



**ASSEMBLY — 40TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 30: Other issues to be considered by the Technical Commission**

**SIGNIFICANCE OF HARMONIZATION TOWARD REALIZATION OF  
TRAJECTORY-BASED OPERATION (TBO) OVER SYSTEM-WIDE INFORMATION  
MANAGEMENT (SWIM)**

(Presented by Japan)

**EXECUTIVE SUMMARY**

Member States and the air traffic management (ATM) community does realize that the collaborative action for ensuring interoperability and interconnectivity of communications, navigation, and surveillance (CNS)/ATM infrastructure plays a significant role for the realization of globally and harmonized future seamless ATM operational context. It would also provide an evolutionary solution for the realization of TBO.

This paper is focusing on the profound lessons learned from the complex and fragmented infrastructure such typified as DATACOM, which is provided by fragmented infrastructure with complex network elements. Since the communication technology had been most rapidly proceeded by technological innovation, consequently, it has been bringing proliferation of various outdated and useless technical standards and specifications by ICAO and standards developing organizations (SDOs). It might bring an inevitable disincentive for realization of TBO over SWIM infrastructure.

In order to realize the TBO over the CNS/ATM infrastructure with advanced technologies, ICAO, Member States and ATM community should get better understanding that identified disincentive for development of evolutionary solutions and the collaborative activities among stakeholders would bring common benefit for ATM community.

<i>Strategic Objectives:</i>	This information paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
<i>Financial implications:</i>	Not applicable
<i>References:</i>	Doc 10115, <i>Report of the Thirteenth Air Navigation Conference (AN-Conf/13)</i>

## 1. INTRODUCTION

1.1 The global air traffic system had been evolving dramatically for last few decades, thanks to many of advanced technologies with digitalization been introduced to the ATM community. On the other hand, the history of introducing an evolutionary solution for DATACOM infrastructure have been bringing various confliction for the implementation technologies.

1.2 Since the ATM community has been left behind in the digitalization with broadband ICT platform such typified as 4G/5G network, existing complex aviation DATACOM network would be one of the typical lesson learned in CNS/ATM infrastructure.

1.3 While recent cabin communication is available to access the internet, cockpit communication is unfortunately left behind of this advanced network platform. This segregated broadband media brings no benefit for ATM safety communication.

1.4 The platform of the ATM safety communication remains over old-fashioned aviation data-link technology such typified as POA, AOA and AMS(R)S over classic aero services. It comes from outdated technical standards and specifications, which are developed/ caused by long history of complex standardization framework for safety communication.

1.5 Over the last two decades, existence of fragmented and complex DATACOM infrastructure is left behind digitalization of network infrastructure, obviously this is due to the fact that there is a lack of global technological harmonization.

1.6 As well known, ICT/IPS over broadband wireless medium would make a fundamental shift in communication infrastructure, and besides, breaking away from old-fashioned aviation data-link technology brings a significant evolutionary solution for realization of TBO. It means the future broadband ICT network platform would be an integral part of realization of TBO over SWIM.

## 2. DISCUSSION

2.1 Global technological harmonization for implementation of DATACOM over the future SWIM infrastructure, which has been conducting by ICAO, SDOs, United States and Europe should be collaborative standardization activities, and besides all Member States should be involved in there. JCAB is confident that this collaborative activity would turn out to have been truly worthwhile for realization of TBO over SWIM.

2.1.1 With lesson learned from the fragmented standardization activities in ICAO, United States, Europe and SDOs in last two decade, all stakeholders had launched technological harmonization activity for development of safety DATACOM standards and specifications. This significant development shall be welcomed in all Member States and outcome of this will be beneficial for ATM community.

2.1.2 As a remarkable topic regarding standardization activities, the four memoranda (with SDOs: Radio Technical Commission for Aeronautics (RTCA), European Organisation for Civil Aviation Equipment (EUROCAE), Airlines Electronic Engineering Committee (AEEC) and SAE International) were signed on the side-lines of the Second Global Air Navigation Industry Symposium (GANIS/2) ICAO. In order to realize the TBO over SWIM, new framework should cover the development of Standardization Road Map.

2.1.3 Focusing on the avionics equipage, there are many challenges in various security levels, quality of service (QOS) levels and complex operation in the cockpit. It would be also forced to eat the cost of multi-stacks for avionics. Those challenges are caused by fragmented DATACOM infrastructure of each States and regions. The integrated ICT network platform over broadband medium and applications over SWIM would be able to provide many evolutionary solutions for cockpit and cabin. Existing four types of communications (ATC, aeronautical operational control (AOC), aeronautical administrative communications (AAC) and aeronautical passenger communication (APC)) should be integrated under appropriate pre-emptive access method over the future broadband infrastructure.

2.2 Furthermore, the harmonized activities for standardization of new technologies would develop not only ICT/IPS over broadband wireless medium but also effective SWIM platform and flight and flow information for a collaborative environment (FF-ICE).

2.2.1 The introduction of SWIM and FF-ICE is based on the ICAO *Global Air Navigation Plan* (GANP, Doc 9750). SWIM provides users access to relevant and mutually understood information in an interoperable manner. FF-ICE defines information requirements for flight planning, flow management and trajectory management and aims to be a cornerstone of the performance-based concept.

2.2.2 SWIM and FF-ICE will support stakeholders in sharing similar data/information globally, with a high level of automation and integration, and will support the collaborative decision making between stakeholders. However, as a challenge regarding how FF-ICE implementation, all stakeholders should be required to develop new applications that allow them to connect to SWIM platform. It brings additional investment for new infrastructure; we should get better understanding that there would be an initial expenditure for stakeholders.

2.2.3 In order to realize TBO over SWIM, the global governance framework should be required. In addition, in order to assure interoperability with interconnectivity in ATM community, a clear cost-benefit of the implementation should be presented to stakeholders, which would permit them to justify where their investments towards the direction for implementation of advanced technologies.

2.3 While advanced technologies are enablers to achieve an operational improvement, the operational environments, level of QOS for safety critical information, airspace flexibility and cyber security policy might restrict the improvement of efficiency and capacity. Therefore, in order to assure the intended benefits from advanced technologies, all stakeholders should evaluate and consider those factors.

2.4 In order to facilitate implementation for advanced technologies, clear objectives and operational improvements should be defined and established as ICAO policy with roadmap. And besides, to maximize the benefit for all stakeholders, Member States need to consider a regional and cross-regional approaches. Those related activities should be prioritized and based on key global and regional ATM context.

2.5 The significance of both harmonization of standardization activities for advanced technologies and clarification of cost-benefit issues should be presented and understood by all Member States and stakeholders.

2.6 JCAB is confident that those concerns would be seriously considered by Member States, and that the Assembly should be invited to following conclusions.

3. **CONCLUSION**

3.1 The Assembly is invited to:

- a) encourage ICAO, Member States and ATM community to get better understanding that the significance of identifying disincentive for realization of TBO over future CNS/ATM infrastructure, and that the collaborative activities among stakeholders would bring common benefit for ATM community; and
- b) strengthen leadership of ICAO for development of Standards, technical specifications and the roadmap for realization of TBO over SWIM.

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