



International Civil Aviation Organization

**THE TENTH MEETING OF THE SOUTH EAST
ASIA AND BAY OF BENGAL SUB-REGIONAL
ADS-B IMPLEMENTATION WORKING GROUP
(SEA/BOB ADS-B WG/10)**



Singapore, 11 - 13 November 2014

Agenda Item 4: Report on ground system and avionics performance monitoring and improvement in compliance

PERFORMANCE OF ADS-B STATIONS AND AVIONICS IN SINGAPORE FIR

(Presented by Singapore)

SUMMARY

This paper shares with the working group our continuous monitoring of the performance of the ADS-B ground stations and the avionics operating in the Singapore FIR.

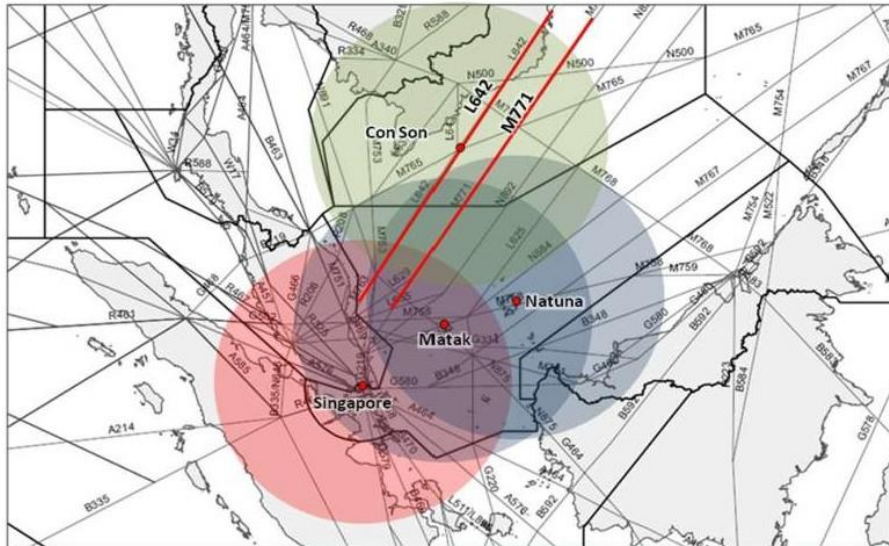
1. Introduction

1.1 This paper shares with the Working Group, the performance of the ADS-B ground stations and the avionics operating in the Singapore FIR.

2. Discussion

ADS-B Ground Stations

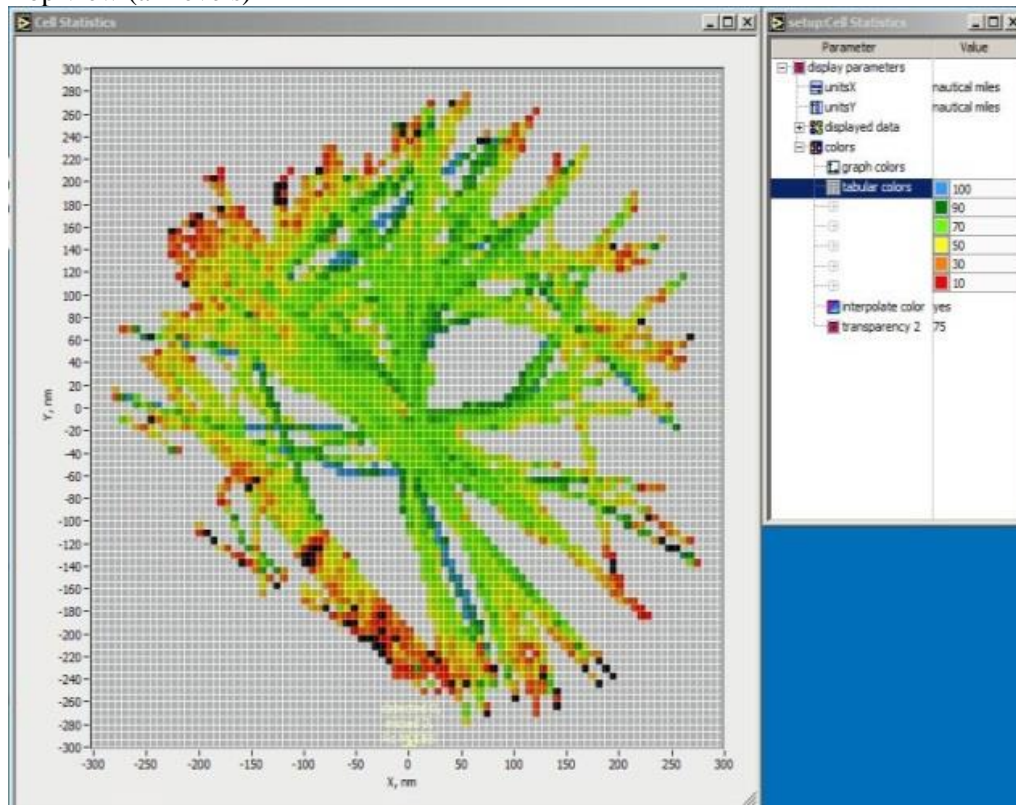
2.1 Singapore is using the ADS-B data from Con Son, Matak, Natuna and Singapore. The theoretical coverage of the ADS-B stations are shown in the diagram below:



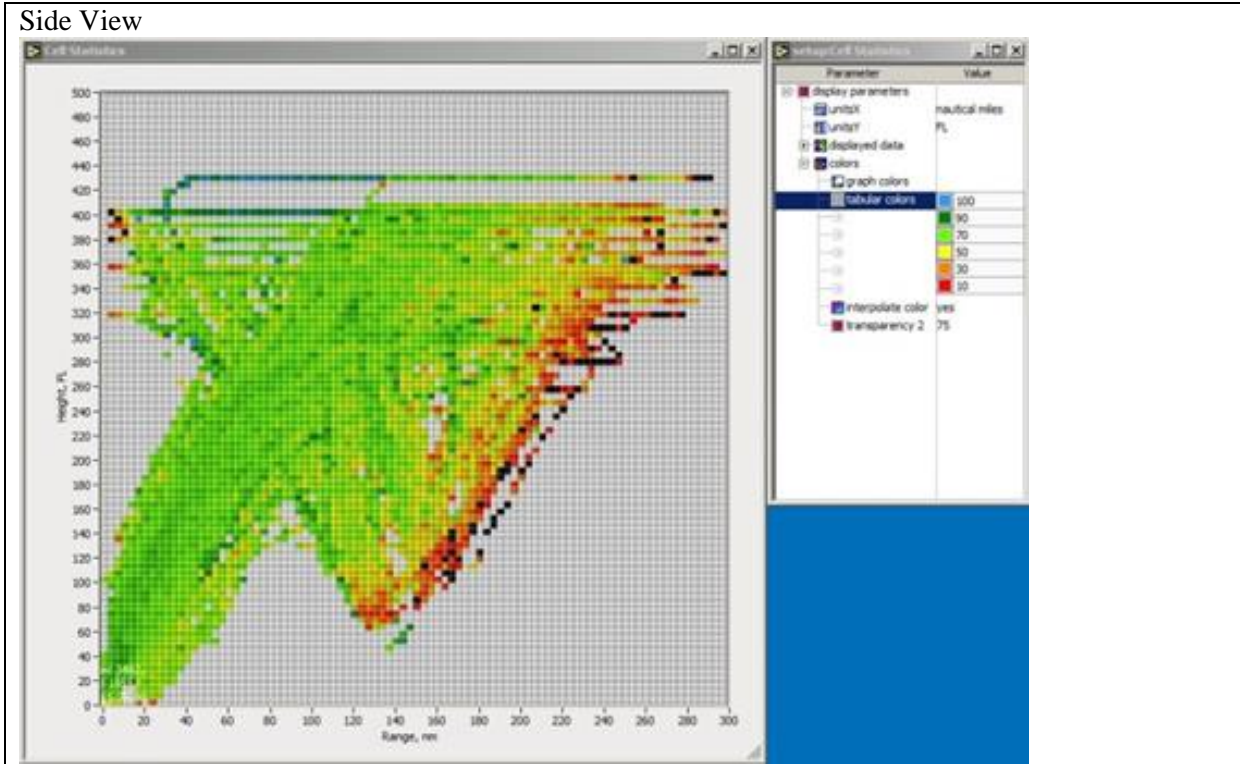
2.2 As part of the effort to ensure that the performance of ADS-B stations meet the operational requirements, we make use of our surveillance monitoring system to monitor the performance. It is observed that the performances of the stations support our ADS-B operations (i.e. probability of detection of more than 95% for 10s update rate in most area). However, the average probability of detection of between 50 to 70% for 1s update rate is far from the theoretical performance.

ADS-B Station A, 1s update rate (Average PD of 54.3%)

Top view (all levels)

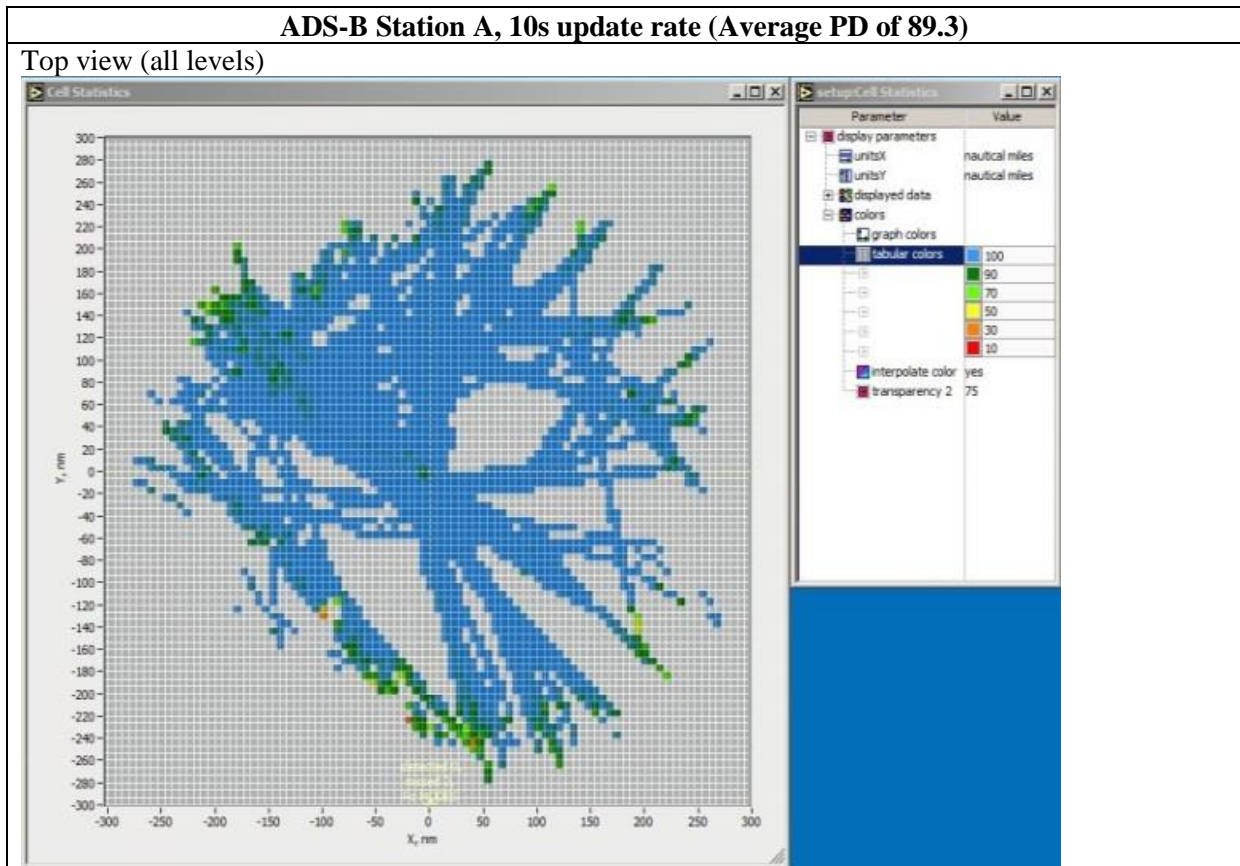


Side View

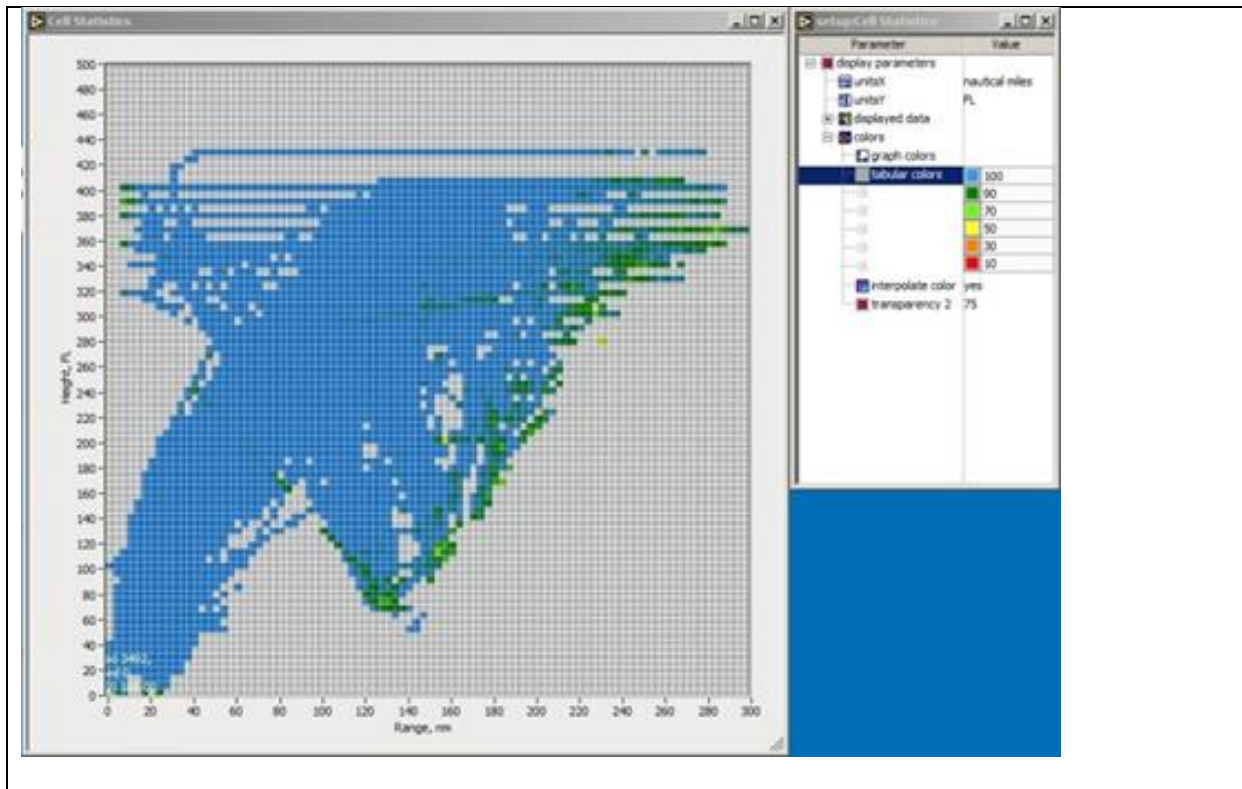


ADS-B Station A, 10s update rate (Average PD of 89.3)

Top view (all levels)

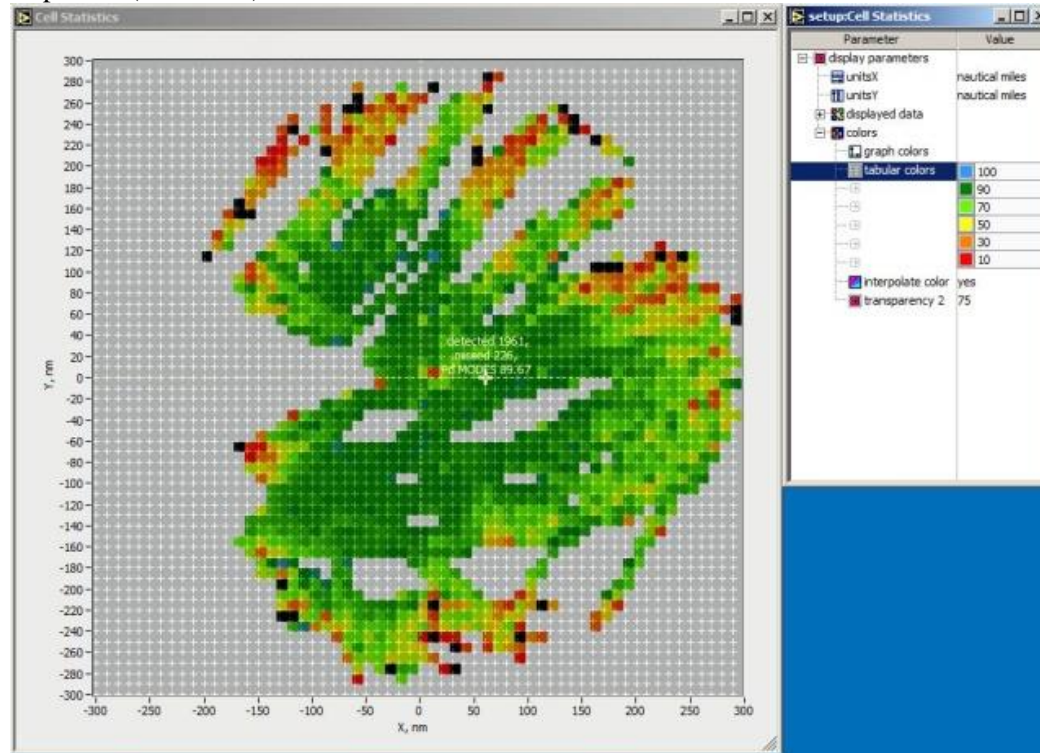


Side View

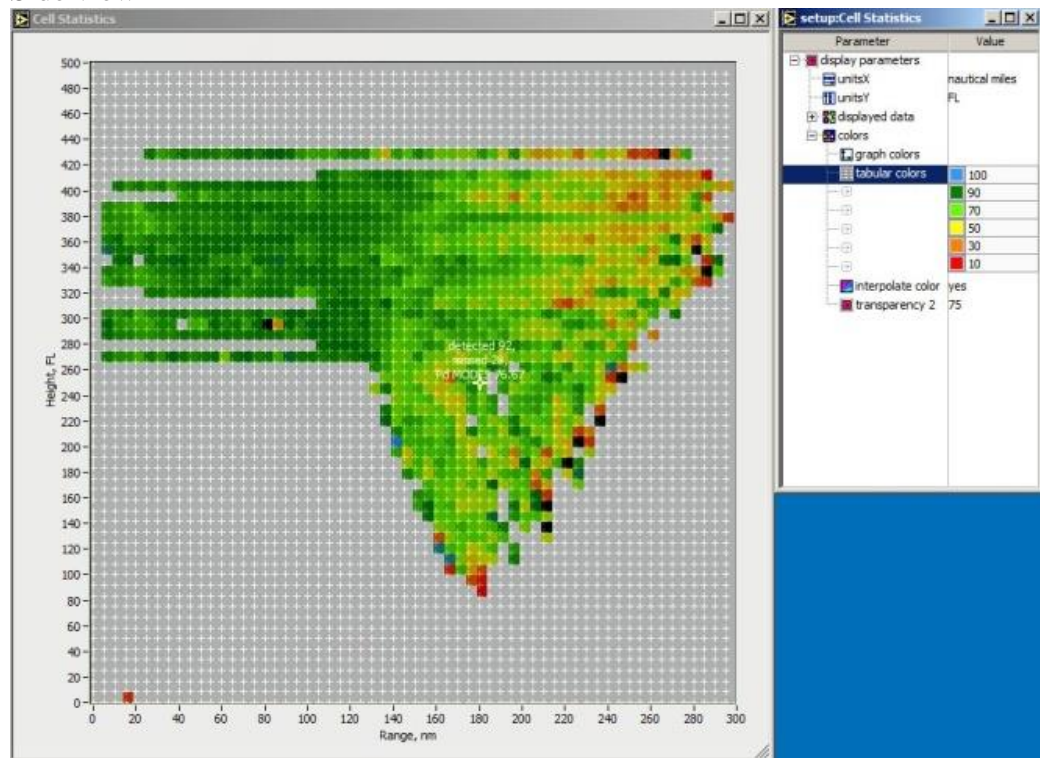


ADS-B Station B, 1s update rate (Average PD of 69.26%)

Top view (All levels)

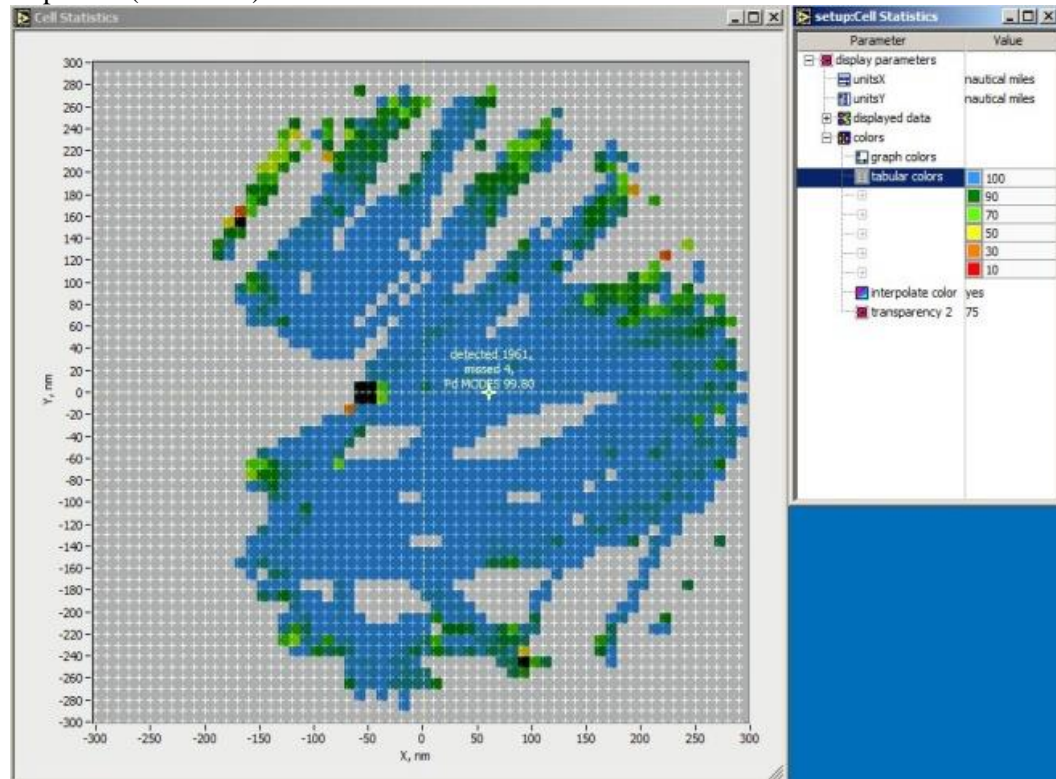


Side view

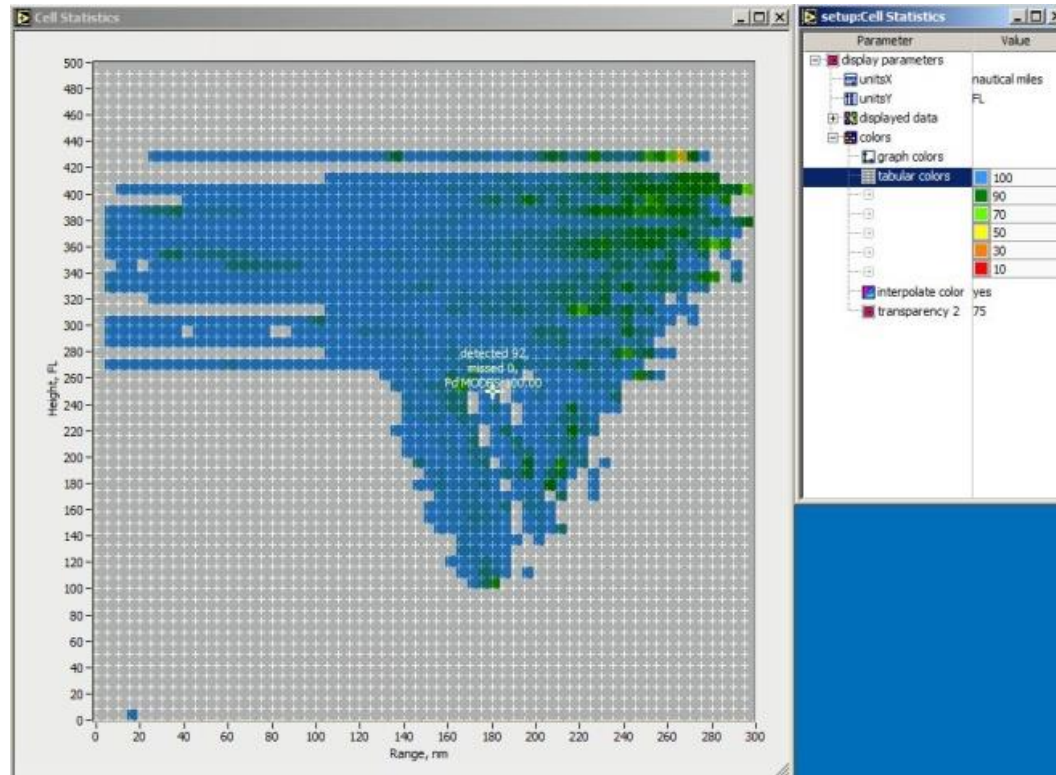


ADS-B Station B, 10s update rate (Average PD of 91.21%)

Top view (All levels)

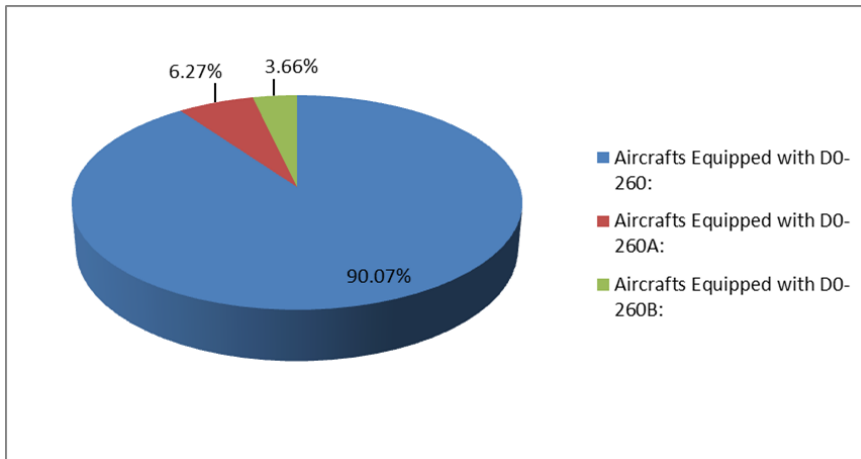


Side view



Distribution of Avionics Type

2.3 A study on the distribution of avionics type was made. The area of study is within the coverage of the Singapore ADS-B station at all flight levels. It was found that about 3.7% are DO-260B avionics and 6.3% are DO-260A avionics. The remaining are DO-260 avionics.



Toggleing between high and low NUC

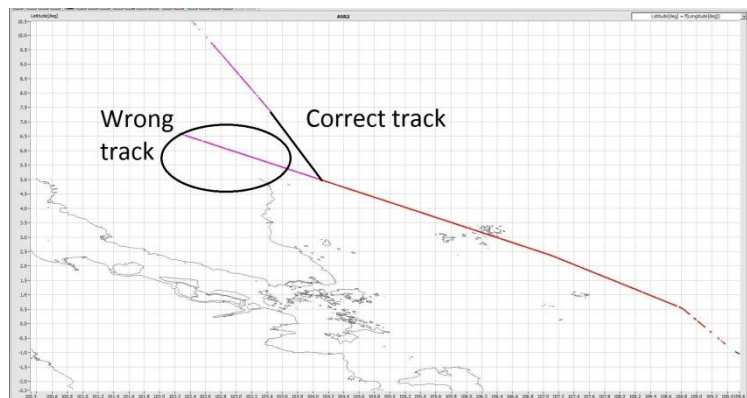
2.4 We still notice that there are occasions where NUC values toggle between high and low without apparent reasons. However, such occurrences have substantially.

Consistent low NUC

2.5 While aircraft may transmit low NUC occasionally, we were of the view that most of the cases of consistent low NUC were due to the avionics problems such as faulty GPS receiver. As agreed in previous ADS-B Study and Implementation Task Force meetings, ADS-B reports with low NUC will not be displayed on the ATC system displays. Airlines need to be notified if any of their aircraft are transmitting low NUC values consistently.

Recent faults

2.6 In October, an aircraft indicated good NUC while the showing misleading position data. (See diagram below). It is observed that initially, the ADS-B data reflected the correct position. When the aircraft made a turn at a way-point, the ADS-B data indicated that the aircraft was still travelling straight. The transponder corrects this error only after more than 30NM of misleading data. We are currently supporting investigation carried out by Air Services Australia and Boeing by providing the recorded ADS-B data.



3. Action by the Meeting

3.1 The meeting is invited to:

- a) Note the above information;
- b) To urge ADS-B ground system vendors and airlines to continue assist ANSPs in the understanding and resolution of issues.
