



# Data Link Performance Report for Singapore FIR




CAA Singapore  
3 – 6 August 2020

# Introduction

- This report presents the data link performance for Singapore from January to December 2019
- Overall performance observed in 2019 against RCP240 and RSP180 specifications is acceptable
- Problem reports were raised against small number of non-compliant aircraft while poor performance (ADS-C only) of some RGS/GES were due to time taken for avionics to transit between different media




# CPDLC Data Link Performance

- Performance by media type

Period	Jan - Jun 2019				Jul - Dec 2019					
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Msg Counts	95%		99.9%		Msg Counts	95%		99.9%	
		ACP % <= 180s	ACTP % <= 120s	ACP % <= 210s	ACTP % <= 150s		ACP % <= 180s	ACTP % <= 120s	ACP % <= 210s	ACTP % <= 150s
		<b>By Media Type</b>								
<b>SATCOM</b>	16,514	97.83%	97.31%	98.55%	98.27%	20,565	97.91%	97.41%	98.71%	98.34%
<b>VHF</b>	15,118	99.33%	99.46%	99.46%	99.64%	27,114	99.44%	99.60%	99.56%	99.71%
<b>HF</b>	62	65.77%	66.38%	73.79%	75.81%	86	78.49%	80.23%	81.88%	85.92%
<b>ALL</b>	31,694	98.47%	98.27%	98.93%	98.88%	47,765	98.74%	98.62%	99.16%	99.09%




# CPDLC Data Link Performance

- Performance by aircraft operator/type

Period	Jan - Jun 2019						Jul - Dec 2019					
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Msg Counts	95%		99.9%		95%	Msg Counts	95%		99.9%		95%
		ACP	ACTP	ACP	ACTP	PORT		ACP	ACTP	ACP	ACTP	PORT
		% <=	% <=	% <=	% <=	% <=		% <=	% <=	% <=	% <=	% <=
		180s	120s	210s	150s	60s		180s	120s	210s	150s	150s
<b>By Aircraft Operator / Type</b>												
<b>FDX/B77 L</b>	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	166	94.95 %	95.25 %	96.99 %	96.92 %	92.47 %
<b>SLK/B738</b>	490	93.19 %	93.98 %	94.59 %	94.55 %	91.63 %	808	93.66 %	92.78 %	95.42 %	94.06 %	95.92 %




# ADS-C Data Link Performance

- Performance by media type

Period	Jan - Jun 2019			Jul - Dec 2019		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.9%	Message Counts	95%	99.9%
		ACP % <= 180s	ACP % <= 210s		ACP % <= 180s	ACP % <= 210s
<b>By Media Type</b>						
<b>SATCOM</b>	351,592	96.99%	99.30%	156,270	96.26%	99.11%
<b>VHF</b>	838,279	99.72%	99.92%	425,153	99.54%	99.88%
<b>HF</b>	119	70.59%	83.24%	123	68.70%	85.91%
<b>ALL</b>	1,189,990	98.91%	99.74%	581,546	98.65%	99.67%

# ADS-C Data Link Performance

- Performance by RGS/GES and aircraft operator/ type

Period	Jan - Jun 2019			Jul - Dec 2019		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.9%	Message Counts	95%	99.9%
		ACP % < = 180s	ACP % < = 210s		ACP % < =180s	ACP % < = 210s
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>						
<b>IG1</b>	831	88.45%	98.56%	555	83.42%	97.19%
<b>XXP</b>	21,508	95.56%	99.07%	11,283	94.99%	98.97%
<b>By Aircraft Operator / Type</b>						
<b>ACA/A333</b>	244	98.91%	100%	106	94.37%	100%
<b>ANA/B788</b>	5,553	99.23%	99.60%	171	93.86%	96.75%
<b>AZG/B744</b>	N.A.	N.A.	N.A.	140	86.67%	93.14%
<b>JAL/B772</b>	35,465	98.14%	99.71%	15,404	93.94%	98.33%
<b>N66/GLF4</b>	146	93.41%	94.20%	N.A.	N.A.	N.A.

# Problems and follow-up actions

S/N	Problem Description	Analysis / Findings
1	Aircraft from operator X failing RSP180 95% criterion for ADS-C downlink since July 2019.	<p>Notified operator X to look into the low performance with recommended solutions shared during FIT-Asia/9 and filed problem report with CRA.</p> <p>Operator X changed the SDU unit in the aircraft due to initial suspicion on SATCOM system. Relevant logs to CRA were submitted and analyzed. Analysis of logs shown that aircraft has trouble maintaining VHF link and no issue with SATCOM. Wiring checks were done and relevant avionics module were changed on 10 Jun.</p> <p>Singapore to continue monitor its performance with Operator X.</p>

# Problems and follow-up actions

S/N	Problem Description	Analysis / Findings
2	Low data link performance of IG1 and IGW1	<p>Submitted problem report to CRA, after CSPs informed Singapore that they will follow up through CRA.</p> <p>CRA updated that the low performance was due to time taken by the avionics to attempt but fail to deliver the messages via VHF when the aircraft was on the edge of VHF coverage, then changed to deliver the messages via SATCOM. CRA also identified the affected areas and aircraft operator/type pairs which were responsible for majority of the failed message exchanges. Suggested solutions were provided, with avionics implementation of Routing Airborne Timer 1 (RAT1) being advised as the most effective to resolve this performance issue.</p> <p>Singapore has notified aircraft operators through IATA of CRA recommendations over the identified areas and advised aircraft operators to consider applying the suggested solutions to improve data link performance.</p>

# Discussion

S/N	Issues Encountered	For Discussion
1	Aircraft with performance different FIRs varying across	For aircraft with varying performance across different FIRs, how do we assess overall PBCS performance of the aircraft?  Who will assess and define the overall PBCS performance of the aircraft?
2	Reinstating performance PBCS	After aircraft operator reported that they have rectified the PBCS performance issue and there is a lack of message exchanges for performance analysis (< 100 messages over 3 months), how do we define that the issue has been rectified?