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: Review States' activities and interregional issues on implementation of ADS-B and multilateration

CONTINUING NEED OF OPERATIONAL APPROVAL FOR ADS-B OUT

(Presented by Japan)

SUMMARY

This paper proposes to reconsider the APANPIRG draft Conclusion 25/52, which requires States to be urged to consider that no operational approval for ADS-B OUT operations is required, for future risk associated with I) the introduction of new operation and service using ADS-B OUT/IN such as ITP and II) the increasing number of aircrafts equipped with ADS-B OUT avionics and operators using ADS-B OUT.

1. Background

1.1 In 2010 the APANPIRG adopted the conclusion 21/39, which proposes that the aircraft operator must have the relevant operational approval from the State of Registry. To comply with the requirement a number of Asia Pacific States have required State of Registry operational approvals for the receiving ADS-B based surveillance service in the airspaces commencing from December 2013.

1.2 In APANPIRG/25 held on September 2014, the issue was discussed that States reconsider the necessity for operational approvals for ADS-B OUT operations in Asia/Pacific Region. Following the discussion, in December 2014, the APAC state letter on adoption of draft Conclusions 25/52 (Attached A), 21/40 and 20/54 was distributed to consider that no operational approval for ADS-B OUT operations is required in the light of experience.

2. Environmental Changes Facing ADS-B Operation

2.1 Two major environmental changes are going to face ADS-B operations.

2.2 I) Introduction of new operation and service based on high reliable transmission by ADS-B OUT.

- Surveillance in Non-radar airspace;

- New Operation using ADS-B OUT/IN such as Visual Separation on Approach (VSA), Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS), CDTI Assisted Pilot Procedure (CAPP) and In-Trail Procedure (ITP).

Hazard A) Higher reliability of ADS-B transmission is demanded than before in conducting above new operation because separation between aircrafts could be reduced utilizing aircraft information derived from ADS-B transmission.

2.3 II) Increasing number of aircrafts equipped with ADS-B OUT avionics and operators using ADS-B OUT.

The number of aircrafts equipped with ADS-B OUT avionics and operators using ADS-B OUT will be increased because of the growing volume of the air transportation accompanying the increasing demand for air transport service especially in Asian-Pacific Region, and the future expanding of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics.

Hazard B) Though the probability of misleading and non-compliant ADS-B transmissions is low under the current circumstances, misleading and non-compliant transmissions will increase in proportion to the increase of the number of aircrafts equipped with ADS-B OUT avionics.

Hazard C) With the expansion of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics, the number of operators who are not familiar with the use of ADS-B OUT such as general aviation and may not implement appropriate operational procedures will increase and as a result the safe operation will be threatened.

2.4 As mentioned above, in order to introduce new operation using ADS-B OUT/IN safely and effectively in ensuring high reliability of ADS-B transmissions, and to deal with the increase of the risk related with the increasing number of the operator using ADS-B OUT accompanying the increasing demand for air transport service and the future expanding of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics, it is not appropriate to determine that operational approval for ADS-B OUT is unnecessary only based on the current operational experience.

3. Future Risks for APINPIRG Draft Conclusion 25/52

3.1 ***Draft Conclusion 25/52 i)*** *In the light of experience, an operational approval from the State of Registry is neither an efficient nor a sufficient safety barrier against avionics transmitting misleading or non-compliant ADS-B;*

Risk i) The number of cases of misleading and non-compliant ADS-B transmissions by non-approved aircrafts will increase resulting from the increasing number of operators who are not familiar with the use of ADS-B OUT, such as general aviation. (**Hazard C)** related)

3.2 ***Draft Conclusion 25/52 ii)*** *In the light of experience, ADS-B data compliant with ICAO Annex 10, but transmitted from airframes having no operational approval from the State of Registry, contribute to the safety and efficiency of ATS services and provide concerned users with a better service;*

In the near future, the introduction of new operation such as ITP, in which high reliability of ADS-B transmission is demanded and increasing number of cases of misleading and non-compliant ADS-B transmissions by non-approved aircrafts with growing number of operators who are not familiar with the use of ADS-B OUT, result in the following risk. (**Hazard B)** and **C)** related)

Risk ii) Introducing new operation using ADS-B OUT/IN such as ITP will be hindered by removal of operational approval.

3.3 ***Draft Conclusion 25/52 iii)*** *both APANPIRG Conclusion 25/42 on regulations for Compliance of ADS-B Transmissions, urging States to implement regulations to give effect to Regional Supplementary Procedure Serial APAC-S12/10 – MID/ASIA 5-3 (page) to ensure that all aircraft transmitting ADS-B are compliant with the standards, and Conclusion 20/54 about Regional ADS-B Equipage Requirement and the certification process, constitute a first safety barrier to misleading and non-compliant ADS-B transmissions;*

Risk iii) It becomes impossible to exclude misleading and non-compliant ADS-B transmission with inappropriate operation based on inappropriate procedure and training by new operators who are not familiar with the use of ADS-B and the number of which is predicted to increase. (**Hazard C)** related)

3.4 ***Draft Conclusion 25/52 iv)*** *in the light of experience, a monitoring of misleading and non-compliant ADS-B transmissions and reactive filtering out of concerned aircraft (black list), and necessary follow-up with concerned operators, and their state regulators for the foreign registered aircraft, is an efficient second safety barrier to misleading and non-compliant ADS-B transmissions;*

Risk iv) By the means of Monitoring and Filtering it is impossible to exclude in advance misleading and non-compliant ADS-B transmission by improper aircrafts and operators the number of which ispredicted to increase. (**Hazard B)** and **C)** related)

Risk v) The safety and efficient introduction of new operation using ADS-B OUT/IN such as VSA and ITP will be hindered because operators conducting new operation using ADS-B OUT/IN use information which is transmitted between aircrafts and cannot be excluded by the means of Monitoring and Filtering by ATC etc.. (**Hazard A)** related)

3.5 ***Draft Conclusion 25/52 v)*** *in the light of experience, that air crew are already experienced in correct operation of ATC transponder and GPS systems, and that there is no ADS-B OUT specific action that the flight crew can take, and that whilst desirable, ADS-B OUT training has minimal (if any) impact on the safety and efficiency of ADS-B OUT based operations;*

Risk vi) Some operational procedures for ADS-B OUT threaten safe operation, such as emergency procedures including to notify the appropriate ATC when trouble with ADS-B occurs and to disable the ADS-B function by ATC instruction. Training program has effect on safe operation for new operators who are not familiar with the use of ADS-B OUT such as general aviation the number of which is predicted to increase. (**Hazard C)** related)

3.6 ***Draft Conclusion 25/52 vi)*** *in the light of the similarity of ADS-B systems to ATC transponder systems, and the fact that ATC transponder systems do not require operational approval;*

Risk vii) While transponder systems have been used for a relatively long time and aircrews are used to that operation, ADS-B systems are relatively new and developing ones with the introduction phase of new operation using ADS-B transmission such as ITP etc. (**Hazard A)** related)

Risk viii) ADS-B procedures to enter Flight ID induces misleading and non-compliant ADS-B transmission due to human error caused by new operators who are not familiar with ADS-B operation. (**Hazard C)** related)

4. Continuous Need of Operational Approval for ADS-B OUT

4.1 It is necessary to ensure high reliability of ADS-B OUT transmission for the purpose of promoting introduction of new operation using ADS-B OUT/IN such as VSA, CAVS, CAPP or ITP operation. However Monitoring and Filtering by ATC cannot exclude misleading and non-compliant ADS-B transmissions between aircrafts conducting new operation using ADS-B OUT/IN. States need to ensure that operators equip appropriate avionics and establish appropriate training programs and operational procedures for ADS-B OUT by Operational approval and exclude misleading and non-compliant ADS-B transmissions in advance for the safety and efficient introduction of new operation using ADS-B OUT/IN.

4.2 It is predicted that the number of operators including new ones who are not familiar with the use of ADS-B OUT such as general aviation will increase for the growing volume of the air transportation accompanying the increasing demand for air transport service especially in Asian-Pacific Region and the future expanding of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics. However, Monitoring and Filtering by ATC cannot exclude non-compliant operators in advance, which results in the increase of operational risk because misleading and non-compliant ADS-B transmissions will increase in proportion to the increase of the number of ADS-B OUT operators. Therefore, States need to ensure that operators equip appropriate avionics and establish appropriate training programs and operational procedures for ADS-B OUT by Operational approval and have responsibility and authority to exclude non-compliant operators in advance.

4.3 If Operational approval is removal at this time, it becomes very difficult to readopt Operational approval for the safe ADS-B operation even when future **Risks** mentioned above chapter 3 emerge. It is necessary to maintain Operational approval for ADS-B OUT to introduce new operation using ADS-B OUT/IN safely and effectively and to deal with the increase of risk related with the increasing number of the operator using ADS-B OUT accompanying the increasing demand for air transport service and the future expansion of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics. Therefore, it is not appropriate to abolish Operational approval only based on low cost effectiveness under the current conditions. If current cost related with operational approval is high, first action for States is to simplify operational approval procedures (e.g. cutting off the unnecessary inspection item) based on the operational experience, and not to remove operational approval.

5. Action by the Meeting

5.1 The meeting is invited to:

a) note that it is not appropriate to determine that Operational approval for ADS-B OUT is unnecessary only based on the current operational experience, in order to introduce new operation using ADS-B OUT/IN safely and effectively in ensuring high reliability of ADS-B transmissions, and to deal with the increase of the risk related with the increase of the operator using ADS-B OUT accompanying the increasing demand for air transport service and the future expansion of airspace which require ADS-B equipage and scope of aircrafts which shall be equipped with ADS-B OUT avionics; and

b) reconsider APANPIRG draft Conclusion 25/52 suggesting that no operational approval for ADS-B OUT operations is required.

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Attachment A: APINPIRG draft Conclusion 25/52 -Airworthiness and filtering process for ADS-B Avionics Equipage

That, considering the need to harmonize States' practices regarding Airworthiness and Operational Approval for ADS-B Avionics Equipage, and the outcomes of the Ad hoc working group on the review of the APANPIRG Conclusions 21/39, 21/40 and 20/54, and specifically that:

i) in the light of experience, an operational approval from the State of Registry is neither an efficient nor a sufficient safety barrier against avionics transmitting misleading or non-compliant ADS-B;

ii) in the light of experience, ADS-B data compliant with ICAO Annex 10, but transmitted from airframes having no operational approval from the State of Registry, contribute to the safety and efficiency of ATS services and provide concerned users with a better service;

iii) both APANPIRG Conclusion 25/42 on regulations for Compliance of ADS-B Transmissions, urging States to implement regulations to give effect to Regional Supplementary Procedure Serial APAC-S12/10 – MID/ASIA 5-3 (page) to ensure that all aircraft transmitting ADS-B are compliant with the standards, and Conclusion 20/54 about Regional ADS-B Equipage Requirement and the certification process, constitute a first safety barrier to misleading and non-compliant ADS-B transmissions;

iv) in the light of experience, a monitoring of misleading and non-compliant ADS-B transmissions
and reactive filtering out of concerned aircraft (black list), and necessary follow-up with concerned operators, and their state regulators for the foreign registered aircraft, is an efficient second safety barrier to misleading and non-compliant ADS-B transmissions;

v) in the light of experience, that air crew are already experienced in correct operation of ATC transponder and GPS systems, and that there is no ADS-B OUT specific action that the flight crew can take, and that whilst desirable, ADS-B OUT training has minimal (if any) impact on the safety and efficiency of ADS-B OUT based operations; and

vi) in the light of the similarity of ADS-B systems to ATC transponder systems, and the fact that ATC transponder systems do not require operational approval;

States be urged to:

a) consider that no operational approval for ADS-B OUT operations is required while reminding airlines, operators, manufacturers and industry of their obligations including training and maintenance aspects; and

b) monitor ADS-B transmissions from aircraft and take action to ensure compliance with Regional Supplementary Procedure specified in MID/ASIA Section 5.5

c) provide capabilities to either

- reject ADS-B data from aircraft which are known to transmit misleading ADS-B data until corrective actions have been successfully conducted; or

- implement procedures to ensure that such aircraft are safely managed;

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