International Civil Aviation Organization

SECOND SATELLITE DATA LINK OPERATIONAL CONTINUITY MEETING TO REVIEW THE PERFORMANCE AND PROVISION OF SATELLITE COMMUNICATIONS IN THE ASIA AND PACIFIC REGIONS

(Bangkok, Thailand, 8-10 February 2012)

Agenda Item 2: **Review planning and implementation programs involving satellite communications (SATCOM) data-link services (Update since SOCM/1)**

2.1 State/ANSP planning and implementation of data-link services

iv) Safety management

GOLD DATA LINK ANALYSIS

(Presented by the United States of America)

SUMMARY

This paper provides observed data link performance from the operational data collected in the Oakland, Anchorage and New York oceanic airspace according to the measures specified in the Global Operational Data Link Document (GOLD). The performance of the Controller Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance – Contract (ADS-C) systems is assessed. A comparison of performance between the three respective flight information regions (FIRs) for the years 2010 and 2011 is presented.

1 INTRODUCTION

1.1 This paper provides observed data link performance of the Controller Pilot Data Link Communication (CPDLC) and Automatic Dependent Surveillance – Contract (ADS-C) systems used in Oakland, Anchorage and New York oceanic flight information regions (FIRs). The purpose of this paper is to assess the most recent performance as well as to compare performance between three of the oceanic FIRs in which data link is used.

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)

specifications to demonstrate that safety objectives which rely on the communications infrastructure can be met by the aircraft and the ground systems in the respective airspace.

1.3 In this paper, the observed performance for each respective FIR is shown for all media types combined during the aggregate periods from January to December 2010 and from January to December 2011. Error! Reference source not found. contains additional charts related to the data link performance separated by media type and by month during the period from July to December 2011. These charts are provided individually for each of the three respective FIR. Further charts showing performance by station identifier (for satellite operations) and by operator in each of the three respective FIRs are included.

2 DISCUSSION

2.1 The Global Operational Data Link Document (GOLD) provides the guidance material describing the required ADS-C and CPDLC data points to be extracted from the operational data. The GOLD describes the calculation process for the prescribed performance measures – the actual communication performance (ACP), the actual communication technical performance (ACTP), the pilot operational response time (PORT), and the surveillance latency – and specifies the requirements for each performance measure at the 95% and 99.9% levels.

2.2 According to the guidance in the GOLD, the ACP, ACTP and PORT for applicable CPDLC transactions are required to meet RCP240 criteria when sent via satellite and VHF, and are required to meet RCP400 criteria when sent via HF. Similarly, the ADS-C downlink latency is required to meet RSP180 criteria for ADS-C downlink messages sent via satellite and VHF, and is required to meet RSP400 criteria when sent via HF.

2.3 **Table 1** outlines the requirements for these performance measures at the 95% and 99.9% levels.

Table 1. Summary of performance requirements

Performance Measure	Percent of Messages Required to Meet Criteria	RSP180 Criteria (sec)	RSP400 Criteria (sec)	RCP240 Criteria (sec)	RCP400 Criteria (sec)
ADS-C Downlink Latency	95.0%	90	300	--	--
	99.9%	180	400	--	--
ACTP	95.0%	--	--	120	260
	99.9%	--	--	150	310
ACP	95.0%	--	--	180	320
	99.9%	--	--	210	370
PORT	95.0%	--	--	60	60

2.4 Observed Data Link Performance by FIR

2.4.1 **Figure 1**, **Figure 2**, and **Figure 3** present the ACTP, ACP and ADS-C downlink latency performance for the aggregate time periods from January to December 2010 and from January to

December 2011 in the Oakland (ZAK), Anchorage (ZAN) and New York (ZNY) FIRs. These figures show performance for all media combined, inclusive of satellite, very high frequency (VHF) and high frequency (HF) operations. The number of transactions (ACP and ACTP) or messages (ADS-C) included in the analysis during each time period is shown for each respective FIR in the legend key of each figure.

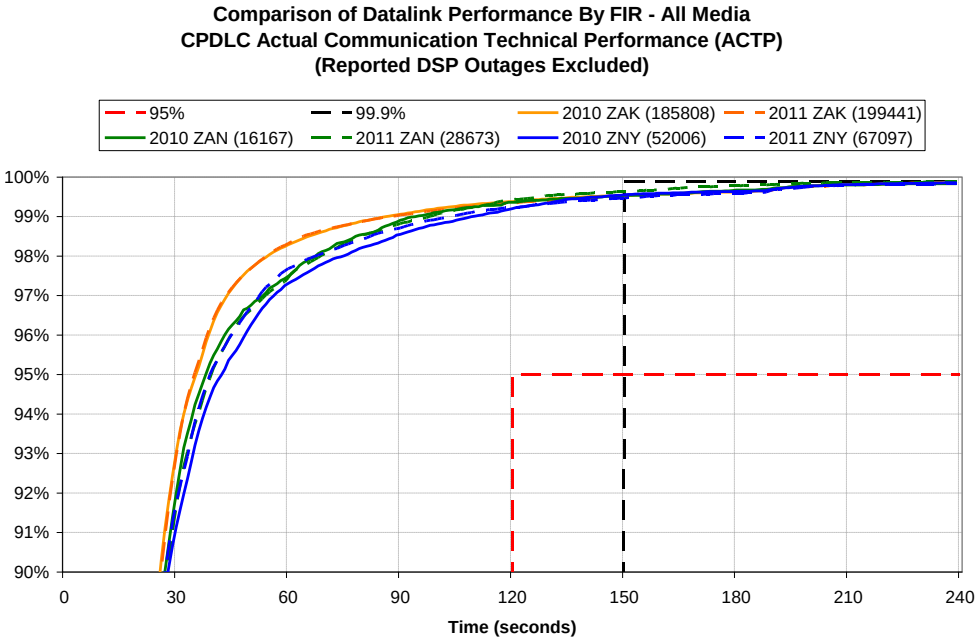

Figure 1. ACTP by FIR – 2010 and 2011

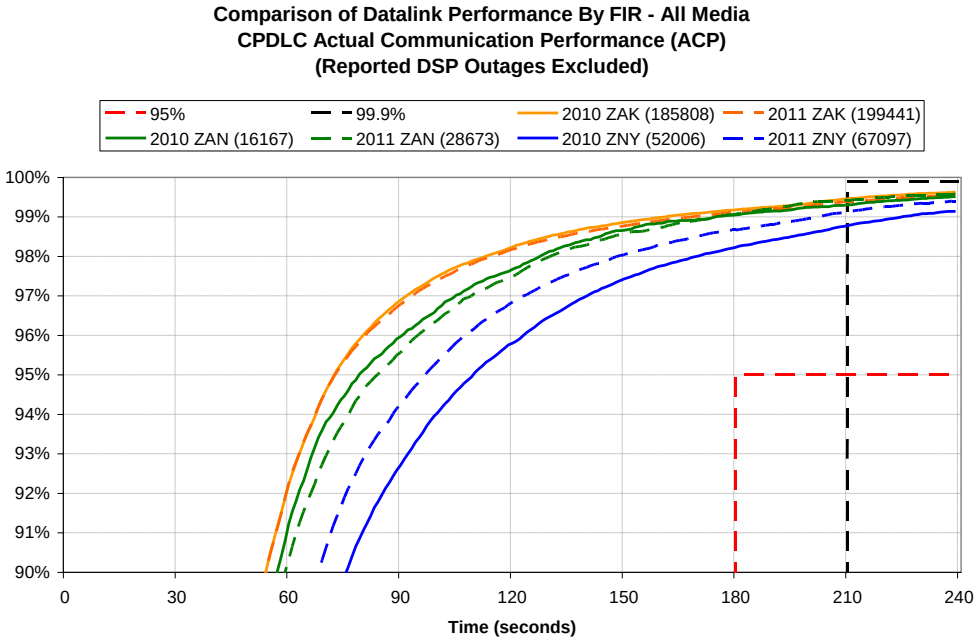

Figure 2. ACP by FIR – 2010 and 2011

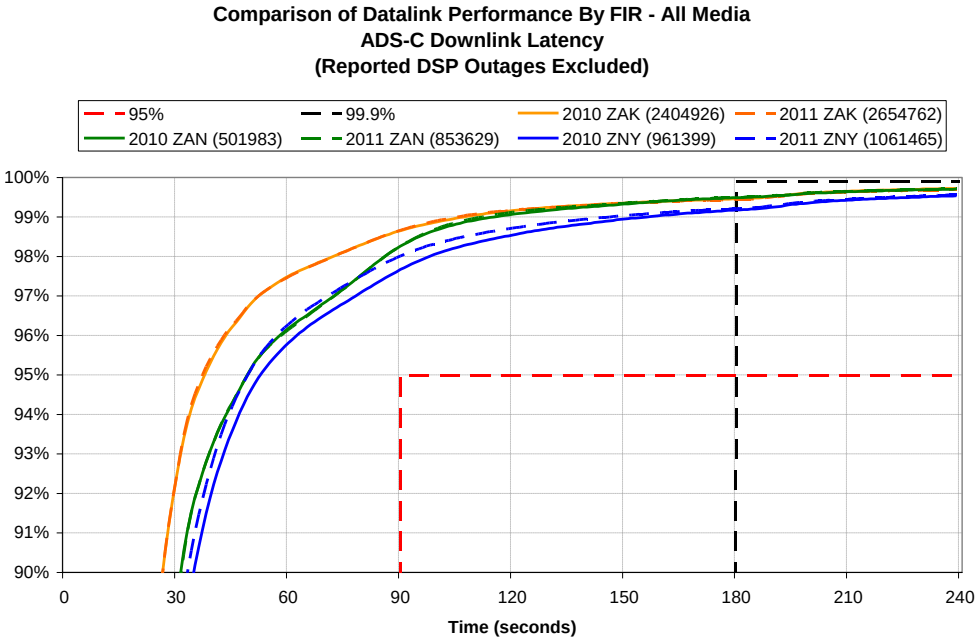

Figure 3. ADS-C Downlink Latency by FIR – 2010 and 2011

2.4.2 The 95% criteria were met for the RCP240 ACTP and ACP and the RSP180 ADS-C Downlink Latency in Oakland, Anchorage and New York FIRs during both 2010 and 2011. Conversely, the 99.9% criteria were not met for any of the included performance measures in any of the three FIRs during the same periods.

2.4.3 As observed in all three figures, the performance in Oakland FIR appears to be stable between the years 2010 and 2011, and is shown to be exceeding the performance of the other two FIRs for both years. Additionally, an approximate increase of ten percent in ADS-C downlink messages and an approximate increase of seven percent in RCP CPDLC transactions can be observed from 2010 to 2011.

2.4.4 The performance in Anchorage FIR appears to be relatively stable between the years 2010 and 2011 as well. Although a dramatic increase in both ADS-C messages and RCP CPDLC transactions can be observed from 2010 to 2011, this is due to data collection issues experienced in 2010.

2.4.5 A notable improvement in performance from 2010 to 2011 is observed in New York FIR by all three performance measures. Additionally, an approximate increase of ten percent in ADS-C downlink messages and an approximate increase of thirty percent in RCP CPDLC transactions can be observed from 2010 to 2011.

2.5 Error! Reference source not found. contains additional charts related to the data link performance for each of the three respective FIR broken down by media type and by month during the period from July to December 2011. Also included are charts showing performance by station identifier (for satellite operations) and by operator in each of the three respective FIRs.

3 ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the information in the paper and the accompanying presentation; and

b) Review and comment on the observed performance.

Attachment A. GOLD Data Link Analysis

[Provided as a separate file]

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