



ICAO

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-C/CPDLC Operations and Performance

DATA LINK PERFORMANCE REPORT FOR KUALA LUMPUR FIR

(Presented by Malaysia)

SUMMARY

This paper presents data link performance data for January to December 2021 for Kuala Lumpur FIR

1. INTRODUCTION

1.1 This paper presents the data link performance for Malaysia (WMFC) FIR from January to December 2021. This performance report is based on the Performance-Based Communications and Surveillance (PBCS) performance monitoring analysis reporting format.

1.2 The overall performance observed in 2021 against both RCP240 and RSP180 specifications improved significantly compared to performance in 2020. Problem reports were highlighted against number of criterions that did not meet the specifications.




2. DISCUSSION

2.1 In summary, ADS-C performance overall were able to meet the 95% criterion but failed for 99.9% criterion as shown in **Table 1** below.

FIR	WMFC					
Criteria	RSP180					
Period	January-June 2021			July-December 2021		
Colour Key						
Meet Criteria	Message	95%	99.90%	Message	95%	99.90%
99.0% - 99.90%	Counts	%<=90sec	%<=180sec	Counts	%<=90sec	%<=180sec
Under Criteria						
By Media Type						
SATCOM	79,462	98.24%	99.61%	62,290	98.34%	99.62%
VHF	107,918	99.52%	99.84%	114,176	99.62%	99.89%
HF	30	87.72%	92.43%	21	63.56%	91.11%
ALL	187,410	98.97%	99.74%	176,487	99.16%	99.79%

Table 1: WMFC RSP180 by Media Type

2.2 **Table 2** present ADS-C Downlink Latency by Remote Ground Station (RGS) Ground Earth Station (GES) with respect to VHF Data Link (VDL).

Criteria		RSP180					
Period		January-June 2021			July-December 2021		
Colour Key		Message Counts	95% %<=90sec	99.90% %<=180sec	Message Counts	95% %<=90sec	99.90% %<=180sec
	Meet Criteria						
	99.0% - 99.90%						
	Under Criteria						
Designator	Type	(only RGS/GES with message counts >100 recorded)					
AOR1	VHF	109	100.00%	100.00%	197	100.00%	100.00%
APK1	VHF	1243	98.98%	100.00%	2171	98.79%	100.00%
APK2	VHF				147	91.97%	97.46%
BTJ1	VHF	1209	96.89%	98.30%	5125	98.60%	99.50%
CGK2	VHF	168	99.10%	99.70%	100	100.00%	100.00%
HDY	VHF	8043	99.37%	99.74%	9443	99.57%	99.74%
HDYV	VHF	1139	99.34%	99.72%	884	99.81%	99.91%
HKT	VHF	28997	99.69%	99.92%	24093	99.84%	99.97%
HKTV	VHF	933	98.20%	99.58%	1295	99.84%	100.00%
IXZ1	VHF	16321	99.66%	99.91%	8838	99.66%	99.89%
JHB	VHF				152	100.00%	100.00%
KBR1	VHF	1998	99.59%	99.99%	1817	99.83%	100.00%
KBV	VHF	1733	99.70%	99.82%	2803	99.94%	99.96%
KNO1	VHF	1988	99.95%	100.00%	3099	99.85%	99.94%
KUA	VHF	370	97.18%	98.12%	478	99.15%	100.00%
KUA1	VHF	668	99.63%	100.00%	521	99.63%	100.00%
KUL	VHF	1828	99.17%	99.56%	2459	99.81%	99.89%
KUL1	VHF	1363	99.48%	99.79%	2140	99.70%	99.98%
KUL2	VHF	1320	99.93%	100.00%	2384	99.94%	100.00%
KULA	VHF	3245	98.85%	99.72%	4954	99.61%	99.94%
LGK1	VHF	280	100.00%	100.00%	899	99.90%	99.95%
NAW	VHF	606	98.32%	99.81%	907	99.62%	100.00%
PEN	VHF	497	99.15%	99.35%	519	99.69%	99.90%
PEN1	VHF	4598	99.97%	100.00%	4919	99.99%	100.00%
PQC	VHF				174	100.00%	100.00%
SIN	VHF	5356	99.69%	99.90%	6648	99.46%	99.86%
SIN1	VHF	322	100.00%	100.00%	390	100.00%	100.00%
SIN2	VHF	659	100.00%	100.00%	880	100.00%	100.00%
SIN7	VHF	3782	99.94%	99.99%	3145	99.83%	99.97%
SIN8	VHF	5603	99.83%	99.97%	6905	99.84%	99.98%
SIN9	VHF	2344	99.90%	100.00%	2225	99.74%	99.94%
SINA	VHF				135	100.00%	100.00%
SINV	VHF	911	99.27%	99.76%	761	99.57%	100.00%
SZB	VHF	1129	98.52%	98.85%	1975	99.53%	99.78%

SZB1	VHF	4526	99.26%	99.88%	6830	99.46%	99.85%
TGG1	VHF	927	99.50%	100.00%	759	99.68%	100.00%
USM	VHF	2053	99.35%	99.74%	1186	99.90%	100.00%
UTP	VHF	106	100.00%	100.00%			
XSP	VHF	204	97.82%	99.24%	467	100.00%	100.00%
XXA	VHF	352	98.28%	99.04%	414	97.09%	98.66%
XXP	VHF				191	100.00%	100.00%

Table 2: WMFC RSP180 by VDL VHF RGS

2.3 **Table 3** present ADS-C Downlink Latency by Remote Ground Station (RGS) Ground Earth Station (GES) with respect to Satellite Communication (SATCOM).

Criteria		RSP180					
Period		January-June 2021			July-December 2021		
Colour Key		Message Counts	95% %<=90sec	99.90% %<=180sec	Message Counts	95% %<=90sec	99.90% %<=180sec
Meet Criteria							
99.0% - 99.90%							
Under Criteria							
Designator	Type	(only RGS/GES with message counts >100 recorded)					
AOR	SAT	232	98.15%	99.06%	236	98.67%	99.25%
AOR1	SAT	5461	99.80%	99.95%	11094	99.88%	99.94%
APK1	SAT	54188	98.49%	99.81%	34582	98.53%	99.85%
APK2	SAT	4421	94.41%	98.42%	6,153	95.99%	98.84%
IGW1	SAT	591	89.85%	97.83%	772	94.99%	99.25%
XXA	SAT	11433	97.94%	98.99%	6,757	96.92%	98.59%
XXP	SAT	2983	99.43%	99.99%	2693	99.52%	99.98%

Table 3: WMFC RSP180 BY SATCOM RGS

2.4 Kuala Lumpur Air Traffic Control Centre had recently migrated to a new facility in September 2021. With this migration, coupled with a comprehensive training programme for all participating staff, we were able to observe a significant increase in CPDLC message count when comparing performance of PBCS between the first half to the second half of 2021.

2.5 In summary, CPDLC performance overall were able to meet the 95% criterion. For first half of 2021 the ACP was under the 99.9% criterion but then showed improvement in the second half of 2021. For HF media type, all benchmarks indicate that the performance was under all criteria as shown in **Table 4** below

FIR	WMFC									
Criteria	RCP240									
Period	January-June 2021					July-December 2021				
Colour Key Meet Criteria 99.0% - 99.90% Under Criteria	Message Counts	95% Benchmark		99.9% Benchmark		Message Counts	95% Benchmark		99.9% Benchmark	
		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s
SATCOM	4,928	98.00%	98.44%	98.52%	99.03%	11,677	98.93%	98.98%	99.37%	99.35%
VHF	7,141	98.67%	98.99%	98.89%	99.26%	15,220	99.07%	99.35%	99.27%	99.57%

HF	185	91.71%	92.22%	93.26%	94.76%	160	89.64%	90.25%	92.19%	94.06%
ALL	12,254	98.29%	98.66%	98.65%	99.09%	27,057	98.95%	99.14%	99.26%	99.44%

Table 4: WMFC RCP240 by Media Type

2.6 **Table 5** present CPDLC Downlink Latency by Remote Ground Station (RGS) Ground Earth Station (GES) with respect to Satellite Communication (SATCOM).







Period	January-June 2021				July-December 2021					
Colour Key   	Message Counts	95% Benchmark		99.9% Benchmark		Message Counts	95% Benchmark		99.9% Benchmark	
		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s
Designator	(only RGS/GES with message counts >100 recorded)									
AOR1	601	98.93%	99.48%	99.24%	100.0%	1,899	99.57%	99.97%	99.70%	100.0%
APK1	3040	97.45%	97.96%	97.99%	98.77%	6,659	98.87%	98.83%	99.38%	99.26%
APK2	277	97.34%	97.95%	98.83%	98.15%	1,454	98.72%	98.45%	99.16%	99.03%
IGW1						139	95.65%	96.92%	96.85%	98.64%
XXA	817	99.74%	99.76%	100.0%	99.83%	1,238	99.09%	99.03%	99.57%	99.25%
XXP	160	100.0%	100.0%	100.0%	100.0%	286	99.14%	100.0%	99.22%	100.0%

Table 5: WMFC RCP240 BY SATCOM RGS

2.7 **Table 6** present CPDLC Downlink Latency by Remote Ground Station (RGS) Ground Earth Station (GES) with respect to VHF

Colour Key   	Message Counts	95% Benchmark		99.9% Benchmark		Message Counts	95% Benchmark		99.9% Benchmark	
		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s
Designator	(only RGS/GES with message counts >100 recorded)									
BTJ1	297	99.42%	99.68%	99.67%	99.72%	859	99.39%	99.71%	99.86%	100.0%
HDY	379	99.72%	100.0%	100.0%	100.0%	1,090	98.36%	98.75%	98.51%	98.91%
HKT	2094	97.73%	98.01%	97.91%	98.57%	4,649	98.54%	98.63%	98.76%	99.10%
HKTV	125	100.0%	99.99%	100.0%	100.0%	173	100.00%	100.0%	100.0%	100.0%
IXZ1	836	100.0%	99.97%	100.0%	100.0%	1,212	99.74%	99.88%	99.83%	99.96%
KBR1	100	100.0%	100.0%	100.0%	100.0%	152	100.00%	100.0%	100.0%	100.0%
KBV	122	97.32%	99.57%	97.96%	99.76%	368	99.74%	100.0%	99.79%	100.0%
KNO1	119	100.0%	100.0%	100.0%	100.0%	330	99.59%	100.0%	99.67%	100.0%
KUL	141	100.0%	100.0%	100.0%	100.0%	235	100.00%	100.0%	100.0%	100.0%
KUL1						117	99.65%	100.0%	99.87%	100.0%
KUL2						250	99.93%	100.0%	100.0%	100.0%
KULA	166	99.69%	100.0%	99.77%	100.0%	633	98.99%	100.0%	99.31%	100.0%
PEN1	259	99.70%	100.0%	100.0%	100.0%	1,117	99.56%	100.0%	99.61%	100.0%
SIN	122	98.27%	99.03%	98.52%	99.47%	284	98.79%	98.60%	99.42%	98.68%

SIN7	379	100.0%	100.0%	100.0%	100.0%	480	100.00%	100.0%	100.0%	100.0%
SIN8	487	99.66%	100.0%	99.86%	100.0%	747	100.00%	100.0%	100.0%	100.0%
SIN9	345	100.0%	100.0%	100.0%	100.0%	384	99.37%	99.82%	99.58%	99.87%
SZB						239	99.82%	100.0%	99.92%	100.0%
SZB1	280	100.0%	100.0%	100.0%	100.0%	1,110	99.73%	100.0%	99.82%	100.0%
USM	236	97.46%	96.98%	97.66%	97.32%	153	96.41%	96.92%	98.59%	97.12%

Table 6: WMFC RCP240 BY VHF RGS

2.8 **Table 7** present CPDLC Downlink Latency by Remote Ground Station (RGS) Ground Earth Station (GES) with respect to HF




Period	January-June 2021				July-December 2021					
Colour Key   	Message Counts	95% Benchmark		99.9% Benchmark		Message Counts	95% Benchmark		99.9% Benchmark	
		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s		ACP 180s	ACTP 120s	ACP 210s	ACTP 150s
Designator	(only RGS/GES with message counts >100 recorded)									
H06	132	92.93%	95.02%	94.24%	97.12%					

Table 7: WMFC RCP240 BY HF RGS

2.9 **Table 8** below summarize the aircraft operator/type which failed the criteria for ADS-C RSP180.




PERIOD		January-June 2021			July-December 2021		
Colour Key   	Message Counts	95%	99.90%	Message Counts	95%	99.90%	
		<=90sec	<=180sec		<=90sec	<=180sec	
Oper.	Type	By Aircraft Operator / Type (only message counts >100 recorded)					
THY	A333	1,098	96.61%	98.22%	789	98.71%	99.33%
SIA	B744	1,976	95.39%	98.39%	5,107	96.57%	98.85%
UPS	B763	228	96.87%	98.55%	199	98.12%	98.48%
FDX	B763	320	95.10%	98.91%	362	98.43%	99.50%
THY	B77L	806	94.17%	98.29%	707	97.41%	98.95%
CKS	B77L	220	95.28%	97.00%	122	95.13%	97.64%
KAL	B77L	340	97.49%	98.42%			
BAW	B77W	2,729	96.79%	98.31%	2,342	97.83%	98.90%
SWR	B77W	1,769	95.97%	97.91%	870	96.78%	98.44%
HVN	B789	123	88.94%	99.70%			
MMD	F2TH	231	97.81%	99.10%	135	95.42%	97.78%

Table 8: WMFC RSP180 BY AIRCRAFT OPERATOR/TYPE THAT ARE UNDER CRITERIA

2.10 **Table 9** and **Table 10** below summarize the aircraft operator/type which failed the criteria for CPDLC RCP240.




PERIOD		January-June 2021					
Colour Key		Message Counts	95% Benchmark		99.9% Benchmark		95%
	Meet Criteria		ACP	ACTP	ACP	ACTP	PORT
	99.0%-99.90%		%<=180sec	%<=120sec	%<=210sec	%<=150sec	%<60sec
	Under Criteria						
By Aircraft Operator / Type (only message counts >100 recorded)							
SIA	A359	2,502	96.87%	96.92%	97.24%	97.72%	93.09%
SIA	B744	133	96.87%	96.47%	97.69%	96.88%	98.40%
AZG	B748	107	98.62%	98.75%	99.27%	100.00%	96.73%
FDX	B77L	110	99.17%	96.06%	99.29%	98.49%	98.71%
THY	B77W	318	97.46%	97.88%	98.10%	98.05%	94.86%
QTR	B77W	892	97.00%	98.36%	98.02%	99.27%	93.16%
AIC	B788	149	98.70%	98.40%	98.94%	99.33%	96.33%
AFR	B789	143	94.83%	96.50%	95.55%	97.96%	88.91%
ETD	B789	780	98.38%	99.23%	98.79%	99.88%	95.77%

Table 9: WMFC RCP240 BY AIRCRAFT OPERATOR/TYPE THAT ARE UNDER CRITERIA FOR THE PERIOD BETWEEN JANUARY 2021 AND JUNE 2021




PERIOD		July-December 2021					
Colour Key		Message Counts	95% Benchmark		99.9% Benchmark		95%
	Meet Criteria		ACP	ACTP	ACP	ACTP	PORT
	99.0%-99.90%		%<=180sec	%<=120sec	%<=210sec	%<=150sec	%<60sec
	Under Criteria						
By Aircraft Operator / Type (only message counts >100 recorded)							
EXV	A320	114	96.43%	98.93%	97.92%	99.49%	92.63%
SIA	A359	3,157	97.13%	96.96%	97.64%	97.97%	94.58%
SIA	B738	106	99.19%	100.00%	100.00%	100.00%	93.22%
SIA	B744	705	98.79%	98.07%	99.40%	99.14%	98.01%
AZG	B748	216	97.72%	97.79%	97.84%	98.28%	91.90%
ABW	B748	125	98.56%	98.83%	98.76%	99.22%	95.64%
FDX	B77L	250	99.80%	96.47%	100.00%	97.92%	97.40%
THY	B77L	103	97.01%	97.09%	97.72%	98.76%	94.26%
THY	B77W	1,024	97.64%	97.95%	98.40%	98.40%	94.73%
QTR	B77W	597	97.90%	99.20%	98.34%	99.55%	95.73%
AIC	B788	377	99.16%	98.92%	99.49%	99.35%	96.02%
AFR	B789	279	98.71%	98.95%	98.83%	99.64%	96.33%
ETD	B789	1,684	99.11%	99.74%	99.61%	99.94%	96.64%
SIA	B78X	1,357	98.89%	98.61%	99.15%	98.78%	95.80%




Table 10: WMFC RCP240 BY AIRCRAFT OPERATOR/TYPE THAT ARE UNDER CRITERIA FOR THE PERIOD BETWEEN JULY 2021 AND DECEMBER 2021

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.

.....

Appendix A

FIR		WMFC					
Criteria		RSP180					
Period		January-June 2021			July-December 2021		
Colour Key							
	Meet Criteria	Message Counts	95% %<=90sec	99.90% %<=180sec	Message Counts	95% %<=90sec	99.90% %<=180sec
	99.0% - 99.90%						
	Under Criteria						
By Media Type							
SATCOM		79,462	98.24%	99.61%	62,290	98.34%	99.62%
VHF		107,918	99.52%	99.84%	114,176	99.62%	99.89%
HF		30	87.72%	92.43%	21	63.56%	91.11%
ALL		187,410	98.97%	99.74%	176,487	99.16%	99.79%
By Remote Ground Station (RGS) Ground Earth Station (GES)							
Designator	Type	(only RGS/GES with message counts >100 recorded)					
AOR	SAT	232	98.15%	99.06%	236	98.67%	99.25%
AOR1	SAT	5461	99.80%	99.95%	11094	99.88%	99.94%
APK1	SAT	54188	98.49%	99.81%	34582	98.53%	99.85%
APK2	SAT	4421	94.41%	98.42%	6,153	95.99%	98.84%
IGW1	SAT	591	89.85%	97.83%	772	94.99%	99.25%
XXA	SAT	11433	97.94%	98.99%	6,757	96.92%	98.59%
XXP	SAT	2983	99.43%	99.99%	2693	99.52%	99.98%
AOR1	VHF	109	100.00%	100.00%	197	100.00%	100.00%
APK1	VHF	1243	98.98%	100.00%	2171	98.79%	100.00%
APK2	VHF				147	91.97%	97.46%
BTJ1	VHF	1209	96.89%	98.30%	5125	98.60%	99.50%
CGK2	VHF	168	99.10%	99.70%	100	100.00%	100.00%
HDY	VHF	8043	99.37%	99.74%	9443	99.57%	99.74%
HDYV	VHF	1139	99.34%	99.72%	884	99.81%	99.91%
HKT	VHF	28997	99.69%	99.92%	24093	99.84%	99.97%
HKTV	VHF	933	98.20%	99.58%	1295	99.84%	100.00%
IXZ1	VHF	16321	99.66%	99.91%	8838	99.66%	99.89%
JHB	VHF				152	100.00%	100.00%
KBR1	VHF	1998	99.59%	99.99%	1817	99.83%	100.00%
KBV	VHF	1733	99.70%	99.82%	2803	99.94%	99.96%
KNO1	VHF	1988	99.95%	100.00%	3099	99.85%	99.94%
KUA	VHF	370	97.18%	98.12%	478	99.15%	100.00%

Criteria		RSP180					
Period		January-June 2021			July-December 2021		
Colour Key		Message Counts	95% %<=90sec	99.90% %<=180sec	Message Counts	95% %<=90sec	99.90% %<=180sec
 	Meet Criteria						
 	99.0% - 99.90%						
 	Under Criteria						
Designator	Type	(only RGS/GES with message counts >100 recorded)					
KUA1	VHF	668	99.63%	100.00%	521	99.63%	100.00%
KUL	VHF	1828	99.17%	99.56%	2459	99.81%	99.89%
KUL1	VHF	1363	99.48%	99.79%	2140	99.70%	99.98%
KUL2	VHF	1320	99.93%	100.00%	2384	99.94%	100.00%
KULA	VHF	3245	98.85%	99.72%	4954	99.61%	99.94%
LGK1	VHF	280	100.00%	100.00%	899	99.90%	99.95%
NAW	VHF	606	98.32%	99.81%	907	99.62%	100.00%
PEN	VHF	497	99.15%	99.35%	519	99.69%	99.90%
PEN1	VHF	4598	99.97%	100.00%	4919	99.99%	100.00%
PQC	VHF				174	100.00%	100.00%
SIN	VHF	5356	99.69%	99.90%	6648	99.46%	99.86%
SIN1	VHF	322	100.00%	100.00%	390	100.00%	100.00%
SIN2	VHF	659	100.00%	100.00%	880	100.00%	100.00%
SIN7	VHF	3782	99.94%	99.99%	3145	99.83%	99.97%
SIN8	VHF	5603	99.83%	99.97%	6905	99.84%	99.98%
SIN9	VHF	2344	99.90%	100.00%	2225	99.74%	99.94%
SINA	VHF				135	100.00%	100.00%
SINV	VHF	911	99.27%	99.76%	761	99.57%	100.00%
SZB	VHF	1129	98.52%	98.85%	1975	99.53%	99.78%
SZB1	VHF	4526	99.26%	99.88%	6830	99.46%	99.85%
TGG1	VHF	927	99.50%	100.00%	759	99.68%	100.00%
USM	VHF	2053	99.35%	99.74%	1186	99.90%	100.00%
UTP	VHF	106	100.00%	100.00%			
XSP	VHF	204	97.82%	99.24%	467	100.00%	100.00%
XXA	VHF	352	98.28%	99.04%	414	97.09%	98.66%
XXP	VHF				191	100.00%	100.00%

FIR		WMFC					
Criteria		RSP180					
PERIOD		January-June 2021			July-December 2021		
Colour Key		Message Counts	95% %<=90sec	99.90% %<=180sec	Message Counts	95% %<=90sec	99.90% %<=180sec
 	Meet Criteria						
 	99.0% - 99.90%						
 	Under Criteria						
By Aircraft Operator / Type (only message counts >100 recorded)							
2TS	B762	152	99.34%	100.00%			
2YA	GLF4	333	100.00%	100.00%			
ABD	B744	553	99.46%	100.00%	381	99.58%	99.82%
ABW	B748	1,726	98.98%	99.79%	1,479	98.82%	99.69%
AFR	B77W				441	99.06%	100.00%
AFR	B789	2,578	98.94%	99.97%	1,337	99.09%	100.00%
AIC	B788	2,558	97.07%	99.78%	2046	98.32	99.7
ALK	A332	285	100.00%	100.00%			
ALK	A333	643	100.00%	100.00%			
AZG	B744	485	96.70%	100.00%	650	98.18%	100.00%
AZG	B748	1,505	98.59%	99.91%	1,502	98.97%	100.00%
BAW	B772	130	100.00%	100.00%			
BAW	B77W	2,729	96.79%	98.31%	2,342	97.83%	98.90%
BAW	B788	466	99.62%	99.97%	450	99.54%	100.00%
BAW	B789	1,863	99.05%	99.89%	779	99.86%	100.00%
BOX	B77L	1,690	100.00%	100.00%	2,251	99.60%	99.99%
CAL	A333	150	100.00%	100.00%	127	99.43%	99.94%
CAZ	FA7X	120	99.94%	100.00%			
CCA	A332				169	100.00%	100.00%
CCA	B77W				169	99.49%	100.00%
CES	A332	132	100.00%	100.00%			
CES	A333	111	100.00%	100.00%			
CKS	B77L	220	95.28%	97.00%	122	95.13%	97.64%
CLX	B744	1,071	98.18%	99.75%	1,364	99.66%	100.00%
CLX	B748	6,947	99.39%	99.78%	8,285	99.17%	99.77%
CPA	A333				281	100.00%	100.00%
CPA	B744	159	100.00%	100.00%			
CSZ	A333	104	97.58%	100.00%			
DLH	A343	849	99.94%	100.00%	1,377	99.37%	99.52%
EDW	A343				171	100.00%	100.00%
ETD	B77W	726	98.26%	100.00%	1,085	98.19%	99.36%
ETD	B789	11,748	99.42%	100.00%	9,410	99.57%	99.98%
ETH	A359				150	100.00%	100.00%
ETH	B788	661	99.79%	100.00%	329	97.82%	100.00%
ETH	B789	494	100.00%	100.00%	317	100.00%	100.00%
EVA	B77W	392	100.00%	100.00%	500	99.43%	100.00%

EXV	A320				272	97.47%	99.66%
FDX	B763	320	95.10%	98.91%	362	98.43%	99.50%
FDX	B77L	1,845	99.08%	99.87%	2,083	99.25%	99.75%
FIN	A359	836	100.00%	100.00%	1,118	100.00%	100.00%
GFA	B789	171	100.00%	100.00%	409	100.00%	100.00%
GIA	A333	299	97.24%	99.78%			
GIA	B77W	300	97.40%	99.40%	575	99.73%	99.92%
HBJ	FA7X	132	100.00%	100.00%			
HFM	S343				111	100.00%	100.00%
HKC	A332	169	98.70%	99.86%			
HVN	B789	123	88.94%	99.70%			
ICV	B744				318	99.42%	99.53%
ICV	B748	910	99.42%	99.98%	1,136	99.47%	99.85%
KAL	A333	2,334	99.91%	100.00%	1,888	99.97%	100.00%
KAL	B744	412	99.93%	100.00%	249	100.00%	100.00%
KAL	B748	256	97.98%	99.44%			
KAL	B77L	340	97.49%	98.42%			
KAL	B789				112	99.07%	100.00%
KLM	B772	409	100.00%	100.00%	325	99.08%	100.00%
KLM	B77W	5,038	99.90%	100.00%	3,943	99.58%	99.88%
KLM	B789	2,424	99.08%	100.00%	844	99.19%	100.00%
MAS	A332	2,259	99.93%	100.00%	4,123	99.90%	99.98%
MAS	A333	6,524	99.39%	100.00%	8,254	99.62%	99.97%
MAS	A359	620	99.57%	100.00%	1,730	99.28%	99.87%
MMD	F2TH	231	97.81%	99.10%	135	95.42%	97.78%
MMZ	B763				125	98.55%	100.00%
MPH	B744	114	100.00%	100.00%			
N99	GLF5				105	99.24%	100.00%
QFA	A333	106	100.00%	100.00%	211	100.00%	100.00%
QFA	B789	460	98.04%	100.00%	330	97.46%	100.00%
QQE	GLF6	170	99.45%	100.00%			
QTR	A333				225	99.95%	100.00%
QTR	A359	11,851	99.47%	99.90%	3,932	99.60%	99.86%
QTR	A35K	487	100.00%	100.00%	356	99.79%	100.00%
QTR	B77L	2,046	98.69%	99.61%	3,523	99.74%	99.98%
QTR	B77W	12,475	97.88%	99.54%	4,464	98.12%	99.69%
QTR	B788	3,525	99.05%	99.90%	4,098	99.54%	99.90%
QTR	B789	270	98.70%	100.00%	4,738	99.58%	100.00%
RCH	C17	235	99.57%	100.00%	101	100.00%	100.00%
RMY	B762				100	98.79%	100.00%
SHE	FA8X	109	99.39%	100.00%			
SIA	A359	32,489	99.78%	99.98%	22,896	99.80%	99.99%
SIA	A388				133	100.00%	100.00%
SIA	B738				342	98.82%	100.00%

SIA	B744	1,976	95.39%	98.39%	5,107	96.57%	98.85%
SIA	B77W	680	98.77%	99.98%	4,148	99.51%	99.85%
SIA	B78X	8,121	98.89%	99.83%	6,926	99.12%	99.94%
SLK	B738	174	99.83%	100.00%			
SVA	B77W	642	99.77%	100.00%	334	100.00%	100.00%
SVA	B789	366	100.00%	100.00%	534	99.75%	100.00%
SVA	B78X	777	100.00%	100.00%	429	99.60%	100.00%
SWR	A343				705	100.00%	100.00%
SWR	B77W	1,769	95.97%	97.91%	870	96.78%	98.44%
TGW	B788	354	98.95%	100.00%	1,906	99.42%	99.93%
THY	A333	1,098	96.61%	98.22%	789	98.71%	99.33%
THY	A359	692	96.18%	99.94%	1,584	98.25%	100.00%
THY	B744	548	98.96%	99.97%	512	99.83%	100.00%
THY	B77L	806	94.17%	98.29%	707	97.41%	98.95%
THY	B77W	5,461	97.99%	99.65%	7,309	98.73%	99.82%
THY	B789	4,767	99.08%	100.00%	4,216	98.62%	99.99%
TT7	F2TH				102	100.00%	100.00%
UAE	B77L	2,030	99.65%	99.94%	2,068	99.63%	99.93%
UAE	B77W	20,567	98.97%	99.49%	20,710	99.02%	99.56%
UPS	B763	228	96.87%	98.55%	199	98.12%	98.48%
VQB	GLEX				102	99.24%	99.78%
XAX	A333	383	100.00%	100.00%	853	100.00%	100.00%
XAX	G4				128	98.12%	99.65%