



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 4: Optimum capacity and efficiency – through global collaborative ATM

4.1: Efficient management of airspace and improved flow performance through collaborative decision-making (CDM)

SEAMLESS SURVEILLANCE TOWARDS “ONE SKY”

(Presented by Singapore)

SUMMARY

The ability of ATM system to support safe and efficient operations is critically dependent upon implementing a high performance, reliable and cost-effective surveillance infrastructure. To improve safety, capacity and efficiency, there is a need to implement new ATM techniques which will require support from an improved surveillance system. The paper presents the importance of improving surveillance and enhancing air traffic control capabilities in meeting the needs of rapid air traffic growth through the implementation of ADS-B. The paper also highlights the need for ADS-B data sharing between the neighbouring States to achieve seamless surveillance coverage amongst adjacent FIRs and that more can be done. The benefits of ADS-B over radar and other surveillance alternatives are its low cost, high accuracy and the ability to support airborne surveillance applications which will enable many future safety capabilities.

ANSPs around the world should view ADS-B technology as an initial step in creating a more flexible air transportation system that will create a seamless surveillance environment and shared situational awareness picture for both ground and air operations. States are urged to continue to improve surveillance coverage through current and emerging technologies by collaborating and coordinating with each other.

Action: The Conference is invited to consider the recommendations in paragraph 3.4 for the collaborative and seamless implementation of ADS-B surveillance coverage for enhanced air traffic operations.

1. INTRODUCTION

1.1 With the projected air traffic growth showing that Asia/Pacific Region will see more traffic on its main trunk routes than Europe, there is a clear need to ensure that standards of safety and efficiency are maintained, or even enhanced. Surveillance continues to be an essential enabler to air traffic management (ATM) modernization. New modes of separation, including air-air surveillance application (ASAS) and increased safety nets are placing greater demands on surveillance systems. The needs make it necessary the use of surveillance techniques, such as automatic dependent surveillance — broadcast (ADS-B), which can deliver improved performance in terms of coverage, accuracy and update rate. ADS-B provides a robust foundation for future capability while delivering tangible benefits today.

2. **PROGRESS SO FAR AND NEED FOR MORE**

2.1 The ADS-B technology has the benefit of overcoming existing radar gaps with safety improvement and operational efficiency through surveillance data sharing between States, particularly at FIR boundaries. ADS-B represents a significant advancement over the existing surveillance system by providing increased accuracy and safety.

2.2 Recognizing ADS-B technology as an enabler for Global ATM Operational Concept, ICAO has encouraged States to implement cross FIR data sharing between adjoining States. Improved sharing of surveillance data will allow a rationalization of the surveillance infrastructure which leads to lower cost. By having neighbouring States adopt FIR data sharing collaboration with deployment of ADS-B ground stations, effective surveillance can be developed at a lower cost compared to each State installing ADS-B ground stations independently. It also will be practical to share the associated air/ground communication capabilities from remote VHF stations, for the application of radar like separation to increase airspace capacity and efficiency. This will prompt existing airspace users to equip themselves for ADS-B to enjoy the efficiency.

2.3 Currently, a number of major ADS-B collaboration and data sharing projects in the Asia Pacific Region are in progress with the aim to provide enhanced surveillance over major traffic flow routes. Singapore and Indonesia have embarked on ADS-B data sharing trials since November 2011. Singapore has been receiving the ADS-B data from the Indonesian islands of Matak and Natuna ADS-B stations while Indonesia is also receiving ADS-B data from Singapore ADS-B station. The focus of the extensive range of trials conducted is to verify and validate the actual performance that an end-to-end ADS-B system can achieve. The Singapore-Indonesia ADS-B data sharing trials and mode has the potential to expand further with cross FIR data sharing between neighbouring States. In November 2011, Singapore signed the ADS-B collaboration Agreement with Vietnam. The collaboration between Singapore, Indonesia and Vietnam has made it possible for Singapore to work towards implementation of ADS-B mandate in the northern part of Singapore FIR. The implementation of exclusive ADS-B airspace is targeted to be on 12 December 2013 and aircraft intending to operate at or above F290 within this defined ADS-B airspace will need to be ADS-B equipped and certified accordingly. This will enhance safety and improve capacity and efficiency on the air routes within the ADS-B exclusive airspace that traverse into three or more FIRs. States in the sub-region have also been working together to develop agreements and technical templates covering ADS-B data sharing, and the sharing of very high frequency (VHF) communication capabilities.

2.4 The collaborative efforts and progress made by Indonesia, Singapore and Vietnam shows the commitment to achieve seamless surveillance coverage over the South China Sea area that will improve flight efficiency and enhance safety. This will represent a significant shift in the provision of future CNS services in the Asia/Pacific Region. The activities also demonstrate the spirit of cooperation and coordination between the Asia Pacific States in the effort to establish a foundation for a seamless ATM system in the region. Such a collaborative approach should be considered by States when formulating regional ATM plans which requires a common deployment strategy across the region.

2.5 It is evident from the above examples that implementation of ADS-B surveillance through close collaboration with their neighbours will get the most out of the new technology. States should share their implementation plans and work closely together in a way that will bring the most benefits to the region as a whole. The ADS-B implementation plans should aim to close surveillance coverage gaps within the region. Overlapping surveillance coverage, allowing cross-border sharing of ADS-B data and VHF communications, should be strongly encouraged so that flights can transit seamlessly across national and airspace boundaries. Regional Contingency Plans should take into consideration the existence of such overlapping surveillance coverage and plan contingency routes through the coverage area where applicable.

2.6 ADS-B should be used as a key enabling technology for the future ATM system which is based on the trajectory-based operations and collaborative ATM. The future air traffic environment will require increased use of aircraft-derived surveillance information for the implementation of a seamless air traffic flow

management system. ADS-B plays a pivotal role in the concept of free flight as it shows great promise for both air-to-air and air-to-ground surveillance. ADS-B (IN) will allow aircraft to send messages to each other to provide surveillance and collision avoidance through data link. The increased situational awareness offered by satellite navigation builds a picture in the cockpit equivalent to that on the ground used by air traffic controller. This is a powerful inducement for aircraft to get equipped.

3. CONCLUSION

3.1 The introduction of ADS-B in the surveillance infrastructure provides features such as improved safety, increased capacity and global interoperability. ADS-B also increases the capability for onboard monitoring, enabling delegation of responsibility to the crew of the aircraft, increasing airspace flexibility and in future, making “free flight” possible.

3.2 A challenge for seamless surveillance coverage is to have the right policies, processes and resources in place. An analysis is needed to determine what resources will satisfy the stated requirements of all the States involved and identify areas where the requirements intersect. The analysis will provide States with information they need to prioritize acquisition and development objectives, and to share the cost of realizing those objectives to benefit all parties involved.

3.3 The role of ADS-B in achieving ICAO’s vision of “One Sky” should not be underestimated. The delivery of seamless surveillance coverage is a collaborative effort that requires significant effort, resources, leadership and commitment. The transition to the future will be challenging and such challenges can only be addressed by all parties working together to deliver the surveillance based services that the technology enables.

3.4 The Conference is invited to agree to the following recommendations:

Recommendation 1/x – Recognize the effective use of automatic dependent surveillance — broadcast technology in bridging surveillance gaps and its role in supporting future trajectory-based type of air traffic management operating concepts

Recommendation 1/x - Urge States to share automatic dependent surveillance — broadcast data and associated very high frequency (VHF) communications to enhance safety, increase efficiency and achieve seamless surveillance

That the Conference:

- a) recognize that cooperation between States is key towards improving flight efficiency and enhancing safety involving the use of automatic dependent surveillance — broadcast technology;
- b) agree that the full potential of automatic dependent surveillance — broadcast technology has yet to be fully realized and that it can be further expanded and exploited by States/Territories to attain optimum air traffic management system capacity and safe operations; and
- c) urge States to work closely together to harmonize their automatic dependent surveillance — broadcast implementation plans to optimize benefits to all.