International Civil Aviation Organization

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST SEMINAR AND FOURTEENTH MEETING OF AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) STUDY AND IMPLEMENTATION TASK FORCE (ADS-B SITF/14)

Christchurch, New Zealand, 14 – 17 April 2015

Agenda Item 4: Revew States' activities and interregional; issues on implementation of ADS-B and multilateration

SINGAPORE'S ACTIVITIES AFTER IMPLEMENTATION OF ADS-B SERVICES

(Presented by Singapore)

SUMMARY

This paper updates the activities carried out by Singapore following the implementation of ADS-B services.

1. Introduction

1.1 Singapore commenced ADS-B services along the routes L642, L644, M753, M771, N891 and N892 on 12 December 2013.

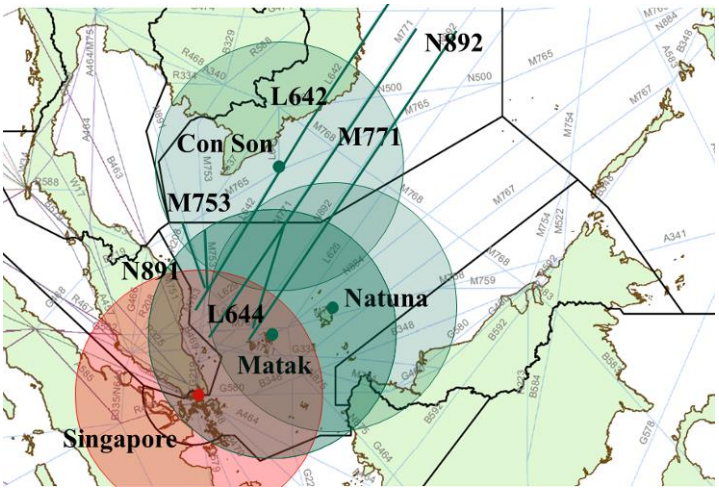

Fig 1: Commencement of ADS-B services over the South China Sea

1.2 This paper updates the meeting on the activities that Singapore is carrying out post implementation.

2. Discussions

Removal of the need for Operational Approval

2.1 On 28 December 2010, Singapore issued the Aeronautical Information Circular (AIC) informing aircraft operators on CAAS's plan to implement ADS-B operations on and after 12 December 2013 within parts of the Singapore FIR.

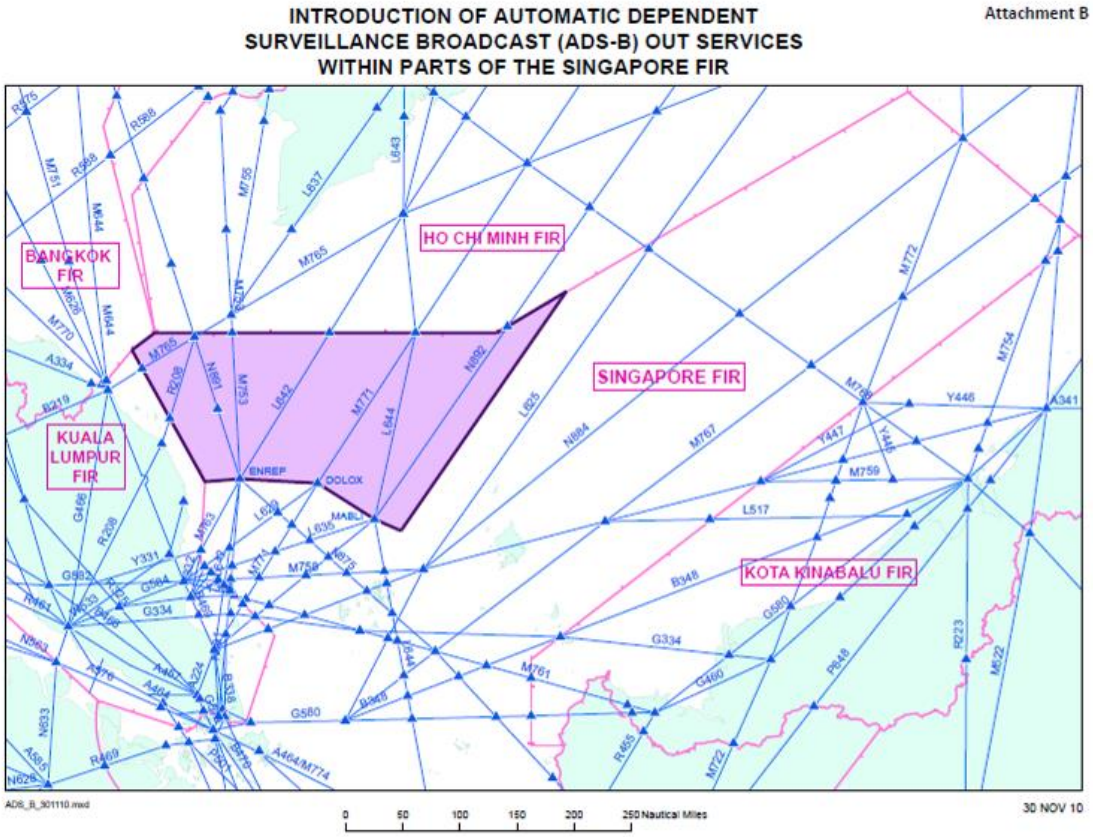

Fig 2: ADS-B airspace within Singapore FIR.

2.2 If an aircraft operates within the ADS-B airspace, the aircraft has to be suitably equipped and the operator has to have the relevant operational approval from the State of Registry. The need for the operational approval was included then due to APANPIRG/21's conclusion to harmonise the requirements.

2.3 As some States were of the view that the operational approval process is onerous and does not add value, the review on the need for operational approval started during ADS-B SITF/13 in April 2014. Subsequently, APANPIRG /25 agreed to review the conclusion made in APANPIRG/21 and formed an ad-hoc group in November 2014 to deliberate on the need for operational approval. The operational approval issue was further discussed during SEA/BOB WG/10 in November 2014. A consensus was reached to do away with the need for operational approval.

2.4 As a result of the consensus, Singapore issued an AIP supplement in end 2014 to remove the need for operational approval for ADS-B operations.

Regular verification of ADS-B performance figures

2.5 As part of the safety case for ADS-B under non-radar environment was based on the assumption that the probability of detection for ADS-B based on 10s update rate is above 95%. Checks were regularly made to ensure that the performance of the ADS-B meets the standard as stated in the safety case.

Regular Monitoring of ADS-B avionics performance

2.6 ADS-B services can only be provided to aircraft with working ADS-B equipment. However, aircraft would not know if their ADS-B equipment is working properly and would rely on ANSPs to feedback.

2.7 Singapore hence provides feedback to the respective airlines when deficiencies are discovered, regardless whether the aircraft is operating within the ADS-B airspace. Such deficiencies can either be reported by controllers (normally when within ADS-B airspace), or discovered during the regular technical analysis.

2.8 Some of the States in the region, (e.g. Australia, Hong Kong, Indonesia, Singapore and Vietnam) shares the occurrences of the deficiencies (especially the more complex ones) with one another offline with the purpose of verifying the issues, obtaining additional data for investigations, as well as to learn more about the causes of the issue. The most significant example is the B787 positional error issue.

Study on ADS-B-RAD

2.9 Before the implementation of the ADS-B services, CAAS planned to use ADS-B in both its radar and non-radar environments. However, the ADS-B safety case consultant then advised against the use of ADS-B within radar environment. This is because most aircraft are equipped with DO-260 avionics and according to ED-161, at least DO-260A is required for medium to high density. While Cir326 does not differentiate between the avionics requirement for various traffic density, it did mention that a separate study has to be conducted to verify that ADS-B data from DO-260 avionics can be used in high complexity air space, which is usually within radar environment. As such, the safety case only covered ADS-B in non-radar environment and on 12 December 2013, Singapore only operationalize ADS-B in the non-radar environment.

2.10 Singapore is now performing a safety case study on fusing ADS-B and radar data within high density and complex radar environment and hopes to operationalize it in future.

Engagement of neighboring States on ADS-B data sharing to cover surveillance gaps

2.11 With the assistance from Indonesia and Vietnam, some surveillance gaps in South China Sea area are filled by ADS-B.

2.12 There are still other surveillance gaps in the South China Sea area and Singapore is exploring with Brunei, the Philippines and Viet Nam on ways to cover the remaining surveillance gaps.

2.13 Thus far, high level memoranda of cooperation were signed between Singapore and the Philippines and between Singapore and Brunei on 11 February 2014 and 27 November 2014 respectively, agreeing in-principle on ADS-B collaboration. The details are yet to be ironed out. Viet Nam has also in-principle agreed to provide additional ADS-B data to Singapore to cover surveillance gaps.

3. Action by the meeting

3.1 The meeting is invited to note the activities of Singapore post implementation of ADS-B services.

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