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

ADS-B AND MULTILATERATION OPERATIONAL SERVICE WITHIN NEW ZEALAND

(Presented by Airways New Zealand)

SUMMARY

This paper updates the meeting on Airways experiences since the introduction of ADS-B and MULTILATERION surveillance into the New Zealand Air Traffic Management System (ATMS) in Dec 2013.

1. INTRODUCTION

1.1 This paper provides information on Airways Operational and Technical experiences since the introduction of data from the Queenstown (NZQN) Wide Area Multilateration (WAM) System into the ATMS in December 2013. This paper is an update to the paper provided to ADS-B SITF/13

1.2 The MLAT network was originally designed to provide surveillance around Queenstown airport with tower located situational displays providing enhanced situational awareness for tower controllers. The system was later expanded to cover the lower South Island using the same central processor that is based at Queenstown but for application with enroute separation provided by Christchurch Centre radar controllers.

1.3 The original system configuration design was based on an enhanced situational awareness proof of concept approach. As a result, there were constraints around making the system work vs. keeping control of the installation costs. This impacted the system availability and performance when the wider enroute application was required.

1.4 Now that Airways have realised the value of the system in wider separation based applications, we would possibly change the design for future installations

2. STATUS UPDATE – Configuration and availability

2.1 The wider application of WAM and ADS-B in the en-route environment has resulted in operational and safety efficiencies for Airways and cost savings for aircraft operators. Chiefly:

- Reduction in the use of procedural separations between the Enroute Surveillance sector and those procedural towers within the sectors area of control;
- An increase in surveillance coverage to the west of the established Domestic FIR. This has led to an extension of the domestic controllers area of responsibility and a reduction in separation criteria and coordination between the Domestic and Oceanic controllers covering the relevant airspace;
- Increase in track update rate. The use of a 1 second track update rate from WAM and ADS-B being displayed on the Controller Work Position (CWP);
- Increase in the number of aircraft able to be handled –a major benefit at NZQN;
- Controller acceptance and buy-in to the benefits of the technology;
- A reduction in the number of Air Safety Incident Reports (ASI) - being filed;
- Less hold downs for aircraft through the use of unrestricted climbs or descents within surveillance coverage; and
- Track shortening at pilot request where applicable

2.2 The provision of WAM and ADS-B data from the NZQN based system has become critical for the provision of the enroute services to the level that provides the operational and safety efficiencies and cost savings identified. However some limitations in the design and configuration of the NZQN system have been highlighted by events during the 17 months of operational use that affect the provision required, namely:

- Power configuration and supply
- Site redundancy (N -2)

The configuration and supply of contingent power has been identified as one area that may affect system performance. Some sites are co-located with other service providers who have backup generators on-site. Where this is not the case Airways installed UPS to provide 30 minutes backup power allowing the controllers time to ensure a procedural separation was in place prior to a system shutdown.

2.3 The WAM system has suffered a single eight hour outage as the result of power failures generated by a major weather event (Snow Storm). The snow storm caused extensive mains power failures throughout the region over an eight hour period.

Up to 18 sites lost power at some time during the period. The situation was made worse in that power was not off all the time but kept being restored which caused the WAM system to come and go at short notice as UPS batteries became depleted.

2.4 Site redundancy has also been seen as a point of failure for the provision of service. For ease of management the WAM system is designed with an N -2 approach, meaning it will continue to operate without degradation if any two of the twenty-five individual receiver sites fail. The withdrawal of the WAM systems CAT20 data from the ATMS has a large impact in ATC procedures, especially when the outage is prolonged. The snow storm caused the whole system to shut down when the receivers located within the Queenstown Basin lost power. Outside of the basin the WAM sites continued to operate normally as they were not affected by the power outage- yet the enroute service (to which they supply the majority of the WAM data had to be restricted as a result.

3. FINDINGS

3.1 The WAM system has become a critical tool for the provision of enroute ATC.

3.2 The initial system design was limited in its provision of services by the nature of the proof of concept project used to implement it.

3.3 Events have demonstrated longer UPS autonomy is considered more appropriate to meet operational needs.

3.4 As more clusters of MLAT sites are added it would be better to install independent processors for each cluster rather than employ one large network to cater for N -2. It is possible for adjacent processors to share overlapping receivers to improve redundancy and lessen the impact of a cluster failure.

3.5 Understanding the difference in failure modes for the WAM and ADS-B outputs from the system is challenging for all users of the systems. Implementation along the lines of 3.4 would allow a more uniform failure mode to be implemented

3.6 While the WAM system may fail, ADS-B data from the system can still be provided

3.7 Communication integrity has also been identified as a potential cause for the loss of WAM surveillance. The WAM network has a dual redundant path for data communications. While this has proven adequate, the communications paths can be a weak link with the possibility of a drop of a communications link at some stage. The lesson learnt is it is better to assume that the communications paths will be compromised and design accordingly.

4. FUTURE WORK

4.1 The planned software upgrade of Nov 2014 to support DO260B has been delayed. The software release is now planned for May 2015, with the expectation to be live before the end of May 2015.

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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