



International Civil Aviation Organization

**FIRST MEETING OF THE SURVEILLANCE IMPLEMENTATION
COORDINATION GROUP (SURICG/1)**

Bangkok, Thailand, 21 - 22 April 2016

Agenda Item 7: Use of Mode S DAPS in Asia Pacific

**IMPLEMENTATION OF MODE S DAPS (SELECTED FLIGHT LEVEL)
IN AIRWAYS ATMS**

(Presented by New Zealand)

SUMMARY

This paper presents an update on Airways New Zealand's implementation of MODE S DAPS, specifically Selected Flight Level, within the Air Traffic Management System.

1. INTRODUCTION

1.1 In 2015 Airways indicated that it was progressing with the introduction of MODE S DAPS data into its Skyline Air Traffic Management System.

1.2 This project is now entering the final testing stages before a planned implementation date of May 25th 2016.

1.3 The paper will indicate the process used and issues found during the project.

1.4.1 The intent of this enhancement is to provide controllers with a "Selected Flight Level" (SFL) data extracted from aircraft equipped with Mode S Enhanced Surveillance transponders (EHS).

1.4.2 Selected altitude is available from BDS Register (4,0) and is interrogated for every 20 seconds by Airways MODE S radars and the Multilateration system or alternatively from ADS-B equipped aircraft with DO260A or DO260B transponders.

1.4.3 The extracted data enables the Air Traffic Management system (ATMS) to generate a safety alert when the SFL chosen by the crew **DOES NOT** match the cleared altitude given by the controller, alerting the controller to take appropriate action to remedy the issue.

2. DISCUSSION

Issues Encountered with the Implementation of Selected Flight Level

2.1 The various Flight Management Systems used on aircraft means that the use of Selected Flight Level within the ATM system required both Software and ATC procedures to handle automated and manual aircraft systems. For example;

2.1.1 An automated FMS allows the crew to input the final cleared level as issued by the controller and the aircraft systems will take care of any intermediate levels up to the final cleared level (E.g. Cleared FL250 SID14B – The Flight Crew will input FL250 into the FMS which will provide and SFL of FL250 in the BDS register (4,0). The aircraft FMS will comply with any intermediate level requirements within the SID procedure automatically without changing the SFL).

2.1.2 In contrast, a manual FMS requires the crew to input each level restriction within a SID/STAR procedure, which then introduces the need for more complex software resolutions within the ATM system. For example ATC clear the aircraft to FL250, but the FMS SFL will show each altitude restriction in the SID procedure as selected by the crew until they can input the final cleared level FL250. This generates spurious alerts to ATC because of the mismatch between the CFL in the ATC system and the SFL provided by the aircraft.

2.2 The functionality was required only for radar sectors. This meant that software had to be written to stop SFL alert processing when aircraft were released to procedural approach units and towers attached to radar sectors.

2.3 During testing with ADS-B data from five trial systems, it was found that the decoding of the CAT21 message I021/146 was different in three out of five cases.

2.3.1 One did not decode SFL data from DO260A or DO260B transponders.

2.3.2 Two did not decode DO260A data but did decode DO260B data.

2.3.3 Of the 2 decoding both DO260A and DO260B transponder data, one was decoding DO260A data incorrectly, generating spurious SFL altitudes and as a consequence spurious SFL alerts within the test system.

2.4 Incorporating the SFL alerts with other alert functionality such as Short Term Conflict Alert (STCA) and Cleared Level Adherence Monitoring (CLAM) also needed to be taken into account.

2.5 Testing of both the “Processing of SFL Data” and “SFL Alerting” is complex.

2.5.1 Access to a target generator capable of processing Enhanced MODE S data (MODE S EHS) and ADS-B data is essential

2.5.2 Lab testing using live data is also essential to find issues which are not seen using a target generator. Access to frequencies is essential for this type of testing.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

- a) Note the information contained in this papers; and
- b) Discuss any relevant matters as appropriate.
