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International Civil Aviation Organization
South American Regional Office
Thirteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/13) - Regional Project RLA/06/901
Lima, Peru, 21 to 25 April 2014

Agenda Item 4: **Assessment of operational requirements in order to determine the implementation of communications, navigation, and surveillance (CNS) capabilities improvement for en-route and terminal area operations**

Expanding ATS surveillance coverage via space-based ADS-B

(Presented by Canada)

SUMMARY

This paper provides information concerning the planned expansion of ATS surveillance coverage via the space-based reception of ADS-B. This paper also provides information about Canada's coordination with the North Atlantic Systems Planning Group and the North American, Central American and Caribbean Working Group on this subject. Finally, this paper invites the SAM IG to consider the potential to expand ATS surveillance coverage using Space-Based ADS-B.

ICAO Strategic Objectives:	*A – Safety;* *B - Air Navigation Capacity and Efficiency;* *D - Economic Development of Air Transport; and* *E - Environmental Protection*

1. INTRODUCTION

1.1 An international partnership has been formed to implement a space-based Air Traffic Services (ATS) surveillance service using satellite reception of Automatic Dependent Surveillance - Broadcast (ADS B) signals from aircraft. This international partnership, led by NAV CANADA, the primary Air Navigation Services Provider (ANSP) in Canada, includes IAA (Irish Aviation Authority), ENAV (the ANSP for Italy), NAVIAIR (the ANSP for Denmark) and Iridium Communications, Incorporated.

1.2 Along with expanding surveillance coverage in its sovereign airspace, Canada plans to use Space-Based ADS-B to decrease the separation applicable between aircraft operating in portions of the ICAO North Atlantic (NAT) Region where Canada has accepted the responsibility for the provision of ATS.

2. DISCUSSION

2.1 Global ADS-B coverage will become possible through the use of 66 Iridium NEXT satellites equipped with receivers capable of receiving signals from 1090 megahertz (MHz) Mode S Extended Squitter transponders. The space-based reception of ADS-B signals will augment the current ground-based ATS surveillance infrastructure. It is important to note that this service will use a separate network from that which supports the current FANS 1/A (and equivalent) Controller Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance - Contract (ADS-C) capabilities.

2.2 The satellite constellation will begin launching in February 2015 and it is expected that full operational capability will be achieved in late 2017.

2.3 Where ATS surveillance services are not provided, maintaining a safe, orderly and expeditious flow of air traffic requires the use of the largest air traffic control separation standards. To ensure that the required spacing will be maintained between aircraft, flights must often operate at less than optimum flight levels or on other than their preferred routes. Flights may also be restricted to less efficient speeds or be required to maintain a specified speed, rather than varying speed to achieve maximum fuel efficiency.

2.4 Expanding the geographic area where ATS surveillance is available is expected to enhance safety, increase operational efficiency and predictability and reduce negative environmental impacts from aviation operations. Space-Based ADS-B will significantly improve situational awareness for air traffic controllers and provide for more timely conflict detection and resolution. The ability for air traffic controllers to provide flight information services during contingency and emergency situations will improve, as will the information available for search and rescue purposes. The ability to provide ATS surveillance services could also be an effective means for harmonizing ATS. Increased harmonization and interoperability would support cost-effective improvements to safety and efficiency between ATS units, States and Regions**.**

2.5 Within the ICAO NAT Region, the increasing availability of ATS surveillance has led Canada to reconsider the NAT operating concept, which currently views ATS surveillance as a means for transitioning to and from the core traffic areas, which are managed using procedural air traffic control techniques. At its upcoming meeting in June 2014, the NAT Systems Planning Group will be invited to formally change this operating concept, based on the availability of ATS surveillance:

Why	To support the effective use of expanded ATS surveillance coverage
What	Develop an implementation plan for the integration of ATS surveillance coverage into the NAT operating concept, taking account of the Report of the NAT 2025 Task Force.
Who	NAT IMG, in coordination with the NAT EFG and NAT SOG
When	NAT SPG/51

Draft NAT SPG Conclusion 50/xx (wp##_1) – ATS Surveillance Services in the ICAO NAT Region

That the:

a) North Atlantic Implementation Management Group (NAT IMG), taking account of the Report of the NAT 2025 Task Force, develop an implementation plan for the expanded use of Air Traffic Services (ATS) surveillance in the ICAO NAT Region, including proposed amendments to procedures and documentation and a list of Air Traffic Management systems which will need to be updated;

b) NAT Safety Oversight Group (NAT SOG) and NAT Economic and Financial Group (NAT EFG) consider what activities should be undertaken by them in relation to the foregoing; and

c) NAT IMG, NAT SOG and NAT EFG provide input or updates, as appropriate, to NAT SPG/51.

2.6 As noted in paragraph 2.1 above, Space-Based ADS-B will use ADS-B signals emitted by aircraft equipped with 1090 MHz Mode S Extended Squitter transponders. Currently, these signals are protected through an Allocation under the International Telecommunication Union (ITU) Radio Regulations for terrestrial use only. Expansion of the current allocation to also provide regulatory protection for the aircraft to satellite signal requires agreement at a World Radiocommunication Conference (WRC). The next WRC takes place in November 2015 (WRC-15).

2.7 WRC agendas are agreed well ahead of time to permit thorough preparations and studies in support of proposed changes to the ITU Radio Regulations. The WRC-15 agenda was agreed at the previous WRC in 2012, just as space-based ADS-B was emerging as a potential service. As a result, there is no agenda item already set aside to discuss expanding the current ADS-B allocation to also include the aircraft to satellite signal.

2.8 It is possible to introduce subjects for discussion at a WRC through an ITU Regional Director's Report or by agreement at the WRC itself. For this reason, considerable efforts have been expended to raise awareness of this issue within the ITU global and regional working arrangements and within global and regional ICAO groups. At the recently concluded 4th meeting of the North American, Central American and Caribbean Working Group (NACC WG/4, 24 to 28 March, 2014 in Ottawa, Canada), the Meeting agreed to take appropriate actions to ensure the necessary knowledge and support on this subject by their ITU representatives, including:

a) the desirability for the ITU Regional Director's report to include information on the need to extend the 1090 MHz allocation to include the aircraft to satellite ADS-B signal;

b) the need for extension of the 1090 MHz protection to be discussed at WRC-15; and

c) the need to support revision of the ITU Radio Regulations to protect the aircraft to satellite ADS-B signal.

3. CONCLUSION

3.1 Space-Based ADS-B is an innovative use of existing technology (satellites and ADS-B) and could potentially lead the way to other game-changing improvements in aviation. The future remote airspace (e.g. oceanic, polar etc.) environments would become more flexible and centred on accommodating operators' preferred flight trajectories.

3.2 It is important for all stakeholders to consider the potential safety, efficiency, environmental and financial benefits they might achieve through expanded ATS surveillance coverage. This will allow for timely and coordinated planning for the necessary systems and procedures changes to take place in a cost effective, harmonized and interoperable manner.

4. ACTION BY THE MEETING

4.1 The SAM IG is invited to:

a) note the information provided; and

b) consider the availability of ATS surveillance via Space-Based ADS-B in its implementation planning.

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