential providers of surveillance data could be launching such data service according to their own agenda with or without such collaboration and possibly outside of CRV. The proposed commercial-ANSP would enrich the surveillance coverage by way of the strategic locations of an ANSP's receiver sites and would also provide an additional layer of data source redundancy.

Discussion at 4th Meeting of SWIM Task Force (SWIM TF/4)

- Contents of this paper were presented as WP/13 at the recent SWIM TF/4 meeting held during 3-6 November 2020.
- The working paper had generated enthusiastic discussion of the proposal, the exchange model to be adopted for surveillance data in SWIM and the establishment of a Study Group under SURICG on surveillance sharing as reflected in the draft SWIM TF/4 Report that as an action (ACTION Item 4-4) to nominate members to join the Study Group Task to further explore initiative.

Actions by the Meeting

- The meeting is invited to:
 - consider the Commercial-ANSP collaboration scheme proposed in this paper (chiefly paragraphs 4.12-14) and the various consideration factors leading to this potential scheme;
 - consider the potential developments in surveillance data, particularly ADS-B data carried over CRV; and
 - support the establishment of the Study Group comprising surveillance experts and experts in relevant areas such as SWIM and ATFM to recommend solutions on regional surveillance data sharing to provide surveillance from “departure to destination”.

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