International Civil Aviation Organization

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Bangkok, Thailand, 9 – 11 June 2026

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

DATA LINK PERFORMANCE REPORT FOR MALAYSIA

(Presented by Malaysia)

SUMMARY

This paper presents data link performance data for 2025 for the Kuala Lumpur FIR, and information on actions taken to identify and rectify the causes of performance issues

1. INTRODUCTION

1.1 **Tables 1 to 4B** summarise 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

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

2.1 **Table 1** summarises overall ADS-C performance per media type, Remote Ground Station (RGS) and Ground Earth Station (GES) for downlinks sent within the Kuala Lumpur FIR during 2025, where performance did not meet the RSP180 performance criteria.

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

FIR	Kuala Lumpur FIR WMFC					
Criteria	RSP180					
Period	Jan-June 2025			July-December 2025		
Colour 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	232,166	97.87%	99.15%	237,046	98.06%	99.37%
VHF	231,471	98.96%	99.38%	296,900	99.14%	99.50%
HF	141	32.45%	49.88%	102	30.17%	49.87%

ALL		463,778	98.40%	99.25%	534,048	98.65%	99.43%
By Remote Ground Station (RGS) Ground Earth Station (GES)							
Designator	**Type**	(only RGS/GES with message counts >100 recorded)					
IG1	**SAT**	474	83.54%	93.71%	220	86.14%	92.76%
XXP	**SAT**	147	97.62%	100.00%	273	94.02%	97.94%
APK2	**SAT**	3,081	92.28%	97.44%	5,395	92.70%	97.94%
EUA1	**SAT**	230	94.73%	100.00%	227	100.00%	100.00%
IGW1	**SAT**	14,605	79.00%	89.02%	11,333	78.77%	90.03%
AOR1	**VHF**	21,341	96.64%	97.23%	21,862	95.91%	96.35%
BLR2	**VHF**	166	94.78%	95.17%	105	100.00%	100.00%
BTJ1	**VHF**	17,419	96.36%	98.15%	80,803	99.05%	99.56%
GOI1	**VHF**	100	97.38%	98.07%			
KBR1	**VHF**	404	97.55%	98.16%	333	87.23%	87.75%
LGK1	**VHF**	1,387	97.84%	98.72%	1,587	99.05%	99.53%
MAA1	**VHF**	310	97.67%	98.75%	196	99.61%	100.00%
NAG1	**VHF**	170	95.30%	95.71%			
SIN1	**VHF**	237	97.91%	98.00%	205	100.00%	100.00%
SIN2	**VHF**	334	96.99%	98.25%	263	99.37%	100.00%
VTZ1	**VHF**	298	88.31%	89.28%	180	97.47%	98.33%
H06	**HF**	133	30.64%	48.37%			

2.2 Overall ADS-C performance within the Kuala Lumpur FIR in 2025 met the RSP180 requirement for the 95% criterion and remained within acceptable limits for the 99.9% criterion. Performance by media type was generally compliant for SATCOM and VHF, while HF data link consistently failed to meet both RSP180 criteria.

2.3 At the Remote Ground Station (RGS) level, performance during the first half of 2025 showed that only a limited number of stations met the required criteria. In the second half of 2025, performance improvements were observed across more than half of the RGS, particularly among stations with higher message volumes.

2.4 HF data link performance did not meet RSP180 requirements due to inherent limitations of the medium. HF usage remained low and no specific aircraft was observed to consistently utilise HF data link. No single RGS or Ground Earth Station (GES) was identified as a consistent source of performance degradation, and no formal issues were reported by the Communication Service Provider (CSP) during the reporting period.

2.5 Performance assessment based solely on communication path or ground station identifiers may be misleading. Greater emphasis should therefore be placed on aircraft-level and operator-level analysis to accurately identify the root causes of non-compliance.

2.6 Performance of RGS and GES will continue to be closely monitored to ensure sustained compliance with RSP180 requirements and to identify any emerging trends or degradation.

KUALA LUMPUR FIR ADS-C RSP180 Performance – Aircraft Operator/Type

2.7 **Table 2** summarises overall ADS-C performance per Aircraft Operator/Type for downlinks sent within the KUALA LUMPUR FIR during 2025, where performance did not meet the RSP180 performance criteria.

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

FIR	Kuala Lumpur FIR WMFC					
Criteria	RSP180					
Period	Jan-June 2025			July-December 2025		
Colour 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)						
ABD/B744				272	88.97%	93.57%
AZG/B744	739	82.71%	88.04%	1,071	76.47%	84.28%
CFG/A339	612	65.85%	76.47%	967	72.49%	83.35%
CLX/B744	430	92.09%	96.05%	422	93.54%	95.72%
ETD/A21N				725	97.89%	98.57%
FAD/A332	327	88.04%	100.00%			
MAS/A359	12,063	85.34%	92.92%	20,116	99.05%	99.96%
MAS/B38M	10,276	92.89%	97.24%	1,891	87.20%	94.76%
MAS/B738				25,937	94.97%	98.26%
NCR/B744	343	93.70%	96.70%	373	94.05%	97.87%
RBA/A20N	1,272	71.38%	84.12%	1,826	83.46%	92.28%
RHH/CL60				297	84.59%	90.40%
SAZ/CL60	182	97.49%	98.69%			
SIA/B38M	10,482	94.81%	97.11%	13,427	95.97%	97.95%
SIA/B744	2,354	97.28%	98.40%	2,559	99.83%	99.87%
SVA/A333	2,694	99.50%	99.71%	670	96.88%	97.40%
SVA/B772	162	91.85%	99.89%			
TGW/A20N	115	85.38%	94.70%	1,646	95.32%	98.93%
TGW/A21N				256	94.36%	100.00%
XAX/A333	5,759	84.68%	86.33%	15,382	92.44%	93.71%

2.8 In the first half of 2025, only a limited number of operator-aircraft combinations met the RSP180 95% criterion, including SAZ CL60, SIA B744 and SVA A333. All other operators and fleets did not meet the required performance threshold. For the more stringent 99.9% criterion, only FAD A332 achieved full compliance, while SVA A333 and SVA B772 demonstrated acceptable performance.

2.9 In the second half of 2025, notable improvement was observed, particularly for MAS A359, which showed significant enhancement in both performance criteria and message volume. However, most operator-aircraft combinations continued to fall short of the 99.9% criterion, with only MAS A359, TGW A21N and SIA B744 achieving compliance. Several operators met the 95% criterion, including ETD A21N, MAS A359, SIA B38M, SIA B744, SVA A333 and TGW A20N.

2.10 Performance issues were primarily attributed to data link transition delays between VHF and SATCOM, as well as variability in SATCOM routing, particularly along Iridium communication paths.

2.11 Operational factors, including FIR boundary transitions involving multiple ADS-C contracts, also contributed to latency. Certain operator-aircraft combinations with low message counts over the reporting period may not provide statistically significant performance results.

2.12 Monthly ADS-C performance was monitored at airframe level for aircraft with more than 100 messages. Non-conformance cases were reported to the Monitoring Agency for Asia Region (MAAR), including XAX/A333, TGW/A20N and RBA/A20N. Certain operator-aircraft such as MAS B38M aircraft did not file for PBCS during the reporting period, which may have contributed to observed performance outcomes.

KUALA LUMPUR FIR CPDLC RCP240 Performance – Media Type, RGS and GES

2.13 **Tables 3A and 3B** summarise overall CPDLC performance per Media Type, RGS and GES for messages sent within the KUALA LUMPUR FIR during 2025, where performance did not meet the RCP240 performance criteria.

Table 3A: KUALA LUMPUR FIR CPDLC Performance Latency per Media Type, RGS and GES – Jan-Jun 2025.

FIR		Kuala Lumpur FIR WMFC				
Criteria		RCP240				
Period		Jan - Jun 2025				
Colour Key Meets Criteria 99.0%-99.89% Under Criteria		Message Counts	95% benchmark		99.9% Benchmark	
			ACP % < = 180sec	ACTP % <= 120sec	ACP % < = 210sec	ACTP % <= 150sec
By Media Type						
SATCOM		12,907	94.45%	98.88%	95.51%	99.19%
VHF		35,900	96.53%	99.54%	97.02%	99.64%
HF		1,212	78.22%	85.40%	83.33%	91.67%
ALL		50,019	95.55%	99.03%	96.30%	99.33%
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator	**Type**	(RGS/GES with message counts >100)				
APK2	**SAT**	122	90.76%	95.42%	93.60%	97.04%
IGW1	**SAT**	658	77.05%	84.80%	82.07%	89.48%
BTJ	**VHF**	605	95.15%	98.30%	95.69%	98.75%
IXZ1	**VHF**	264	89.66%	97.30%	91.76%	98.08%
SIN	**VHF**	318	96.78%	98.33%	97.00%	98.57%
USM	**VHF**	571	94.80%	97.96%	95.27%	98.16%
H06	**HF**	1,140	78.25%	85.35%	83.60%	91.75%

Table 3B: KUALA LUMPUR FIR CPDLC Performance Latency per Media Type, RGS and GES – Jul-Dec 2025.

FIR	Kuala Lumpur FIR WMFC
Criteria	RCP240
Period	Jul - Dec 2025

Colour Key Meets Criteria 99.0%-99.89% Under Criteria		Message Counts	95% benchmark		99.9% Benchmark	
			ACP % < =180sec	ACTP % <= 120sec	ACP % < = 210sec	ACTP % <= 150sec
By Media Type						
SATCOM		13,770	97.68%	98.71%	98.37%	99.09%
VHF		46,048	99.18%	99.54%	99.31%	99.63%
HF		1,077	78.18%	82.82%	85.24%	90.16%
ALL		60,895	98.47%	99.06%	98.84%	99.34%
By Remote Ground Station (RGS) Ground Earth Station (GES)						
Designator	**Type**	(RGS/GES with message counts >100)				
APK2	**SAT**	390	96.57%	97.86%	97.89%	98.58%
IG1	**SAT**	119	94.43%	95.93%	95.29%	96.22%
IGW1	**SAT**	659	87.63%	89.98%	90.50%	93.32%
BTJ	**VHF**	772	97.74%	97.79%	97.85%	98.23%
HKT	**VHF**	6,467	98.19%	98.54%	98.34%	98.78%
IXZ1	**VHF**	294	93.73%	98.32%	94.24%	98.45%
NAW	**VHF**	186	98.24%	98.66%	98.43%	98.97%
SIN	**VHF**	399	97.82%	98.18%	97.87%	98.42%
H06	**HF**	956	80.65%	85.56%	86.82%	91.74%
H16	**HF**	110	58.18%	62.42%	73.03%	78.64%

2.14 Overall CPDLC performance within the Kuala Lumpur FIR in 2025 met the RCP240 95% benchmark and remained within acceptable limits for the 99.9% benchmark. Performance across media types was generally satisfactory for both Actual Communications Performance (ACP) and Actual Communications Technical Performance (ACTP), indicating that communication system performance was largely compliant.

2.15 SATCOM and VHF media types demonstrated consistent performance across both reporting periods. In contrast, HF data link did not meet RCP240 performance requirements and remained below both the 95% and 99.9% benchmarks. However, HF usage was low, and no specific aircraft consistently utilised this media type.

2.16 Analysis indicates that, for SATCOM and VHF media types, ACTP performance was generally within acceptable limits, suggesting that the communication system and network performance were not the primary contributors to any observed delays.

2.17 Deviations in ACP performance is influenced by a combination of technical and operational factors. Where ACP degradation was observed despite acceptable ACTP performance, this indicates that delays were largely attributable to Pilot Operational Response Time (PORT), rather than communication system latency.

2.18 It is noted that the number of CPDLC message transactions associated with non-compliance cases was relatively low. As such, the available data is insufficient to derive statistically significant conclusions regarding specific root causes, and the observed deviations are not considered indicative of systemic performance issues.

2.19 Further analysis should be conducted at the aircraft level to better isolate contributing factors.

2.20 Performance of RGS and GES will continue to be closely monitored to ensure sustained compliance with RSP180 requirements and to identify any emerging trends or degradation.

KUALA LUMPUR FIR CPDLC RCP240 Performance – Aircraft Operator/Type

2.21 **Tables 4A and 4B** summarise overall CPDLC performance per Aircraft Operator/Type for messages sent within the KUALA LUMPUR FIR during 2025, where performance did not meet the RCP240 performance criteria.

Table 4A: KUALA LUMPUR FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2025

FIR	Kuala Lumpur FIR WMFC					
Criteria	RCP240					
Period	Jan - Jun 2025					
Colour Key Meets Criteria 99.0%-99.89% Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP % < = 180sec	ACTP % <= 120sec	ACP % < = 210sec	ACTP % <= 150sec	PORT %<60secs
By Aircraft Operator / Type (only message counts >100 recorded)						
AFR/B77W	581	96.29%	100.00%	97.25%	100.00%	92.63%
AFR/B789	267	97.91%	100.00%	98.38%	100.00%	94.80%
AIC/A20N	156	93.02%	100.00%	95.06%	100.00%	84.94%
AIC/A21N	378	96.69%	100.00%	97.55%	100.00%	91.48%
AIC/B788	405	98.45%	99.87%	98.63%	99.95%	95.63%
BAW/A388	289	96.89%	100.00%	97.58%	100.00%	94.28%
BAW/B77W	319	95.15%	100.00%	95.93%	100.00%	89.50%
CLX/B748	383	97.13%	100.00%	98.26%	100.00%	93.60%
DHX/B763	127	93.29%	100.00%	94.55%	100.00%	79.27%
DLH/A359	431	97.80%	100.00%	98.39%	100.00%	93.27%
DLH/B748	218	96.86%	100.00%	97.31%	100.00%	92.05%
ELY/B772	158	95.86%	100.00%	96.84%	100.00%	90.02%
ETD/B77W	396	94.78%	99.85%	95.48%	100.00%	89.56%
ETD/B789	1,815	96.35%	99.95%	97.11%	99.98%	93.99%
ETD/B78X	1,466	94.82%	99.74%	95.63%	99.80%	91.68%
ETH/B788	167	97.26%	99.74%	98.37%	99.89%	94.91%
ETH/B789	150	98.27%	100.00%	98.48%	100.00%	93.70%
FDX/B77L	257	95.72%	99.73%	97.80%	99.82%	91.44%
FIN/A359	723	97.30%	99.74%	97.49%	99.77%	94.01%
GFA/B789	652	94.72%	97.85%	95.65%	98.37%	92.02%
KLM/B77W	299	96.32%	100.00%	96.81%	100.00%	92.37%
KLM/B789	300	90.98%	100.00%	92.49%	100.00%	85.56%
MAS/A332	339	94.46%	100.00%	94.84%	100.00%	90.17%
MAS/A333	770	98.70%	100.00%	98.87%	100.00%	96.88%

MAS/A359	1,317	97.45%	99.88%	97.80%	99.92%	94.00%
MAS/B38M	842	87.77%	93.80%	90.62%	95.55%	84.92%
MAS/B738	547	87.89%	96.53%	89.53%	97.38%	79.89%
OMA/B789	414	97.47%	100.00%	98.17%	100.00%	92.37%
QFA/A388	408	98.09%	100.00%	98.24%	100.00%	90.20%
QTR/A359	2,344	96.73%	99.85%	96.98%	99.89%	93.94%
QTR/B77L	450	95.05%	99.93%	95.25%	100.00%	91.61%
QTR/B77W	2,505	95.42%	99.29%	96.53%	99.48%	92.57%
QTR/B788	703	97.47%	99.87%	97.57%	99.91%	94.22%
RBA/A20N	135	95.05%	98.15%	97.23%	99.23%	93.66%
SIA/A359	5,580	92.20%	95.79%	93.53%	97.20%	88.55%
SIA/A388	1,817	94.99%	98.16%	95.80%	98.61%	92.41%
SIA/B38M	872	93.90%	97.75%	94.94%	98.39%	90.60%
SIA/B744	261	98.32%	100.00%	98.76%	100.00%	95.30%
SIA/B77W	491	97.72%	99.75%	98.25%	99.94%	94.50%
SIA/B78X	1,901	95.82%	98.91%	96.68%	99.24%	93.32%
SVA/B789	400	98.80%	100.00%	98.99%	100.00%	93.96%
SVA/B78X	1,064	97.19%	99.91%	97.31%	99.94%	93.23%
SWR/B77W	376	96.32%	99.78%	97.45%	99.88%	94.07%
TGW/B788	574	98.06%	100.00%	98.16%	100.00%	94.60%
THY/A359	2,725	96.92%	99.86%	97.44%	99.91%	93.47%
THY/B77W	750	92.33%	99.67%	92.91%	99.83%	87.33%
UAE/A388	2,350	97.60%	100.00%	97.88%	100.00%	95.40%
UAE/B77W	4,066	96.26%	99.82%	96.87%	99.89%	92.50%
XAX/A333	515	93.95%	99.81%	95.38%	99.83%	91.07%

Table 4B: KUALA LUMPUR FIR CPDLC Performance Latency per Aircraft Operator/Type – Jul-Dec 2025

FIR	**Kuala Lumpur FIR WMFC**					
Criteria	**RCP240**					
Period	**Jul - Dec 2025**					
Colour Key Meets Criteria 99.0%-99.89% Under Criteria	**Message Counts**	95% benchmark		99.9% Benchmark		95%
		ACP % < =180sec	**ACTP % <= 120sec**	**ACP % < = 210sec**	**ACTP % <= 150sec**	**PORT %<60secs**
By Aircraft Operator / Type (only message counts >100 recorded)						
AZG/B744	108	97.53%	97.22%	98.41%	100.00%	87.96%
ELY/B772	182	97.28%	100.00%	98.02%	100.00%	93.74%
ETD/B77W	1,031	98.13%	99.29%	98.66%	99.54%	96.90%
FDX/B77L	223	96.38%	99.30%	97.11%	99.46%	91.12%
MAS/B38M	125	96.08%	94.13%	96.36%	97.08%	92.80%
MAS/B738	1,772	95.94%	98.01%	97.12%	98.53%	91.59%
QFA/A388	232	99.62%	100.00%	99.67%	100.00%	93.97%
QTR/B77L	666	97.83%	99.85%	98.33%	100.00%	96.40%

QTR/B77W	2,260	98.81%	99.57%	98.99%	99.68%	97.79%
RBA/A20N	193	95.93%	97.72%	97.52%	98.78%	92.88%
SIA/A359	6,193	94.85%	95.62%	95.88%	96.92%	93.02%
SIA/A388	2,355	96.52%	97.22%	97.11%	98.04%	95.37%
SIA/B38M	1,135	97.83%	98.63%	98.27%	99.01%	95.07%
SIA/B78X	2,005	98.51%	98.70%	98.66%	98.91%	97.01%
SVA/B77W	155	97.40%	100.00%	99.40%	100.00%	92.65%
TGW/A20N	134	97.46%	99.48%	99.41%	99.84%	94.17%
UAE/B77W	4,691	98.45%	99.94%	98.86%	99.98%	96.06%

2.22 Overall CPDLC performance at airframe level was generally compliant with the RCP240 95% benchmark, with most operator-aircraft combinations achieving acceptable ACP and ACTP performance. However, compliance with the more stringent 99.9% benchmark remained limited across several operators and fleets.

2.23 In the first half of 2025, performance against the ACP 95% benchmark was generally satisfactory, although several operator-aircraft combinations fell below the required threshold. ACTP performance was largely compliant across most fleets, indicating that communication system performance was generally adequate.

2.24 In the second half of 2025, performance improved further, with most operators meeting the ACP 95% benchmark. However, compliance with the 99.9% benchmark for both ACP and ACTP remained inconsistent. PORT performance also varied across operators, contributing to differences in overall ACP outcomes.

2.25 ACP non-compliance was observed despite acceptable ACTP performance, this was assessed to be primarily attributable to PORT. This indicates that delays were largely operational in nature rather than due to communication system deficiencies.

2.26 For several operator-aircraft combinations, the number of CPDLC message transactions was relatively low. As such, the available data is insufficient to derive statistically significant conclusions for certain cases, and the observed deviations may not be indicative of systemic performance issues.

2.27 Continued monitoring at airframe level will be maintained to support performance improvement.

Additional Information

2.28 Trial implementation of 30NM PBCS separation implementation on ATS Route N571 for FL290 and above started on 1st September 2025.

2.29 Malaysia is in the process of finalising the appointment of a Central Reporting Agency (CRA) for the Kuala Lumpur FIR.

2.30 Malaysia has subscribed to the Airways New Zealand PBCS monitoring tool to enhance performance monitoring and support implementation efforts.

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.

— END —