International Civil Aviation Organization

Twelfth Meeting of the FANS Interoperability Team – Asia (FIT-Asia/12)

Video Teleconference, 25 – 28 July 2022

Agenda Item 4: Review of ADS/CPDLC Operations and Performance

DATA LINK PERFORMANCE REPORT FOR SINGAPORE

(Presented by Singapore)

SUMMARY

This paper presents data link performance data for 2021 for the Singapore FIR (WSJC), and the information on actions taken to identify and rectify the causes of performance issues

1. INTRODUCTION

1.1 **Tables 1 to 4B** summarize Automatic Dependent Surveillance – Contract (ADS-C) and Controller-Pilot Data Link Communications (CPDLC) performance where the Required Surveillance Performance (RSP) and Required Communications Performance (RCP) criteria stipulated in ICAO Doc 4444 – Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) were not met. Actions taken to address performance not meeting the criteria are discussed, together with the outcomes of such actions.

2. DISCUSSION

WSJC FIR ADS-C RSP180 Performance – Media Type, RGS and GES

2.1 **Table 1** summarizes overall ADS-C performance per media type, Remote Ground Station (RGS) and Ground Earth Station (GES) for downlinks sent within the WSJC FIR during 2021, where performance did not meet the RSP180 performance criteria.

FIR		**WSJC**					
Criteria		**RSP180**					
Period		**January-June 2021**			**July-December 2021**		
Colour Key Meets Criteria 99.0%-99.84% Under Criteria		**Message Counts**	**95%** **% < = 90sec**	**99.90%** **% <= 180sec**	**Message Counts**	**95%** **% < = 90sec**	**99.90%** **% <= 180sec**
By Media Type							
SATCOM		11350	95.66%	99.15%	12825	96.05%	99.20%
VHF		193782	99.40%	99.89%	238154	99.41%	99.89%
HF		59	67.34%	88.27%	56	63.10%	87.10%
ALL		205191	99.19%	99.85%	251035	99.23%	99.85%
By Remote Ground Station (RGS) Ground Earth Station (GES)							
Designator	**Type**	(only RGS/GES with message counts >100 recorded)					

IG1	SAT	454	93.83%	99.27%	765	94.12%	99.25%
IGW1	SAT	1299	93.07%	98.19%	1780	91.29%	98.33%

Table 1: WSJC FIR ADS-C Downlink Latency per Media Type, RGS and GES

2.2 In summary, the ADS-C performance by SATCOM and VHF were able to meet the 95% criteria but SATCOM failed marginally for the 99.9% criteria as shown in **Table 1**. The assessment for ADS-C performance by HF was not statistically significant due to the low number of data points, Singapore had reminded the airline operators to use SATCOM and VHF in WSJC FIR.

2.3 For ADS-C differentiated by RGS/GES, 2 stations had failed to meet 95% and 99.9% criteria. Singapore have filed problem reports with the CRA. The investigation showed that the affected aircraft were operating in area with limited VHF coverage over the South China Sea, and the delay might be due to the transition from VHF to SATCOM. It was also noted that other ANSPs reported good ADS-C performance on the affected aircraft within their FIR.

WSJC FIR ADS-C RSP180 Performance – Aircraft Operator/Type

2.4 **Table 2** summarizes overall ADS-C performance per Aircraft Operator/Type for downlinks sent within the WSJC FIR during 2021, where performance did not meet the RSP180 performance criteria.

FIR	**WSJC**					
Criteria	**RSP180**					
Period	**January-June 2021**			**July-December 2021**		
Colour Key Meets Criteria 99.0%-99.84% Under Criteria	**Message Counts**	**95%**	**99.90%**	**Message Counts**	**95%**	**99.90%**
		% <= 90sec	**% <= 180sec**		**% <= 90sec**	**% <= 180sec**
By Aircraft Operator / Type (only message counts >100 recorded)						
KAL/B748	164	98.41%	99.60%	360	94.70%	97.73%
RMY/B762	435	90.97%	96.09%	738	99.55%	100.00%

Table 2: WSJC FIR ADS-C Downlink Latency per Aircraft Operator/Type

2.5 As for the ADS-C differentiated by aircraft operator/type, there are 2 aircraft operator/type which failed the 95% and 99.9% criteria as shown in **Table 2**. Singapore have followed up with the aircraft operators through respective EMAs and filed problem reports with the CRA. The cause for the poor performance was inconclusive as the data set was limited and the relevant messages log from CSP was no longer available.

WSJC FIR CPDLC RCP240 Performance – Media Type, RGS and GES

2.6 **Tables 3A and 3B** summarize overall CPDLC performance per Media Type, RGS and GES for messages sent within the WSJC FIR during 2021, where performance did not meet the RCP240 performance criteria.

FIR	WSJC					
Criteria	RCP240					
Period	January - June 2021					
Colour Key: Meets Criteria / 99.0%-99.84% / Under Criteria	Message Counts	95% benchmark		99.9% benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% < = 180sec	% <= 120sec	% < = 210sec	% <= 150sec	%<60secs
By Media Type						
SATCOM	1018	97.02%	97.94%	98.35%	98.56%	
VHF	13550	99.38%	99.42%	99.54%	99.54%	
HF						
ALL	14786	99.19%	99.30%	99.45%	99.46%	
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator / **Type**	(RGS/GES with message counts >100)					
IG1 / SAT	105	93.11%	97.38%	97.33%	99.54%	
XXP / SAT	292	94.03%	95.89%	95.63%	96.35%	

Table 3A: WSJC FIR CPDLC Performance Latency per Media Type, RGS and GES – Jan-Jun 2021.

FIR	WSJC					
Criteria	RCP240					
Period	July - December 2021					
Colour Key: Meets Criteria / 99.0%-99.84% / Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% < =180sec	% <= 120sec	% < = 210sec	% <= 150sec	%<60secs
By Media Type						
SATCOM	1453	98.29%	98.86%	99.11%	99.24%	
VHF	22148	99.26%	99.33%	99.55%	99.52%	
HF						
ALL	23916	99.16%	99.26%	99.49%	99.47%	
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator / **Type**	(RGS/GES with message counts >100)					
IG1 / SAT	164	97.95%	98.43%	100.00%	98.71%	
XXP / SAT	347	96.66%	97.52%	97.56%	98.62%	

Table 3B: WSJC FIR CPDLC Performance Latency per Media Type, RGS and GES – Jul-Dec 2021.

2.7 In summary, the CPDLC performance by SATCOM and VHF were able to meet the 95% criterion but failed marginally for 99.9% criterion as shown in **Table 3A** and **3B**. Singapore had reminded the airline operators to use SATCOM and VHF in WSJC FIR.

2.8 For CPDLC differentiated by RGS/GES, 2 stations had failed to meet 95% and 99.9% criteria. Singapore have filed problem reports with the CRA. Due to the low air traffic situation in 2021, the data set for the first half of 2021 used for the investigation was limited and the cause for the poor performance was inconclusive. It is noted that the 2 stations' performance have improved in the second half of 2021.

WSJC FIR CPDLC RCP240 Performance – Aircraft Operator/Type

2.9 **Tables 4A and 4B** summarize overall CPDLC performance per Aircraft Operator/Type for messages sent within the WSJC FIR during 2021, where performance did not meet the RCP240 performance criteria.

FIR	**WSJC**					
Criteria	**RCP240**					
Period	**January - June 2021**					
Colour Key Meets Criteria 99.0%-99.84% Under Criteria	**Message Counts**	95% benchmark		99.9% benchmark		95%
		ACP	**ACTP**	**ACP**	**ACTP**	**PORT**
		% < = 180sec	**% <= 120sec**	**% < = 210sec**	**% <= 150sec**	**%<60secs**
By Aircraft Operator / Type (only message counts >100 recorded)						
Nil	-	-	-	-	-	-

Table 4A: WSJC FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2021

FIR	**WSJC**					
Criteria	**RCP240**					
Period	**July - December 2021**					
Colour Key Meets Criteria 99.0%-99.84% Under Criteria	**Message Counts**	95% benchmark		99.9% Benchmark		95%
		ACP	**ACTP**	**ACP**	**ACTP**	**PORT**
		% < = 180sec	**% <= 120sec**	**% < = 210sec**	**% <= 150sec**	**%<60secs**
By Aircraft Operator / Type (only message counts >100 recorded)						
RMY/B762	131	91.44%	98.79%	93.73%	99.73%	84.35%

Table 4B: WSJC FIR CPDLC Performance Latency per Aircraft Operator/Type – Jul-Dec 2021

2.10 As for the CPDLC differentiated by aircraft operator/type, there is 1 aircraft operator/type which failed the 95% and 99.9% criteria. Singapore has followed up with the aircraft operator through respective EMAs and filed problems with CRA. Due to the low air traffic situation in 2021, it is noted that the affected aircraft operator/type is limited to a single aircraft registration number related to its avionic issue and is unlikely to be a fleet wide issue.

3. ACTION BY THE MEETING

3.1 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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