International Civil Aviation Organization

Fifteenth Meeting of the FANS Interoperability Team – Asia (FIT–Asia/15)

Bangkok, Thailand, 24 – 27 June 2025

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

DATA LINK PERFORMANCE REPORT AND ACTIONS FOR DISCUSSION FROM SINGAPORE

(Presented by Singapore)

SUMMARY

This paper presents data link performance data for 2024 for the Singapore FIR (WSJC), and 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, together with the outcomes of such actions, are discussed.

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 2024, where performance did not meet the RSP180 performance criteria.

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

FIR	**WSJC**					
Criteria	**RSP180**					
Period	**Jan-Jun 2024**			**Jul-Dec 2024**		
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	**Message Counts**	**95%** **% < = 90sec**	**99.90%** **% <= 180sec**	**Message Counts**	**95%** **% < = 90sec**	**99.90%** **% <= 180sec**
By Media Type						
SATCOM	139795	95.23%	99.18%	144765	95.91%	99.26%
VHF	670717	99.60%	99.89%	650629	99.61%	99.87%

FIR	WSJC					
Criteria	RSP180					
Period	Jan-Jun 2024			Jul-Dec 2024		
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	Message Counts	95% % < = 90sec	99.90% % <= 180sec	Message Counts	95% % < = 90sec	99.90% % <= 180sec
HF	142	46.01%	72.25%	185	47.30%	73.33%
ALL	810654	98.84%	99.76%	795579	98.92%	99.75%
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator / **Type**	(only RGS/GES with message counts >100 recorded)					
H06 HF	121	45.73%	71.57%	156	49.74%	73.63%
IG1 SAT	3375	94.01%	98.59%	4821	91.39%	97.40%
IGW1 SAT	15127	92.19%	98.00%	15005	93.27%	98.15%
XXI SAT	9013	92.77%	98.79%	9308	94.23%	98.79%
XXP SAT	2436	93.92%	98.52%	2453	92.30%	98.24%

2.2 In summary, the ADS-C performance by SATCOM and VHF met the 95% criteria, while HF did not meet the criteria as shown in Table 1. As HF does not meet the performance required by PBCS, Singapore has reminded airline operators to use SATCOM and VHF in WSJC FIR.

2.3 For ADS-C differentiated by RGS/GES, five stations failed to meet the 95% and 99.9% criteria. Similarly, HF, specifically H06, does not meet the performance required by PBCS. For the SATCOM stations, the affected aircraft were likely operating in an area with limited VHF coverage over the South China Sea, and delays presumably occurred during the transition from VHF to SATCOM. CRA Boeing also noted that analyzing performance issues based solely on communication media type, such as SATCOM, might not yield effective results.

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 2024, where performance did not meet the RSP180 performance criteria.

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

FIR	WSJC					
Criteria	RSP180					
Period	Jan-Jun 2024			Jul-Dec 2024		
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	Message Counts	95% % <= 90sec	99.90% % <= 180sec	Message Counts	95% % <= 90sec	99.90% % <= 180sec
By Aircraft Operator / Type (only message counts >100 recorded)						
VPB/GLF5	319	94.63%	98.61%	289	94.53%	95.62%
9MJ/GLF5	121	90.81%	92.81%	15		
ANG/B763	619	93.38%	97.47%	0		

FIR	WSJC					
Criteria	RSP180					
Period	Jan-Jun 2024			Jul-Dec 2024		
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	Message Counts	95% % <= 90sec	99.90% % <= 180sec	Message Counts	95% % <= 90sec	99.90% % <= 180sec
CKS/B77L	183	93.29%	97.97%	168	96.88%	98.65%
N55/GLF5	150	94.00%	99.41%	4		
VPC/GA6C	178	94.47%	98.48%	93		
AFL/A359	0			163	93.99%	98.03%
APJ/A21N	0			539	78.54%	85.86%
GIA/A332	244	99.18%	100.00%	218	94.65%	98.32%
N82/CL60	178	98.06%	98.74%	114	93.80%	96.76%
N88/GLF4	0			138	94.62%	97.64%
QQE/GLF6	433	98.27%	99.95%	272	94.75%	99.07%
TCJ/GLF6	155	96.32%	100.00%	139	91.37%	97.02%

2.5 In summary, there were 6 aircraft operator/type which failed the 95% and 99% RSP180 criteria during the first half of 2024 and 8 aircraft operator/type which failed the 95% and 99% RSP180 criteria during second half of 2024 as shown in Table 2.

1H2024

2.6 For VPB/GLF5, 9MJ/GLF5, VPC/GA6C, no PBCS indicator was filed in their flight plans, so no investigation was conducted.

2.7 For ANG/B763, poor performance was due to one airframe (91.76% for the 95% criteria) with 461 messages. It was observed that most of the ADSC messages with transit times of more than 90 seconds were near the fringes of VHFs' coverages. Due to the non-availability of an immediate VHF station, the aircraft was likely outside VHF coverage after leaving Kuching's range until it entered Singapore's coverage area, resulting in an extended transit time.

2.8 For CKS/B77L, five airframes were involved, with two contributing to poor performance (92.42% and 94.34% for the 95% criteria) with 33 and 55 messages respectively. The message count was fewer than 100 over a 6-month period and was therefore deemed to be statistically insignificant.

2.9 For N55/GLF5, four airframes were involved, with one contributing to poor performance (86.79% for the 95% criteria) with 53 messages. Similarly, the message count was fewer than 100 over a 6-month period, and was therefore deemed to be statistically insignificant.

2H2024

2.10 For VPB/GLF5, GIA/A332, N82/CL60, N88/GLF4, QQE/GLF6, no PBCS indicator was filed in their flight plans, so no investigation was conducted.

2.11 AFL/A359 involved five airframes, with two airframes contributing to the evaluation (83.53% and 93.35% for the 95% criteria) with message counts of 17 and 40 respectively. The message count was fewer than 100 over a 6-month period and was therefore deemed to be statistically insignificant.

2.12 APJ/A21N involved three airframes with percentages of 81.02%, 72.77%, and 80.50% for the 95% criteria, and message counts of 256, 142, and 141 respectively. Singapore filed a problem report with Boeing CRA, who subsequently notified Airbus. JCAB later informed CAAS that these three airframes were not approved for PBCS operations and would remind the airline about proper PBCS indicator filing procedures.

2.13 TCJ/GLF6 was contributed by one airframe (91.37% for the 95% criteria) with a message count of 139. It was observed that most ADSC messages with transit times exceeding 90 seconds occurred near Pulau Tioman, specifically at the boundary where two VHF stations' coverage areas intersect. The use of SATCOM transmission by the aircraft in the area resulted in extended transit times.

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

2.14 **Tables 3A and 3B** summarize overall CPDLC performance per Media Type, RGS and GES for messages sent within the WSJC FIR during 2024, where performance did not meet the RCP240 performance criteria.

Table 3A: WSJC FIR CPDLC Performance Latency per Media Type, RGS and GES – Jan-Jun 2024.

FIR		**WSJC**				
Criteria		**RCP240**				
Period		**Jan-Jun 2024**				
Color Key Meets Criteria 99.0% - 99.89% Under Criteria		**Message Counts**	95% benchmark		99.9% Benchmark	
			ACP	**ACTP**	**ACP**	**ACTP**
			% < = 180sec	**% <= 120sec**	**% < = 210sec**	**% <= 150sec**
By Media Type						
SATCOM		12962	98.96%	98.90%	99.41%	99.31%
VHF		27470	99.56%	99.76%	99.64%	99.80%
HF		18				
ALL		45233	99.28%	99.42%	99.51%	99.60%
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator	**Type**	(RGS/GES with message counts >100)				
Nil						

Table 3B: WSJC FIR CPDLC Performance Latency per Media Type, RGS and GES – Jul-Dec 2024.

FIR		WSJC				
Criteria		RCP240				
Period		Jul-Dec 2024				
Color Key Meets Criteria 99.0% - 99.89% Under Criteria		Message Counts	95% benchmark		99.9% Benchmark	
			ACP	ACTP	ACP	ACTP
			% < =180sec	% <= 120sec	% < = 210sec	% <= 150sec
By Media Type						
SATCOM		17432	99.16%	99.06%	99.54%	99.43%
VHF		29236	99.67%	99.77%	99.71%	99.82%
HF		35				
ALL		51007	99.43%	99.47%	99.61%	99.65%
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator	Type	(RGS/GES with message counts >100)				
IG1	SAT	339	93.14%	94.40%	95.87%	96.51%

2.15 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. There were 18 and 35 messages count for HF in 1H2024 and 2H2024 respectively. Since HF does not meet the performance required by PBCS, Singapore has reminded airline operators to use SATCOM and VHF in WSJC FIR.

2.16 For CPDLC differentiated by RGS/GES, IGW1 failed the 95% ACP criteria and IG1 failed the 95% ACTP criteria. There were several stations that did not meet the 99.9% criteria (refer to WSJC data link performance report submitted). Singapore will continue to monitor the performance for RGS/GES. Similar to ADS-C RSP180, CRA Boeing indicated that analyzing performance issues based solely on communication media type, such as SATCOM, might not yield effective results.

WSJC FIR CPDLC RCP240 Performance – Aircraft Operator/Type

2.17 **Tables 4A and 4B** summarize overall CPDLC performance per Aircraft Operator/Type for messages sent within the WSJC FIR during 2024, where performance did not meet the RCP240 performance criteria.

Table 4A: WSJC FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2024

FIR	WSJC					
Criteria	RCP240					
Period	Jan-Jun 2024					
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% < = 180sec	% <= 120sec	% < = 210sec	% <= 150sec	%<60s ecs
By Aircraft Operator / Type (only message counts >100 recorded)						
RMY/B762	308	92.78%	98.38%	94.68%	98.80%	84.74%

Table 4B: WSJC FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2024

FIR	WSJC					
Criteria	RCP240					
Period	Jul-Dec 2024					
Color Key Meets Criteria 99.0% - 99.89% Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% < = 180sec	% <= 120sec	% < = 210sec	% <= 150sec	%<60s ecs
By Aircraft Operator / Type (only message counts >100 recorded)						
RMY/B762	438	95.95%	97.49%	97.27%	98.97%	92.09%

2.18 In summary, there was one aircraft operator/type which failed the 95% and 99.9% RCP240 criteria during both first half of 2024 and second half of 2024 as shown in Table 4B.

2.19 For RMY/B762, large PORT was observed in both first and second halves of 2024. However, no PBCS indicator was filed in their flight plans, so no investigation was conducted.

3. ADDITIONAL INFORMATION

Survey of status of current and planned implementation of performance-based separation

3.1 Singapore has submitted the survey of the status of current and planned implementation of performance-based separation based on the revised template and submission dates.

Datalink outages

3.2 In 2024, Singapore experienced three separate datalink outages. The first occurred on 5 January 2024 at 0001 UTC when Air Traffic Control (ATC) encountered difficulties in CPDLC communications with aircraft, leading to a temporary suspension of the service. The connection stabilized at 0058 UTC, allowing the resumption of CPDLC and performance-based separation. ARINC later confirmed that the outage stemmed from a malformed message containing unparseable characters, which caused the ATC Gateway to halt all outgoing messages. The service was restored following an ATC Gateway switchover.

3.3 From 30 July 1929 UTC to 31 July 2303 UTC, ARINC reported that GLOBALink/Satellite Classic Aero I4 Service in the Americas and Asia-Pacific regions lost connectivity intermittently with AviNet during a Ground Earth Station (GES) software upgrade. However, as VHF remained operational, there was no noticeable impact on CPDLC operations.

3.4 The third incident occurred on 22 November 2024 at 2005 UTC, when both CPDLC and ADS-C systems became inoperative, necessitating the suspension of CPDLC and PBCS operations. ARINC identified the cause as unserviceable routers from the local Internet Service Provider (ISP) at 2023 UTC. The routers self-recovered at 2331 UTC, enabling the reinstatement of CPDLC and performance-based separation at 2345 UTC.

4. FOR DISCUSSION

Filing of PBCS by airline not approved for PBCS operations

4.1 It was noted that there were cases whereby airlines continued to file the RCP and RSP indicators in their flight plan despite being not approved for PBCS operations. These would only be flagged during the PBCS monitoring when the airframe's poor performance is reported.

4.2 Currently, the non-compliance of filing RCP and RSP indicators are reported to the respective monitoring agencies who would reach out to the airlines and remind them not to file as PBCS approved. However, this process does not fully ensure that the airlines comply in their subsequent flight planning as information may not be known to ANSPs where the flight overflies.

4.3 Noting that the information of airframes that are flagged to be not PBCS approved currently reside with the respective monitoring agencies, it would be beneficial that a compiled list of not PBCS approved airframes be shared with ANSPs to ensure that they can apply performance-based separation minima with better certainty of the PBCS approval status.

4.4 The meeting is invited to discuss and deliberate on the need by ANSPs for a list of airframes that have been flagged as not PBCS approved for better awareness and safer application of performance-based separation minima.

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss the need of maintaining a list of airframes not approved for PBCS to ensure safer application of performance-based separation minima; and

c) discuss any relevant matters as appropriate.

— END —