



International Civil Aviation Organization

**FIFTEENTH MEETING OF THE ADS-B STUDY AND IMPLEMENTATION
TASK FORCE (ADS-B SITF/15)**

Bangkok, Thailand, 18 - 20 April 2016

**Agenda Item 2: Review the outcome of APANPIRG/26 on ADS-B SITF/14 and the Report
of SEA/BOB ADS- B WG/11 Meetings**

**ADS-B MONITORING SYSTEM: A SURVEY ON COMMON
ITEMS/PARAMETERS MONITORED**

(Presented by Malaysia)

SUMMARY

This paper presents results of the survey conducted to identify the items/parameters being monitored by States/Administrations for ADS-B system.

1. INTRODUCTION

1.1 This work was conducted as a continuation from the previous work presented by DCA Malaysia on a holistic set of system specifications to monitor the ADS-B system in the SEA/BOB ADS-B WG/11 (WP/08).

1.2 To achieve this, a survey provided in the link (<http://goo.gl/forms/SuHJf3T3HU>) was distributed to all States on 22 February 2016.

1.3 Nine (9) States have responded to the survey, namely: New Zealand, Singapore, Japan, United States, India, Hong Kong, Thailand, Malaysia and Australia. Analysis of the survey results are discussed in the next section.

2. DISCUSSION

2.1 ADS-B Implementation, Operations and Monitoring

The first part of the survey investigates on ADS-B Implementation, Operations and Monitoring by the States. The survey results indicate that eight (8) States have ADS-B ground stations installed while one (1) State (Japan) does not have it in place at present. Six (5) States declared their system to be operational and three (3) States; Hong Kong, Thailand

and Malaysia declared their system as not operational to date. The survey also shows that all the nine (8) States have implemented a system to monitor their ADS-B system performance.

2.2 ADS-B Monitoring System

The second part of the survey tries to identify the items/parameters currently being monitored by the States. The results are provided graphically as below:

2.2.1 ADS-B Ground Station: Site Monitoring

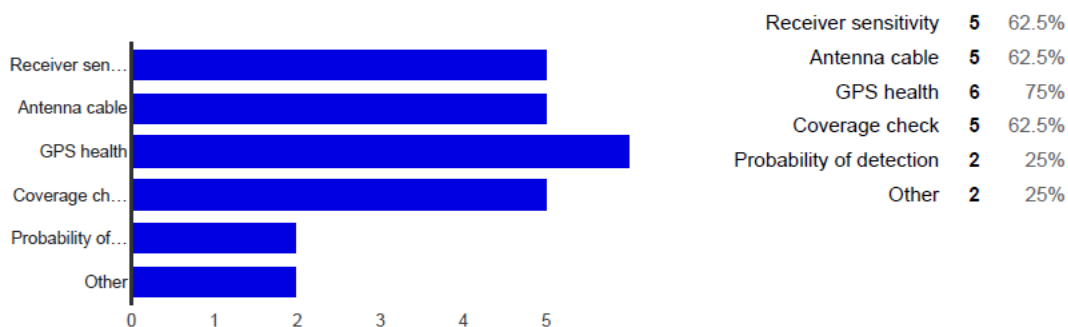


Figure 1: Items/parameters monitored for ADS-B Ground Station Site Monitoring

Additional items/parameters monitored by the States for Site Monitoring include:

- Station service availability (United States);
- Memory usage (India); and
- Receiver status (Malaysia).

2.2.2 ADS-B Ground Station: Remote Control & Monitoring System (RCMS)

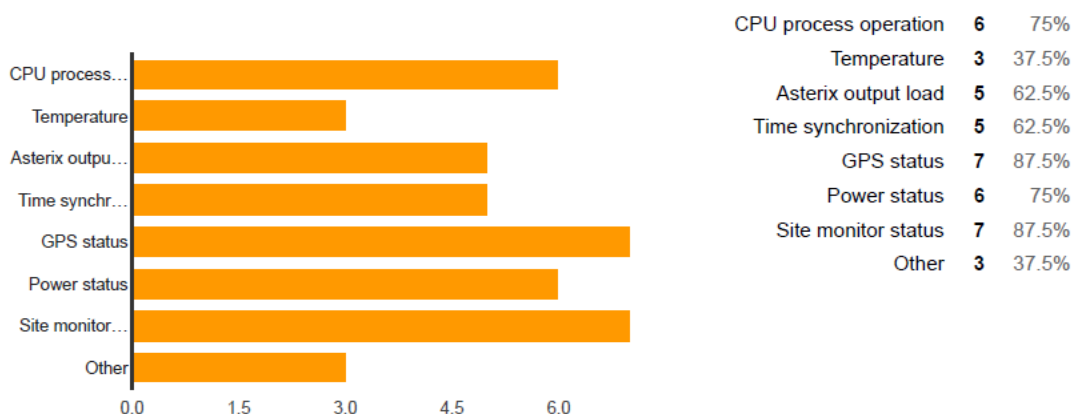


Figure 2: Items/parameters monitored for ADS-B Ground Station RCMS

Additional item/parameter monitored by the States for RCMS includes: Software version for the operating system and application software (Australia).

2.2.3 ADS-B Ground Station: Logistic Support Monitoring

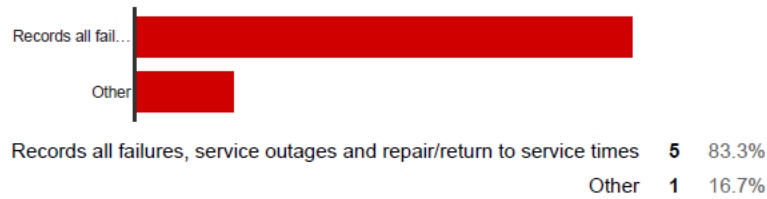


Figure 3: Items/parameters monitored for ADS-B Ground Station Logistic Support

2.2.4 ADS-B Equipage Monitoring

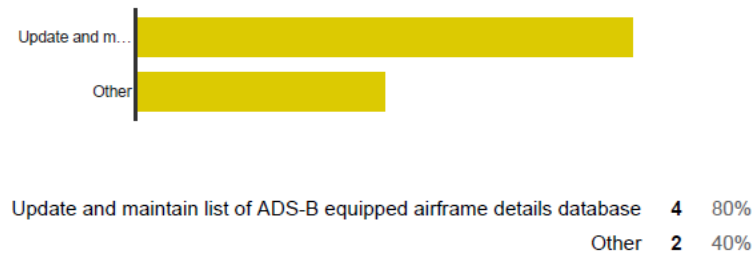


Figure 4: Items/parameters monitored for ADS-B Equipage

Additional item/parameter monitored by the States for ADS-B equipage includes: Identify aircraft not complying with Regional mandate (United States).

2.2.5 ADS-B Avionics Monitoring

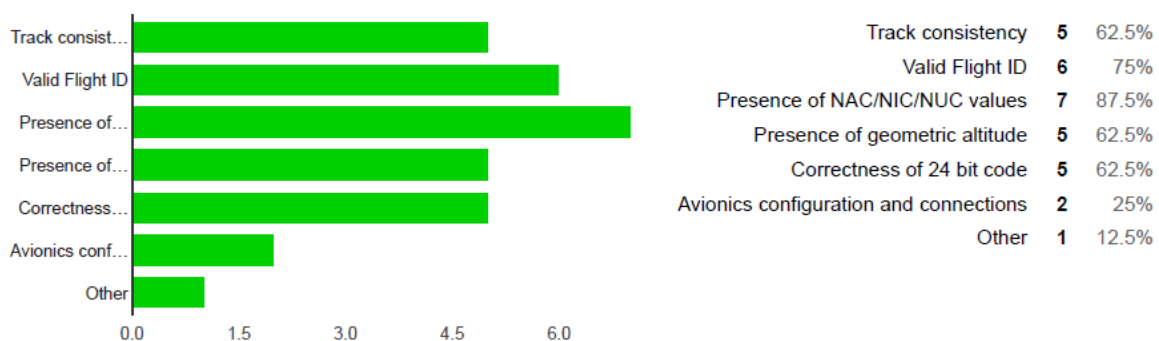


Figure 5: Items/parameters monitored for ADS-B Avionic

Additional item/parameter monitored by the States for ADS-B avionics includes: Update and maintain list of aircraft with faulty avionics (Singapore).

2.2.6 ADS-B Performance Monitoring

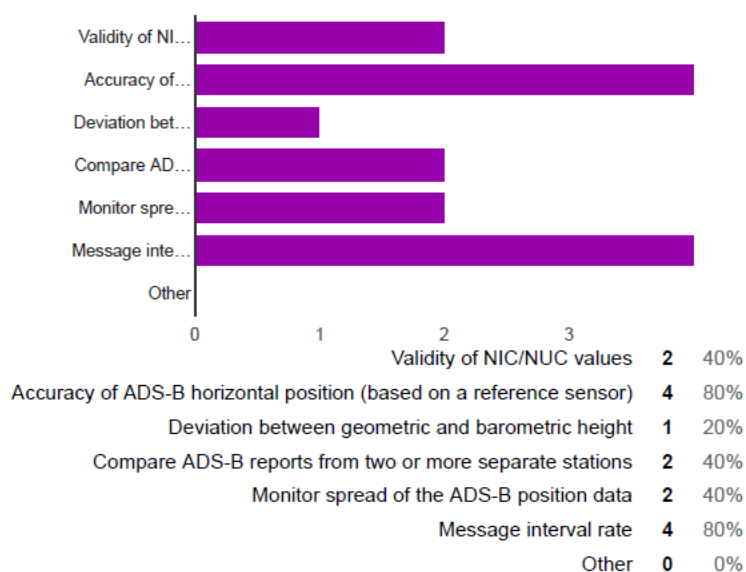


Figure 6: Items/parameters monitored for ADS-B Performance

2.2.7 ADS-B on ATC Display Monitoring

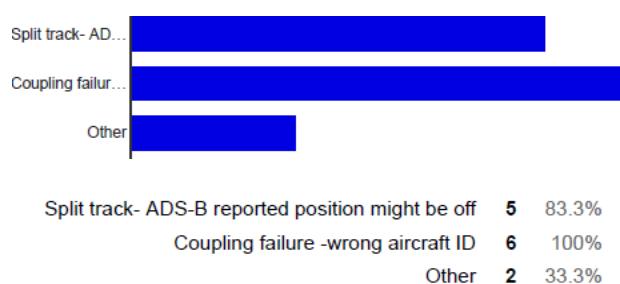


Figure 7: Items/parameters monitored for ADS-B Display

Additional items/parameters monitored by the States for ADS-B on ATC Display include:

- Duplicate ICAO 24-bit address (United States)
- Display of data block (India)

2.3 Suggestions received from the States/Administrations

One suggestion was received from India - To receive and process latest category version 2.1 and also to support backward compatibility.

2.4 Common items/parameters monitored by the States

The monitored items/parameters are categorized into five main modules; Ground Station, Equipage, Avionics, Performance Level and ADS-B Display. The Ground Station module has three sub-modules; namely Site Monitoring, Remote Control & Monitoring and Logistic Support Monitoring. The common items and parameters monitored by the States responded to the survey are summarized in Table 1. The table also includes additional items/parameters specified by the States in section 2.2 as ‘Other’.

The analysis in Table 1 shows that more than half of the respondents with huge monitoring efforts on Ground Station module; particularly sub-module RCMS, followed by Site Monitoring and Logistic Support Monitoring, and Avionics Monitoring module. However, the number of respondents who monitor on ADS-B Performance Monitoring module is relatively low, even though it is directly related to the surveillance data integrity and safety.

In addition, we have learnt that, the common items/parameters identified in this survey does not indicate that the items/parameters are the most important ones. The ‘importance’ depends on the safety impact that the items/parameters may cause to the operations.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this papers;
- b) consider to incorporate in the AIGD a checklist developed based on the outcome of this survey with the most common parameters for the required monitoring; and
- b) discuss any relevant matters as appropriate.

Table 1: Analysis of common items/parameters monitored by the States for ADS-B System Monitoring

Performance Indicators	Singapore	New Zealand	United States	Hong Kong	India	Malaysia	Thailand	Australia	Frequency (States)	%
ADS-B Ground Station										
Site Monitoring										
▪ Receiver Sensitivity	√			√	√		√	√	5	62.5
▪ Antenna Cable	√			√	√		√	√	5	62.5
▪ GPS health	√		√	√	√		√	√	6	75
▪ Coverage check	√	√		√	√		√		5	62.5
▪ Probability of Detection	√				√				2	25
▪ Station service availability			√						1	12.5
▪ Receiver status						√			1	12.5
Remote Control & Monitoring (RCMS)										
▪ CPU process operation	√		√	√	√	√	√	√	7	87.5
▪ Temperature			√	√	√			√	4	50
▪ Asterix output load			√	√	√	√	√	√	6	75
▪ Time synchronization	√		√	√	√	√	√		6	75
▪ GPS status	√	√	√	√	√	√	√	√	8	100
▪ Power status	√		√	√	√	√	√	√	7	87.5
▪ Site monitor status	√	√	√	√	√	√	√	√	8	100
▪ Memory usage					√				1	12.5
▪ Software Version (Operating System and RCMS Application)								√	1	12.5
Logistic Support Monitoring										
▪ Records all failures, service outages and repair/return to service times	√	√	√	√	√			√	6	75
ADS-B Equipage Monitoring										
▪ Update & maintain list of ADS-B equipped airframe details database	√	√	√			√		√	5	62.5
▪ Identify aircraft non-compliant to Regional mandate			√						1	12.5
ADS-B avionics monitoring										
▪ Track consistency			√	√		√	√	√	5	62.5
▪ Valid Flight ID			√	√	√	√	√	√	6	75
▪ Presence of NAC/NIC/NUC values		√	√	√	√	√	√	√	7	87.5
▪ Presence of geometric altitude			√	√	√	√		√	5	62.5
▪ Correctness of 24 bit code		√	√			√	√	√	5	62.5
▪ Avionics configuration & connections			√					√	2	25
▪ Update and maintain list of aircraft with faulty avionics	√		√					√	3	37.5

Performance Indicators	Singapore	New Zealand	United States	Hong Kong	India	Malaysia	Thailand	Australia	Frequency (States)	%
ADS-B performance monitoring										
▪ Validity of NIC/NUC values		√		√					2	25
▪ Accuracy of ADS-B horizontal position (based on a reference sensor)	√		√	√	√				4	50
▪ Deviation between geometric and barometric height					√				1	12.5
▪ Compare ADS-B reports from two/more separate stations	√		√						2	25
▪ Monitor spread of the ADS-B position data			√	√					2	25
▪ Message interval rate	√	√	√		√				4	50
ADS-B Display on ATC Display										
▪ Split track- ADS-B reported position might be off	√	√	√	√	√				5	62.5
▪ Coupling Failure-Wrong aircraft ID	√	√	√	√	√			√	6	75
▪ Duplicate ICAO 24 bit address			√						1	12.5
▪ Display of data block					√				1	12.5