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Agenda Item 7: INMARSAT, Iridium

CPDLC and ADS-C Data Link Performance Monitoring for FANS 1/A Over HF (FOH)

Presented by the Federal Aviation Administration

SUMMARY

This paper provides observed performance of the high frequency data link (HFDL) operations conducted within Oakland Flight Information Region (FIR) as part of the Future Air Navigation System I/A (FANS 1/A) over HFDL (FOH) evaluation project. The performance is measured against the criteria specified in the Global Operational Data Link Document (GOLD). This analysis includes performance of the Controller Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance – Contract (ADS-C) of high frequency (HF) data link operations.

1.   INTRODUCTION

1.1   This paper provides observed performance of the HF data link operations conducted within Oakland FIR as part of the FANS 1/A over HFDL (FOH) evaluation project. The purpose is to aid in the evaluation of the viability of FOH for some oceanic data link operations.

1.2   The performance data observed from the CPDLC and ADS-C systems are measured against the appropriate Required Communication Performance (RCP) and Required Surveillance Performance (RSP) specification to demonstrate that safety objectives which rely on the communications infrastructure can be met by the aircraft and ground systems.

1.3   This paper presents the HF data link performance, by month, for the Hawaiian Airlines (HAL) fleet of B763 participating in the evaluation. In addition, the accompanying Microsoft Power Point presentation contains performance details by individual airframe.
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2. DISCUSSION

2.1 The Global Operational Data Link Document (GOLD) provides the guidance material describing the required data points from the FANS 1/A Aircraft Communications Addressing and Reporting System (ACARS) messages. The GOLD also describes the calculation process for the actual communication performance (ACP), actual communication technical performance (ACTP), pilot operational response time (PORT), and surveillance latency.

2.2 *Observed HF Data Link Performance for Operator HAL*

2.2.1 Figure 1 presents the ACP measurement for the HF data link messages sent for operator HAL within the Oakland FIR, by month, over the last year. The numbers of CPDLC messages included in the analysis are shown in the legend of Figure 1. The ACP data show that the 95 percent criteria for RCP400 were met in six of the twelve months contained in the data sample.
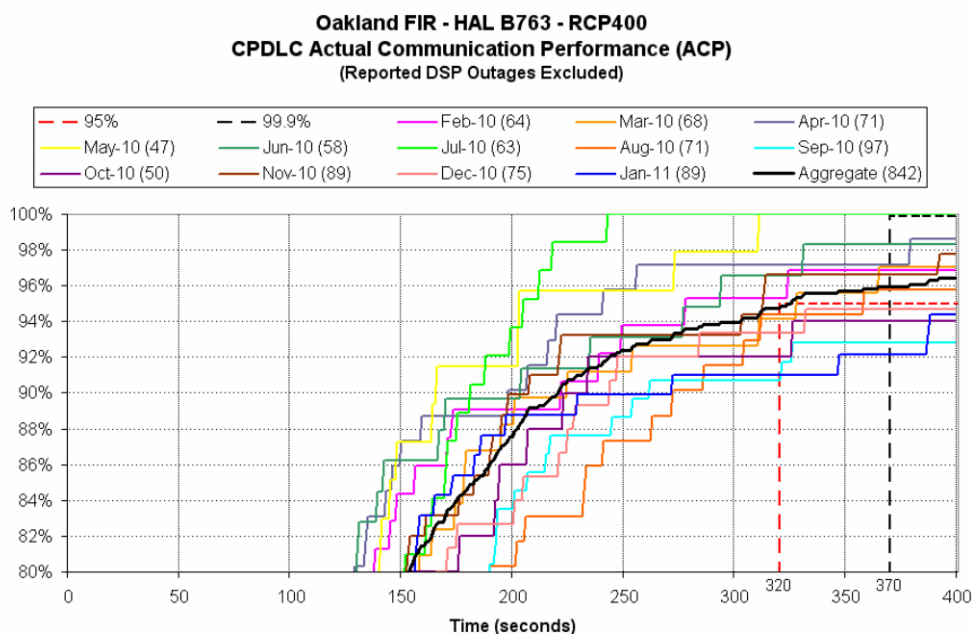

Figure 1. ACP – HF Data Link Performance by Month

2.2.2 Figures 2 and 3 present the ACTP and ADS-C measurements, respectively, for HF data link messages sent for operator HAL within the Oakland FIR, by month. Again, the numbers of CPDLC and ADS-C messages used for each measurement are shown in the legend key of the figure.

2.2.3 Figure 2 shows that the ACTP for the HF data link messages met the 95 percent criteria for RCP400 in nine of the twelve months presented. Figure 3 shows that the ADS-C (Type 400) criteria were met in six out of the twelve months presented.
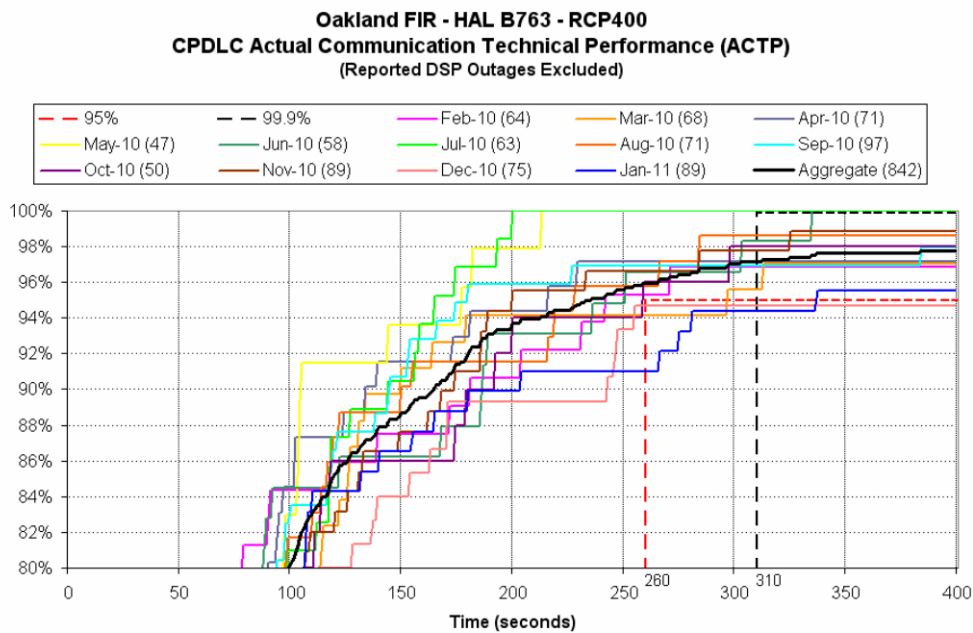
Oakland FIR - HAL B763 - RCP400
CPDLC Actual Communication Technical Performance (ACTP)
(Reported DSP Outages Excluded)

Figure 2. ACTP – HF Data Link Performance by Month

Oakland FIR - HAL B763 - Type 400
ADS-C Downlink Latency
(Duplicate Messages and Messages During Reported DSP Outages Excluded)
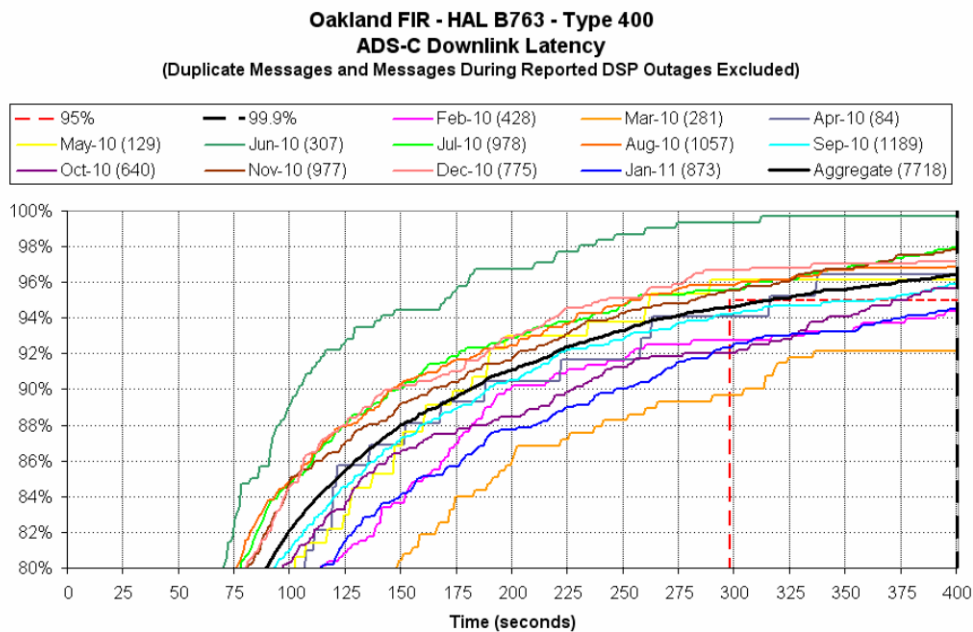
Figure 3. ADS-C Downlink Latency – HF Data Link Performance by Month

2.2.4   The accompanying presentation contains detailed ADS-C performance data by airframe and by aircraft ID. These data show that during the aggregate time period from October 2010 through January 2011, eight of the eighteen B763 airframes met the 95 percent ADS-C (Type 400) criteria. The analysis by aircraft ID highlights a noticeable difference in performance between various routes being flown by the HAL FOH aircraft. It is suspected that this is due to known problem areas of the HF ground stations.

3.   ACTION BY THE MEETING

3.1   The meeting is invited to:

   a)   Review and comment on the information contained within this paper and the accompanying power point presentation file.