International Civil Aviation Organization

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST SEMINAR AND ELEVENTH MEETING OF AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) STUDY AND IMPLEMENTATION TASK FORCE (ADS-B SITF/11)

Jeju, Republic of Korea, 24-27 April 2012

Agenda Item 5: Report and updates by the leading member of the Task Force on Tasks assigned

GUIDANCE MATERIAL RELATING TO SHARING ADS-B DATA WITHTHE MILITARY

(Presented by Australia)

SUMMARY

This paper proposes Guidance Material for states discussing ADS-B data sharing with the Military organisations.

1. BACKGROUND

1.1 ADS-B SITF/10 - Updated ADS-B Subject/Tasks List includes an action for Australia to produce "Guidance material addressing military concerns regarding sharing ADS-B data" – Serial 21.

1.2 During preparation for ADS-B data sharing between Australia and Indonesia it as necessary for the military organisations to be briefied on the data sharing proposal. Based on that experience, the attached proposed Guidance material has been prepared.

2. GUIDANCE MATERIAL

2.1 The draft material at **Appendix A** is proposed to support discussions with relevant military authorities.

3. RECOMMENDATION

3.1 It is recommended that the Draft Guidance material be adopted.

APPENDIX A

GUIDANCE MATERIAL ON ADVICE TO MI MILITARY AUTHORITIES REGARDING ADS-B DATA SHARING

Scope
This guidance material relates to the topic of sharing ADS-B data with adjacent ATC service providers. It does not provide guidance regarding the decision by States to adopt ADS-B or not. It assumes that the State has adopted the use of ADS-B for Civilian Air Traffic Control.

Automatic Dependent Surveillance Broadcast (ADS-B) Technology
ADS-B is a technology whereby aircraft transmit their position, altitude and identity to all listeners. This technology has been recognised by ICAO and is a major component of the future air traffic management systems for Europe, USA and Asia/Pacific.
Air Traffic Control supplier organisations have deployed receivers to collect and display ADS-B data to Air Traffic Controllers. This provides Air Traffic Control the ability to use rapid update, high integrity position, altitude, velocity and identity data to improve efficency and safety of operations.

Why data sharing?
The ADS-B and radar transmissions from aircraft are limited in range by the curvature of the earth and terrain obstructions. It is not always possible for two neighbouring ATC organisations to "see" aircraft approaching their areas of responsibility. Sometimes the boundary is out of range of radar or ADS-B receivers..

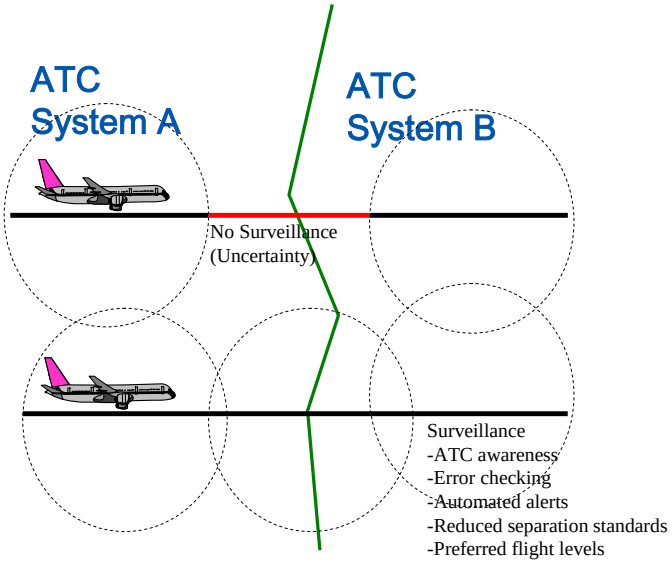
As international aircraft fly around the world, they move from one ATC system to another. To maintain safety, ATC attempt to co-ordinate the time, altitude and place of crossing the common boundary, typically using voice co-ordination and received flight plan information. Sometimes errors occur in this co-ordination and this results in air safety risks.

When either ATC system does not have surveillance, there are two negative consequences :

a) traffic is managed less efficiently using "procedural" means. Thus aircraft need to be separated by very large distances or times, or must fly at altitudes where they will burn more fuel

b) there is increased human error and limited means to detect these errors

These negative consequences can be avoided by providing the same surveillance view of traffic to both parties. ADS-B provides a ready solution since it is inexpensive to deploy ADS-B data receivers and to share this data with ATC systems in neighbouring countries.



Surveillance data allows differences to be identified early before they become a problem. It allows the application of automated safety net tools that automatically alert controllers to a range of problems such as aircraft at the wrong flight level.

Sharing of surveillance data, such as ADS-B, is a major safety benefit to civil air traffic at the boundary. IATA strongly support ADS-B data sharing. The expected outcomes of initial data sharing include :

- reduced numbers of safety incidents at the air traffic control boundary
- earlier detection of air traffic controller and pilot errors
- increased support and confidence in data sharing to allow introduction of radar-like separation at the FIR boundary in future phases.

Radar data sharing could also be as effective as ADS-B, however it is often more difficult to obtain clearance from military authorities because :

- primary radar can measure the position of military/civil aircraft and can therefore disclose location or performance characteristics which may be of concern to military organisations.
- SSR radar can measure the position and altitude of military aircraft which have operating ATC transponders and can therefore disclose location and performance characteristics which may be of concern to military organisations.
- Radars need to be carefully aligned and monitored, and hence the data user must rely on alignment provided by the other party.

In the case of ADS-B, the ground stations are similar to a communication channel, because the actual data is broadcast by the aircraft.

Military aircraft with ADS-B
ADS-B data sharing does **not** influence the decision by Defence Authorities to equip or not equip with ADS-B. The equippage decision is usually based upon a large number of factors including :

- the regulations and policies of the State
- the age, capability and cost of equippage of particular aircraft type fleets
- the operational benefits of using ADS-B in the civilian air traffic environment (and in military ATC environments with ADS-B). These benefits include safety, efficency, and search and rescue.
- the military advantages and disadvantaes of transmitting ADS-B data

Note that many modern Mode S transponders and Mode 5 transponders support ADS-B.
Some military transponders may support ADS-B based "station keeping" using encrypted DF19 ADS-B messages, but this data is not normally decoded or used at all by civil systems.

Military aircraft will not transmit ADS-B if they wish to be un-observed.
In most cases today, tactical military aircraft are not ADS-B equipped or can choose to disable transmissions. In future, increasing numbers of military aircraft will be ADS-B capable and will include the ability to disable the transmisisons.

Military authorities will enable or disable ADS-B data transmission from concerned aircraft taking into account whether they wish operations to be observed by any ADS-B receiver.
Because low cost ADS-B receivers are available to the general public , ADS-B data sharing is only making available to the adjacent authority data that is already available to members of the public (ie: [1]those members of the public that have ADS-B receivers).

Military aircraft that do transmit ADS-B data must always assume they are visible because any ADS-B receiver (on the ground or in the air) can receive and process the transmitted data.

Military needs can be satisfied
ADS-B on the other hand simply only conveys information from co-operative aircraft that have chosen to equip and broadcast ADS-B messages.

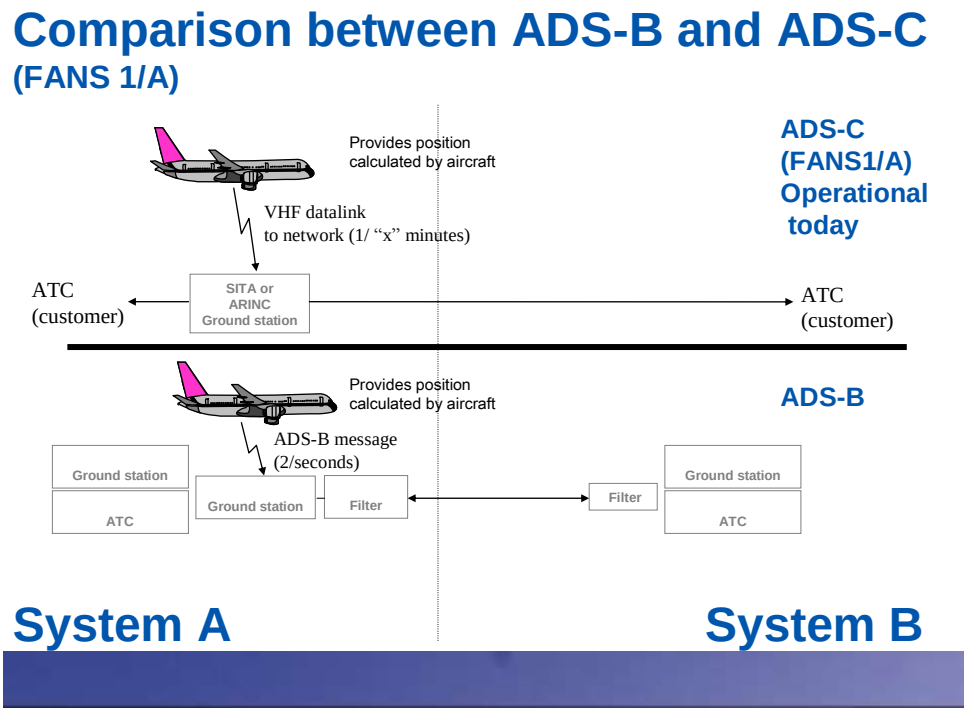
Further, if required, it is possible for States to instal ADS-B filters which will prevent data about sensitive flights being shared. These filters can be based on a number of criteria and typically use geographical filtering to only provide ADS-B data to the other party if aircraft are within 150-200 NM on their side of the boundary.

Appropriate firewalls and data security measures can also be implemented.

The decision to share ADS-B data or not, will have no impact on whether aircraft transmit ADS-B messages. ICAO standards already allow these transmissions and some states such as Australia have published regulations which mandate that ADS-B shall be transmitted by airliners.

[1] Low cost ADS-B receivers can be purchased on the internet

Is this concept new?
No, ADS-Contract (ADS-C) data exchange has been operational for more than 10 years for large international airliners like B747/B777 and A330/A340 aircraft. ADS-C data is received by VHF, satellite of HF receivers operated by commercial aviation communications companies in multiple countries and distributed to their ATC customers worldwide. This is a type of data sharing as a commercail service. ADS-B is different in that it is transmitted more frequently and can be received without the use of a 3rd party.



The concept of data sharing at the boundary between states or systems is not new and is very similar in concept to the operational use of ADS-C today.

Is there an existing precedence?
Australia and Indonesia currently share ADS-B data from 4 ground stations each. The operational experience has been overwhelmingly positive and has allowed the early recognition of ATC/pilot errors before they have become critical. A number of States in Asia-Pacific are planning ADS-B data sharing.

What is the cost?
The Air Traffic Control organisation bears a small additional cost to share ADS-B data. The ground stations to observe equipped aircraft are often already installed and operating for domestic use. The new infrastructure for sharing data includes the operation and maintenance of the link and any filtering devices.

There is normally no additional cost to the military organisation to because the Air Traffic Control organisations normally fund the data sharing infrastructure.