International Civil Aviation Organization

Tenth Meeting of the FANS Interoperability Team – Asia (FIT-Asia/10)

Video Teleconference, 03 – 06 August 2020

Agenda Item 3: PBCS Developments and Implementation

PBCS POST-IMPLEMENTATION MONITORING NZZO

(Presented by Airways New Zealand)

SUMMARY

This paper presents the monthly PBCS post-implementation monitoring and reporting carried out by Airways New Zealand. This monitoring program has been developed using the guidance in Doc 9869 PBCS Manual to meet Annex 11 requirements and ensure that the CPDLC communication and ADS-C surveillance systems operate to the required RCP24/RSP180 performance levels to maintain efficient and safe operations.

1. INTRODUCTION

1.1 Airways uses performance-based separations utilizing PBCS RCP240/RSP180 specifications. Doc 9869 PBCS Manual states in paragraph 4.3.1.7 a) that the ANSP should establish a local PBCS monitoring program, to ensure that the communication and surveillance capabilities in the airspace applicable to its ATS units continue to meet the RCP/RSP specification, and to coordinate monitored data, analysis, and corrective action. Further guidance for local PBCS monitoring is provided in the PBCS Manual paragraph 4.5.2 (**Attachment 4**).

1.2 To satisfy this guidance Airways monitors PBCS RCP240/RSP180 performance on a monthly basis. A monthly PBCS performance report is submitted to the responsible authority (New Zealand Civil Aviation Authority) and PBCS performance degradations are raised as problem reports to the ISPACG CRA through the CRA website.

2. DISCUSSION

2.1 Airways extracts ADS-C and CPDLC data points every month from the Airways Oceanic Control System (OCS) in formats specified in Doc 9869 PBCS Manual Annex D. These records are extracted from OCS as .csv files and are manually processed before importing to a website based PBCS analysis tool. The monthly records are also stored as excel files for subsequent analysis. The PBCS analysis website can produce combined reports of ADS-C and CPDLC performance over specified periods. These combined reports are used as input to the regional reporting of PBCS performance on the CRA website. Airways also uses these combined reports for our monthly performance analysis. Example of a raw combined report .csv file is shown in **Figure 1**.

	A	B	C	D	E	F	G	H	I	J	K	L
1	FIR	State Of Registry	Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO recieved)	ACP <= 180 sec	ACP <= 210 sec	
2	NZZO		AAL	B789	N820AL	402	100.00%	100.00%	-	-	-	
3	NZZO		AAL	B789	N821AN	508	99.80%	100.00%	-	-	-	
4	NZZO		AAL	B789	N822AN	896	99.78%	100.00%	-	-	-	
5	NZZO		AAL	B789	N823AN	251	100.00%	100.00%	-	-	-	
6	NZZO		AAL	B789	N824AN	347	99.42%	99.42%	-	-	-	
7	NZZO		AAL	B789	N826AN	437	99.54%	100.00%	-	-	-	
8	NZZO		AAL	B789	N827AN	476	100.00%	100.00%	-	-	-	
9	NZZO		AAL	B789	N828AA	167	100.00%	100.00%	-	-	-	
10	NZZO		AAL	B789	N829AN	182	100.00%	100.00%	-	-	-	

Figure 1: Example consolidated report as extracted from website

2.2 Excel reports of observed ASP and ACP are created from the raw combined report .csv data as illustrated in **Figure 2**. Minor processing of the raw data includes adding a color key in the performance columns, identifying PBCS qualified aircraft with a color key and removing two unnecessary columns. These excel reports now highlight any performance degradation for further analysis. We have been using a number of different combined reports to assist in analysis. These include combined reports of individual tail number performance, combined reports of aircraft operator and aircraft type for the current month, and combined reports of the previous three months consolidated data to increase the number of data points available for analysis. Two combined reports used in the June 2020 assessment are attached as **Attachment 2** and **Attachment 3**.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec	Colour Key Meets Criteria 99.0%-99.84% Under Criteria PBCS Qualified
AAL	B77W	N723AN	99	100.00%	100.00%	2	100.00%	100.00%	
AAL	B77W	N725AN	106	98.11%	99.06%	5	100.00%	100.00%	
ACA	B77W	CFIVR	105	100.00%	100.00%	3	100.00%	100.00%	
ACA	B789	CFVLU	23	100.00%	100.00%	0	-	-	
ACI	A339	FONET	189	100.00%	100.00%	0	-	-	
AIC	B77L	VTALG	20	100.00%	100.00%	0	-	-	
ANZ	A20N	ZKNHA	989	97.88%	99.70%	16	100.00%	100.00%	
ANZ	A20N	ZKNHC	759	96.44%	99.34%	18	100.00%	100.00%	
ANZ	A20N	ZKNHD	677	96.45%	98.82%	9	100.00%	100.00%	

Figure 2: Example consolidated report of ASP and ACP

2.3 Individual records in the combined reports are not assessed where the number of data points is less than 100. Where records with 100 or greater data points indicate performance deterioration below ASP or ACP criteria, data is extracted from the Excel raw data files for periods where the latency exceeds requirements. **Figure 3** illustrates a recent example.

Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	OCS_time	Downlink_time
20200121	XXH	P	-24.4298	177.5677	19:58:15	19:58:56	41
20200121	XXH	W	-25.0039	177.3341	20:03:03	20:07:45	282
20200121	XXA	P	-26.3032	177.0871	20:13:11	20:14:58	107
20200122	XXP	P	-34.415	176.7161	02:15:31	02:26:46	675
20200122	XXP	W	-34.1443	176.9305	02:17:47	02:27:53	606

20200122	XXP	P	-32.5626	178.0324	02:30:27	02:30:43	16
20200122	XXP	P	-32.0013	178.4125	02:34:54	02:36:28	94
20200122	XXH	P	-30.6692	179.2931	02:45:23	02:56:06	643
20200122	XXH	W	-29.9973	179.7264	02:50:42	02:56:31	349
20200122	XXH	P	-29.0291	-179.661	02:58:18	02:59:02	44
20200207	XXH	W	-34.2851	177.7571	21:25:28	21:25:41	13
20200207	XXH	W	-34.482	177.4898	21:27:49	21:27:59	10
20200207	XXA	P	-35.0191	176.8797	21:33:50	21:37:59	249
20200208	XXA	P	-36.4909	174.8304	02:11:01	02:11:07	6

Figure 3: Example of deterioration extracted from raw records

2.4 The extracted raw data records are then assessed, and an action plan developed. For the data illustrated in Figure 3 this was:

Assessment:
Data analysis shows significant latency delays when transitioning between satellite RGS 21/22 January and 7 February and at initial contract establishment on 22 January"

Action Plan:

1. *16/3 Raise FANS PR to investigate (ACNZ_2020_04).*
2. *Obtain Oakland performance for this tail on the same dates.*
3. *Wait for Oakland feedback before action on ASP below 95% normal operating. A bad day at the office on 22/1 has skewed performance. If Oakland results OK recommend monitor only at this stage.*

2.5 The performance degradations assessed each month are consolidated into a report for the New Zealand CAA. The NZZO June report is attached as **Attachment 1**.

2.6 In addition to monitoring RCP240/RSP180 availability is monitored by maintaining a monthly record of notified CSP outages and an assessment as to operational impact as shown in Figure 4 for June 2020.

CSP	Date	Advice Received	Outage Start	Outage End	Duration (minutes)	Reason	Operational Impact
RC	10-Jun	1622	1508	1605	57	XXA Network Degradation	No operational impact
RC	29-Jun	1932	1806	1936	90	XXS Pamalau, HI	No operational impact

Figure 4: monitoring notified CSP outages and operational impact

2.7 Most FANS problem reports raised by NZZO come about through the monthly PBCS performance monitoring process and are always accompanied by the appropriate data points and investigation carried out by Airways to facilitate the CRA investigation.

2.8 In addition to monthly performance reports Airways provides PBCS performance data to ISPACG for the ISPACG annual report to ICAO, and to the FAA who consolidate performance reports for the CRA website. The PBCS analysis website is regularly used within Airways to review PBCS performance and update our operators on performance when requested.

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.

Attachment 1: NZZO June 2020 performance.docx

Attachment 2: NZZO combined_report_tail 202006

Attachment 3: NZZO combined_report operator 202004_202006

Attachment 4: PBCS Manual paragraph 4.5.2 Local PBCS monitoring programme

PBCS Performance Analysis NZZO – June 2020

In June ADS-C data points were 18,859 and CPDLC 435. The current data points available for analysis remain low compared with pre-pandemic traffic levels. This month's analysis reviewed both the June, and the consolidated April/May/June data and evaluated performance where data points exceeded 100.

PBCS Performance Summary

Previous analysis update:

Boeing CRA advised 8th July reference PR ACNZ_2020_04 raised 16th March, that the Air Canada B788 SATCOM AMI (ORT) is correctly configured and they are continuing to investigate. This fleet did not operate in NZZO in June.

Air New Zealand B77W – PR ACNZ_2020_07 raised 8 June to investigate delays. The delays may be caused by de-activated MTSAT satellite remaining in ORT.

Air New Zealand B789 – PR ACNZ_2020_06 raised 8 June to investigate delays. The delays may be caused by de-activated MTSAT satellite remaining in ORT.

Tasman Cargo B763 – VHEXZ. Performance returned to normal in June. Aircraft was not correctly registered with CSP. June RSP180 performance as follows:

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
TMN	B763	VHEXZ	499	98.00%	99.40%

June 2020 Analysis

Air New Zealand B77W

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	B77W	ZKOKM	753	99.20%	99.60%
ANZ	B77W	ZKOKN	842	97.98%	98.46%
ANZ	B77W	ZKOKO	491	97.15%	98.37%
ANZ	B77W	ZKOKP	872	97.94%	98.74%
ANZ	B77W	ZKOKQ	410	99.02%	99.51%
ANZ	B77W	ZKOKR	151	97.35%	98.68%
ANZ	B77W	ZKOKS	261	100.00%	100.00%

Slight degradation below RSP180 99.0% at 180 seconds for some tails continued through June. Airline has advised that delays may be related to the de-activated MTSAT satellite remaining in the aircraft ORT. Airline is working this and CRA continues to investigate PR ACNZ_2020_07.

No significant operational impact. FANS PR under investigation by CRA.

Air New Zealand B789 – ZKNZG

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	B789	ZKNZE	149	98.66%	100.00%
ANZ	B789	ZKNZF	299	99.67%	100.00%
ANZ	B789	ZKNZG	151	98.68%	98.68%
ANZ	B789	ZKNZH	163	99.39%	100.00%
ANZ	B789	ZKNZJ	101	100.00%	100.00%
ANZ	B789	ZKNZK	117	100.00%	100.00%
ANZ	B789	ZKNZL	392	100.00%	100.00%
ANZ	B789	ZKNZM	382	100.00%	100.00%
ANZ	B789	ZKNZN	252	100.00%	100.00%
ANZ	B789	ZKNZQ	500	100.00%	100.00%
ANZ	B789	ZKNZR	356	100.00%	100.00%

Slight degradation below RSP180 99.0% at 180 seconds for NZG in June while NZE reported last month for same slight degradation is now OK. Airline advised that delays may be related to de-activated MTSAT satellite remaining in aircraft ORT. Airline is working this and CRA continues to investigate PR ACNZ_2020_06.

No significant operational impact. FANS PR under investigation by CRA.

Air New Zealand A20N – ZKNHD

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	A20N	ZKNHD	321	95.33%	98.75%

Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	OCS_time	Downlink_time
20200609	IGW1	P	-19.4163	-170.189	02:29:28	02:32:44	196
20200615	IGW1	P	-29.0388	167.9434	03:28:08	03:28:13	5
20200615	IGW1	W	-29.0262	167.9083	03:38:46	03:43:31	285
20200615	IGW1	P	-29.1084	167.7379	03:41:13	03:44:25	192
20200615	IGW1	P	-29.1462	167.617	03:42:29	03:46:31	242
20200615	IGW1	A	-29.4993	166.4683	03:52:30	03:52:56	26

Slight degradation below 99.0% at 180 seconds was caused by 3 delayed reports on 15th June departing YSNF towards NFFF at 29S167E. Initial delayed report was a waypoint change followed within 2 minutes by two periodic reports. Suspect that NFFF would have been establishing datalink which may explain delays. Aircraft was meeting RSP180 performance in previous analysis. This occurrence identical to that seen with ZKNHB on 25th April and reported in the April 2020 analysis.

No operational impact. No further action.

Cathay Pacific B77W – fleet performance

CPA B77W fleet performance shows below RSP180 requirements in the 3-month consolidated data from April-June. This fleet is operating on Iridium SATCOM via IG1 RGS.

Operator/ Aircraft Type	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
CPA/B77W	264	92.80%	97.73%

Fleet did not operate in May and the available data points for individual tails in April and June are not sufficient for an accurate assessment. While tails BKPV and BKQG show below RSP180 requirements, with only 22 data points this is not considered valid.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
CPA	B77W	BKPE	33	100.00%	100.00%
CPA	B77W	BKPO	40	95.00%	100.00%
CPA	B77W	BKPT	22	95.45%	100.00%
CPA	B77W	BKPV	22	77.27%	95.45%
CPA	B77W	BKPX	24	95.83%	100.00%
CPA	B77W	BKQG	22	72.73%	81.82%
CPA	B77W	BKQK	10	100.00%	100.00%

The actual data points for BKPV and BKQG are shown below.

BKPV June data points

Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	OCS_time	Downlink_time
20200607	IG1	P	-28.5718	160.5041	21:23:54	21:24:44	50
20200607	IG1	P	-30.1762	162.5807	21:38:50	21:39:19	29
20200607	IG1	W	-30.4898	163.0054	21:41:49	21:42:18	29
20200607	IG1	P	-31.5483	164.9314	21:53:47	21:54:01	14
20200607	IG1	W	-32.4759	166.7086	22:04:35	22:05:28	53
20200607	IG1	P	-32.8241	167.3978	22:08:43	22:08:56	13
20200607	IG1	P	-34.0499	169.9343	22:23:39	22:24:49	70
20200607	IG1	P	-34.111	170.0661	2:24:25	22:25:59	94
20200607	AKL	P	-34.3062	170.4886	2:26:52	22:27:04	12
20200607	AKL	W	-34.8517	171.6823	2:33:44	22:33:47	3
20200607	AKL	W	-35.0793	171.9801	2:35:53	22:35:55	2
20200607	IG1	P	-35.3701	172.3516	2:38:36	22:38:48	12
20200609	HLZ	P	-36.752	174.2107	1:49:53	01:50:01	8
20200609	AKL	P	-35.4328	172.4421	2:04:50	02:04:53	3
20200609	AKL	W	-34.8426	171.6803	2:11:17	02:11:28	11

20200609	IG1	P	-34.0492	170.7047	2:19:46	02:22:53	187
20200609	IG1	P	-32.6419	169.0405	2:34:42	02:34:52	10
20200609	IG1	P	-31.305	167.5293	2:49:38	02:49:56	18
20200609	IG1	P	-30.0007	166.114	3:04:35	03:06:15	100
20200609	IG1	P	-29.9683	166.0796	3:04:57	03:07:48	171
20200609	IG1	W	-29.1436	165.2127	3:14:16	03:14:32	16
20200609	IG1	P	-28.7025	164.7179	03:19:31	03:21:51	140

Only delay exceeding 180 seconds associated with a VDL-SATCOM transition on 9th June.

BKQG June data points

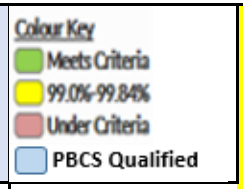
Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	OCS_time	Downlink_time
20200614	IG1	P	-30.6743	159.8566	21:28:34	21:28:55	21
20200614	IG1	P	-31.9031	162.3649	21:43:30	21:44:22	52
20200614	IG1	W	-32.204	163.0057	21:47:18	21:47:52	34
20200614	IG1	P	-33.0481	164.8655	21:58:26	21:58:43	17
20200614	IG1	P	-34.0825	167.2862	22:13:23	22:13:35	12
20200614	IG1	A	-34.9425	169.4394	22:26:45	22:26:57	12
20200614	IG1	P	-34.9836	169.5457	22:27:25	22:28:15	50
20200614	IG1	A	-35.0133	169.6236	22:27:54	22:30:08	134
20200614	IG1	P	-35.0388	169.6902	22:28:19	22:37:10	531
20200614	IG1	A	-35.2716	170.3025	22:32:10	22:38:56	406
20200614	IG1	PW	-35.315	170.418	22:32:54	22:40:48	474
20200616	HLZ	P	-36.7755	174.5137	01:56:17	01:56:20	3
20200616	HLZ	W	-36.6995	174.3142	01:57:55	01:57:58	3
20200616	AKL	W	-36.1807	173.7814	02:03:29	02:03:32	3
20200616	AKL	P	-35.5804	172.8256	02:11:13	02:11:16	3
20200616	AKL	W	-34.8418	171.6813	02:20:25	02:20:34	9
20200616	AKL	P	-34.3228	171.0381	02:26:09	02:26:15	6
20200616	IG1	P	-32.9648	169.4152	02:41:06	02:41:15	9
20200616	IG1	P	-31.6741	167.9401	02:56:02	02:56:14	12
20200616	IG1	P	-30.449	166.5943	03:10:58	03:11:17	19
20200616	IG1	P	-29.7074	165.8031	03:20:02	03:25:57	355
20200616	IG1	PW	-29.2204	165.2926	03:25:54	03:28:11	137

Four delays between 2227-2232 on 14 June, and two delays between 0320-0325 on 16 June.

Intention is to continue monitoring over next few months and also see if additional data points are available from Oakland and Nadi for this fleet.

Minimal operational impact. Continue monitoring and access Fiji and Oakland data for further analysis.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
AAL	B77W	N721AN	118	100.00%	100.00%	2	100.00%	100.00%
AAL	B77W	N723AN	37	100.00%	100.00%	1	100.00%	100.00%
AAL	B77W	N725AN	106	98.11%	99.06%	5	100.00%	100.00%
AAL	B77W	N728AN	105	99.05%	100.00%	3	100.00%	100.00%
AAL	B77W	N734AR	54	96.30%	100.00%	1	100.00%	100.00%
ACA	B77W	CFIVX	230	100.00%	100.00%	8	100.00%	100.00%
ACA	B77W	CFNNU	192	100.00%	100.00%	7	100.00%	100.00%
ACA	B77W	CFNNW	12	100.00%	100.00%	1	100.00%	100.00%
AIC	B77L	VTALG	20	100.00%	100.00%	0	-	-
AIC	B77L	VTALH	107	99.07%	99.07%	0	-	-
ANZ	A20N	ZKNHA	424	98.82%	100.00%	4	100.00%	100.00%
ANZ	A20N	ZKNHB	47	100.00%	100.00%	0	-	-
ANZ	A20N	ZKNHC	300	97.00%	99.33%	6	100.00%	100.00%
ANZ	A20N	ZKNHD	321	95.33%	98.75%	4	100.00%	100.00%
ANZ	A21N	ZKNNE	53	100.00%	100.00%	1	100.00%	100.00%
ANZ	A21N	ZKNNF	112	100.00%	100.00%	2	100.00%	100.00%
ANZ	B77W	ZKOKM	753	99.20%	99.60%	33	100.00%	100.00%
ANZ	B77W	ZKOKN	842	97.98%	98.46%	36	100.00%	100.00%
ANZ	B77W	ZKOKO	491	97.15%	98.37%	22	100.00%	100.00%
ANZ	B77W	ZKOKP	872	97.94%	98.74%	39	100.00%	100.00%
ANZ	B77W	ZKOKQ	410	99.02%	99.51%	10	100.00%	100.00%
ANZ	B77W	ZKOKR	151	97.35%	98.68%	7	100.00%	100.00%
ANZ	B77W	ZKOKS	261	100.00%	100.00%	15	100.00%	100.00%
ANZ	B789	ZKNZC	316	99.68%	100.00%	3	100.00%	100.00%
ANZ	B789	ZKNZE	149	98.66%	100.00%	2	100.00%	100.00%
ANZ	B789	ZKNZF	299	99.67%	100.00%	4	100.00%	100.00%
ANZ	B789	ZKNZG	151	98.68%	98.68%	1	100.00%	100.00%
ANZ	B789	ZKNZH	163	99.39%	100.00%	1	100.00%	100.00%



Editorial Note: Only aircraft with>= 100 data points are assessed. These are indicated by the colour fill which indicates if the performance meets PBCS criteria.

ANZ	B789	ZKNZJ	101	100.00%	100.00%	2	100.00%	100.00%
ANZ	B789	ZKNZK	117	100.00%	100.00%	0	-	-
ANZ	B789	ZKNZL	392	100.00%	100.00%	12	100.00%	100.00%
ANZ	B789	ZKNZM	382	100.00%	100.00%	7	100.00%	100.00%
ANZ	B789	ZKNZN	252	100.00%	100.00%	4	100.00%	100.00%
ANZ	B789	ZKNZQ	500	100.00%	100.00%	9	100.00%	100.00%
ANZ	B789	ZKNZR	356	100.00%	100.00%	8	100.00%	100.00%
ARG	A332	LVFVH	749	99.73%	99.87%	11	100.00%	100.00%
ARG	A332	LVFVI	714	100.00%	100.00%	12	100.00%	100.00%
ARG	A332	LVGHQ	76	100.00%	100.00%	3	100.00%	100.00%
CAL	A359	B18901	24	100.00%	100.00%	0	-	-
CAL	A359	B18903	52	100.00%	100.00%	1	100.00%	100.00%
CAL	A359	B18906	16	100.00%	100.00%	0	-	-
CAL	A359	B18907	30	100.00%	100.00%	0	-	-
CAL	A359	B18908	48	100.00%	100.00%	1	100.00%	100.00%
CAL	A359	B18909	60	100.00%	100.00%	0	-	-
CAL	A359	B18912	35	100.00%	100.00%	0	-	-
CAL	A359	B18915	16	100.00%	100.00%	1	100.00%	100.00%
CAL	A359	B18916	42	100.00%	100.00%	0	-	-
CAL	A359	B18918	27	100.00%	100.00%	0	-	-
CES	B789	B1111	42	100.00%	100.00%	0	-	-
CES	B789	B1113	22	100.00%	100.00%	0	-	-
CKS	B77L	N772CK	293	99.32%	99.32%	8	100.00%	100.00%
CKS	B77L	N773CK	147	100.00%	100.00%	2	100.00%	100.00%
CKS	B77L	N774CK	319	99.06%	99.69%	7	100.00%	100.00%
CPA	B748	BLJN	17	100.00%	100.00%	0	-	-
CPA	B77W	BKPE	33	100.00%	100.00%	0	-	-
CPA	B77W	BKPO	40	95.00%	100.00%	0	-	-
CPA	B77W	BKPT	22	95.45%	100.00%	0	-	-
CPA	B77W	BKPV	22	77.27%	95.45%	0	-	-
CPA	B77W	BKPX	24	95.83%	100.00%	2	100.00%	100.00%
CPA	B77W	BKQG	22	72.73%	81.82%	2	100.00%	100.00%
CPA	B77W	BKQK	10	100.00%	100.00%	0	-	-

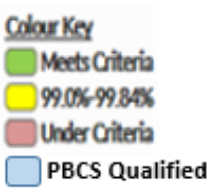
CSN	B789	B1128	44	100.00%	100.00%	1	100.00%	100.00%
CSN	B789	B1293	39	100.00%	100.00%	0	-	-
CSN	B789	B1297	19	100.00%	100.00%	0	-	-
CSN	B789	B209X	86	100.00%	100.00%	3	100.00%	100.00%
CSN	B789	B20AA	19	100.00%	100.00%	0	-	-
CSN	B789	B20C6	85	100.00%	100.00%	0	-	-
CSN	B789	B20CD	34	100.00%	100.00%	0	-	-
CSN	B789	B20CJ	65	100.00%	100.00%	0	-	-
CTM	A342	FRAJA	24	100.00%	100.00%	1	100.00%	100.00%
DAL	B77L	N709DN	8	100.00%	100.00%	1	100.00%	100.00%
DOD	B737	166693	29	100.00%	100.00%	0	-	-
FDX	B77L	N858FD	50	100.00%	100.00%	3	100.00%	100.00%
FDX	B77L	N862FD	50	100.00%	100.00%	2	100.00%	100.00%
FDX	B77L	N863FD	42	97.62%	97.62%	0	-	-
FDX	B77L	N880FD	41	100.00%	100.00%	0	-	-
FDX	B77L	N882FD	12	100.00%	100.00%	0	-	-
FDX	B77L	N998PB	10	100.00%	100.00%	0	-	-
FJI	A332	DQFJV	23	95.65%	100.00%	0	-	-
FJI	A359	DQFAI	592	100.00%	100.00%	4	100.00%	100.00%
FJI	A359	DQFAJ	11	100.00%	100.00%	0	-	-
GTI	B744	N418MC	55	98.18%	98.18%	0	-	-
GTI	B748	N854GT	115	98.26%	100.00%	4	100.00%	100.00%
GTI	B748	N856GT	58	100.00%	100.00%	0	-	-
HVN	B78X	VNA879	14	100.00%	100.00%	0	-	-
KAL	B789	HL7208	19	100.00%	100.00%	0	-	-
KFS	CL60	N242CK	47	91.49%	100.00%	2	100.00%	100.00%
KIW	B752	NZ7571	199	100.00%	100.00%	3	100.00%	100.00%
KIW	C130	NZ7001	50	96.00%	98.00%	0	-	-
KIW	C130	NZ7003	26	100.00%	100.00%	1	100.00%	100.00%
KIW	C130	NZ7005	29	96.55%	100.00%	1	100.00%	100.00%
LAN	B789	CCBGB	79	96.20%	98.73%	3	100.00%	100.00%
LAN	B789	CCBGC	147	99.32%	99.32%	4	100.00%	100.00%
LAN	B789	CCBGD	85	100.00%	100.00%	4	100.00%	100.00%

LAN	B789	CCBGG	36	100.00%	100.00%	1	100.00%	100.00%
LAN	B789	CCBGJ	161	99.38%	99.38%	2	100.00%	100.00%
LAN	B789	CCBGK	67	100.00%	100.00%	2	100.00%	100.00%
LAN	B789	CCBGM	229	99.56%	100.00%	6	100.00%	100.00%
LAN	B789	CCBGN	92	100.00%	100.00%	2	100.00%	100.00%
LAN	B789	CCBGP	91	100.00%	100.00%	2	100.00%	100.00%
PVT	GLEX	N148QS	96	98.96%	100.00%	2	100.00%	100.00%
QFA	A333	VHQPA	34	97.06%	100.00%	0	-	-
QFA	A333	VHQPB	59	96.61%	100.00%	0	-	-
QFA	A333	VHQPC	17	100.00%	100.00%	0	-	-
QFA	A333	VHQPD	21	100.00%	100.00%	0	-	-
QFA	A333	VHQPE	19	94.74%	94.74%	0	-	-
QFA	A333	VHQPF	10	100.00%	100.00%	0	-	-
QFA	A333	VHQPG	21	100.00%	100.00%	0	-	-
QFA	A333	VHQPH	21	100.00%	100.00%	0	-	-
QFA	A333	VHQPI	19	100.00%	100.00%	0	-	-
QFA	A333	VHQPJ	37	100.00%	100.00%	0	-	-
QFA	B744	VHOEE	43	100.00%	100.00%	1	100.00%	100.00%
QFA	B744	VHOEI	39	100.00%	100.00%	2	100.00%	100.00%
QFA	B763	VHEFR	296	100.00%	100.00%	1	100.00%	100.00%
QFA	B789	VHZNH	21	100.00%	100.00%	1	100.00%	100.00%
SIA	A359	9VSHO	20	100.00%	100.00%	0	-	-
SIA	A359	9VSMA	17	100.00%	100.00%	0	-	-
SIA	A359	9VSMC	21	100.00%	100.00%	0	-	-
SIA	A359	9VSMD	39	100.00%	100.00%	1	100.00%	100.00%
SIA	A359	9VSMF	64	100.00%	100.00%	2	100.00%	100.00%
SIA	A359	9VSMG	18	100.00%	100.00%	0	-	-
SIA	A359	9VSMI	22	100.00%	100.00%	0	-	-
SIA	A359	9VSMJ	33	100.00%	100.00%	0	-	-
SIA	A359	9VSMK	42	100.00%	100.00%	1	100.00%	100.00%
SIA	A359	9VSML	38	100.00%	100.00%	0	-	-
SIA	A359	9VSMP	18	100.00%	100.00%	0	-	-
SIA	A359	9VSMR	38	100.00%	100.00%	1	100.00%	100.00%

SIA	A359	9VSMS	50	100.00%	100.00%	1	100.00%	100.00%
SIA	A359	9VSMT	17	100.00%	100.00%	0	-	-
SIA	A359	9VSMU	38	100.00%	100.00%	0	-	-
SIA	B77W	9VSWW	16	100.00%	100.00%	0	-	-
SQC	B744	9VSFI	59	100.00%	100.00%	0	-	-
SQC	B744	9VSFK	58	100.00%	100.00%	0	-	-
SQC	B744	9VSFM	16	100.00%	100.00%	0	-	-
SQC	B744	9VSFO	42	100.00%	100.00%	0	-	-
SQC	B744	9VSFP	19	100.00%	100.00%	0	-	-
SQC	B744	9VSFQ	57	100.00%	100.00%	1	100.00%	100.00%
THA	B77W	HSTKQ	22	95.45%	100.00%	0	-	-
THT	B789	FOTOA	68	100.00%	100.00%	1	100.00%	100.00%
TMN	B763	VHEXZ	499	98.00%	99.40%	4	100.00%	100.00%
UAE	B77W	A6ECG	15	100.00%	100.00%	0	-	-
UAE	B77W	A6ECH	22	100.00%	100.00%	0	-	-
UAE	B77W	A6ECI	27	96.30%	100.00%	0	-	-
UAE	B77W	A6ECK	27	100.00%	100.00%	0	-	-
UAE	B77W	A6ECN	28	100.00%	100.00%	0	-	-
UAE	B77W	A6ECR	42	100.00%	100.00%	0	-	-
UAE	B77W	A6ECV	9	88.89%	100.00%	0	-	-
UAE	B77W	A6ECX	24	100.00%	100.00%	0	-	-
UAE	B77W	A6EGA	18	88.89%	100.00%	0	-	-
UAE	B77W	A6EGC	42	100.00%	100.00%	0	-	-
UAE	B77W	A6EGF	14	100.00%	100.00%	0	-	-
UAE	B77W	A6EGH	16	100.00%	100.00%	0	-	-
UAE	B77W	A6EPV	18	100.00%	100.00%	0	-	-
UAE	B77W	A6EPW	19	100.00%	100.00%	0	-	-
UAE	B77W	A6EQB	40	100.00%	100.00%	1	100.00%	100.00%
UAE	B77W	A6EQC	24	100.00%	100.00%	0	-	-
UAE	B77W	A6EQG	18	100.00%	100.00%	1	100.00%	100.00%
UAE	B77W	A6EQH	20	100.00%	100.00%	0	-	-
UAE	B77W	A6EQO	16	100.00%	100.00%	0	-	-
UAL	B77W	N2138U	52	100.00%	100.00%	1	100.00%	100.00%

UAL	B77W	N2140U	75	98.67%	100.00%	5	80.00%	80.00%
UAL	B77W	N2142U	23	100.00%	100.00%	0	-	-
UAL	B77W	N2639U	31	100.00%	100.00%	1	100.00%	100.00%
UAL	B789	N19951	29	100.00%	100.00%	1	100.00%	100.00%
UAL	B789	N24973	110	100.00%	100.00%	5	100.00%	100.00%
UAL	B789	N24974	72	100.00%	100.00%	1	100.00%	100.00%
UAL	B789	N26952	69	100.00%	100.00%	3	100.00%	100.00%
UAL	B789	N26960	74	100.00%	100.00%	5	100.00%	100.00%
UAL	B789	N26967	101	100.00%	100.00%	5	100.00%	100.00%
UAL	B789	N26970	40	100.00%	100.00%	2	100.00%	100.00%
UAL	B789	N27957	33	100.00%	100.00%	2	100.00%	100.00%
UAL	B789	N27959	95	100.00%	100.00%	2	100.00%	100.00%
UAL	B789	N29961	52	98.08%	100.00%	3	100.00%	100.00%
UAL	B789	N35953	31	100.00%	100.00%	2	100.00%	100.00%
UAL	B789	N36962	103	100.00%	100.00%	2	100.00%	100.00%
UAL	B789	N38955	40	100.00%	100.00%	2	100.00%	100.00%
ULC	GLEX	9HJEH	18	100.00%	100.00%	0	-	-
VJT	GLEX	9HVJL	23	100.00%	100.00%	0	-	-
VJT	GLEX	9HVJX	26	100.00%	100.00%	0	-	-
VOZ	B77W	VHVOZ	191	100.00%	100.00%	9	100.00%	100.00%
VOZ	B77W	VHVPD	30	100.00%	100.00%	1	100.00%	100.00%
VOZ	B77W	VHVPH	32	100.00%	100.00%	0	-	-

Operator/ Aircraft Type	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
AAL/B77W	581	99.14%	99.83%	15	100.00%	100.00%
ACA/B77L	19	100.00%	100.00%	0	-	-
ACA/B77W	829	100.00%	100.00%	33	100.00%	100.00%
ACA/B789	156	100.00%	100.00%	3	100.00%	100.00%
ACI/A339	189	100.00%	100.00%	0	-	-
AIC/B77L	127	99.21%	99.21%	0	-	-
ANZ/A20N	2923	97.02%	99.32%	51	100.00%	100.00%
ANZ/A21N	453	99.56%	99.78%	8	100.00%	100.00%
ANZ/B772	248	99.60%	100.00%	15	100.00%	100.00%
ANZ/B77W	10067	98.73%	99.25%	428	100.00%	100.00%
ANZ/B789	11100	99.67%	99.86%	200	100.00%	100.00%
ARG/A332	3217	99.72%	99.81%	70	100.00%	100.00%
AUA/B772	14	100.00%	100.00%	0	-	-
CAL/A359	660	100.00%	100.00%	3	100.00%	100.00%
CCA/B789	112	99.11%	99.11%	2	100.00%	100.00%
CES/B77W	16	100.00%	100.00%	0	-	-
CES/B789	359	99.66%	100.00%	8	100.00%	100.00%
CFG/B763	17	100.00%	100.00%	0	-	-
CKS/B774	13	100.00%	100.00%	0	-	-
CKS/B77L	2609	99.62%	99.77%	53	100.00%	100.00%
CPA/A359	21	95.24%	100.00%	0	-	-
CPA/A35K	307	100.00%	100.00%	4	100.00%	100.00%
CPA/B748	17	100.00%	100.00%	0	-	-
CPA/B77W	264	92.80%	97.73%	6	83.33%	100.00%
CSN/B77W	46	100.00%	100.00%	0	-	-
CSN/B789	1039	100.00%	100.00%	18	100.00%	100.00%
CTM/A332	20	100.00%	100.00%	0	-	-
CTM/A342	24	100.00%	100.00%	1	100.00%	100.00%
DAL/B763	27	100.00%	100.00%	0	-	-



Editorial Note: Only aircraft with>= 100 data points are assessed. These are indicated by the colour fill which indicates if the performance meets PBCS criteria.

DAL/B77L	54	100.00%	100.00%	3	100.00%	100.00%
DLH/A388	143	100.00%	100.00%	0	-	-
DLH/B744	105	100.00%	100.00%	0	-	-
DOD/B737	56	100.00%	100.00%	1	100.00%	100.00%
ETD/B789	15	100.00%	100.00%	0	-	-
FDX/B748	49	100.00%	100.00%	1	100.00%	100.00%
FDX/B77L	587	99.83%	99.83%	13	92.31%	92.31%
FJI/A332	137	98.54%	100.00%	0	-	-
FJI/A359	1580	99.87%	100.00%	19	100.00%	100.00%
GTI/B744	113	98.23%	98.23%	4	100.00%	100.00%
GTI/B748	573	99.65%	100.00%	11	100.00%	100.00%
HFM/A343	47	100.00%	100.00%	3	100.00%	100.00%
HVN/B78X	20	90.00%	90.00%	1	100.00%	100.00%
KAL/B789	141	100.00%	100.00%	2	100.00%	100.00%
KFS/CL60	47	91.49%	100.00%	2	100.00%	100.00%
KIW/B752	256	99.61%	100.00%	3	100.00%	100.00%
KIW/C130	258	97.67%	99.61%	4	100.00%	100.00%
LAN/B789	3851	99.69%	99.87%	99	100.00%	100.00%
MAS/A332	191	99.48%	99.48%	3	100.00%	100.00%
OAE/B762	25	100.00%	100.00%	0	-	-
PAL/A359	27	100.00%	100.00%	2	100.00%	100.00%
PVT/ASTR	74	93.24%	100.00%	3	66.67%	100.00%
PVT/CL60	65	96.92%	98.46%	1	100.00%	100.00%
PVT/F900	2	0.00%	100.00%	0	-	-
PVT/GLEX	205	99.51%	100.00%	5	100.00%	100.00%
PVT/GLF5	22	95.45%	95.45%	0	-	-
PVT/GLF6	10	100.00%	100.00%	0	-	-
QFA/A333	494	98.58%	99.39%	1	100.00%	100.00%
QFA/B744	94	100.00%	100.00%	3	100.00%	100.00%
QFA/B763	884	99.55%	99.89%	1	100.00%	100.00%
QFA/B789	469	100.00%	100.00%	15	100.00%	100.00%
QQE/GLF6	18	100.00%	100.00%	0	-	-
QTR/B77L	488	98.77%	100.00%	5	100.00%	100.00%
QTR/B77W	53	98.11%	100.00%	0	-	-

SIA/A359	652	99.85%	100.00%	7	100.00%	100.00%
SIA/B77W	58	98.28%	98.28%	1	100.00%	100.00%
SQC/B744	931	100.00%	100.00%	11	100.00%	100.00%
SWR/B77W	22	100.00%	100.00%	1	100.00%	100.00%
THA/B77W	40	97.50%	100.00%	0	-	-
THT/B789	218	100.00%	100.00%	4	100.00%	100.00%
TMN/B763	1365	88.57%	92.31%	10	90.00%	90.00%
UAE/B77W	792	99.37%	100.00%	3	100.00%	100.00%
UAL/B77W	204	99.51%	100.00%	7	85.71%	85.71%
UAL/B789	2336	99.96%	100.00%	94	100.00%	100.00%
UAL/B78X	74	100.00%	100.00%	3	100.00%	100.00%
ULC/GLEX	18	100.00%	100.00%	0	-	-
VJT/GLEX	140	99.29%	100.00%	1	100.00%	100.00%
VOZ/B77W	363	99.45%	100.00%	13	100.00%	100.00%

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4.5.2 Local PBCS monitoring programme

4.5.2.1 After an ATM operation predicated on the RCP/RSP specification becomes operational, the ANSP should ensure that the communication and surveillance systems continue to operate successfully as a whole, to ensure efficient and safe operations.

4.5.2.2 The ANSP should establish means to collect and maintain operational performance data in the standardized data formats defined in Appendix D for CPDLC and ADS-C and Appendix E for SATVOICE.

Note.— While the ANSP develops the data collection mechanisms, monitoring tools, and internal reporting requirements that best suit their particular environment, the data formats provide a consistent means to aggregate performance monitoring data on a regional and global basis. This aggregation of performance data is in accordance with the guidelines provided in the Manual on Global Performance of the Air Navigation System *(Doc 9883).*

4.5.2.3 To determine continued operational compliance, the ANSP should monitor communication and surveillance capabilities in the applicable airspace to detect and correct performance degradations due to potential instabilities or variations in overall system performance, or changes to any of the various subsystems.

4.5.2.4 The ANSP should also be the entity to perform local analysis, as it possesses the necessary operational expertise, local area knowledge and control, when identifying problems and taking corrective action.

4.5.2.5 The ANSP should determine the extent to which these capabilities are monitored (i.e. what to monitor and the interval for producing the monitoring results). As a minimum, the ANSP should monitor ACP for relevant communication transactions and ASP for surveillance data delivery collectively for the airspace concerned, as well as on the basis of other factors affecting the stability of communication or surveillance performance, such as:

a) various infrastructure and technological dependencies (e.g. subnetwork types, subnetwork routing policies, frequencies); and

b) different aircraft operators, different aircraft types/systems or individual aircraft.

4.5.2.6 The ANSP should perform an analysis of ACP and ASP at an interval suitable to verify system performance, and enable continuous performance improvement by detecting where specific infrastructure, aircraft operator fleet, aircraft type, or individual aircraft is not meeting the RCP/RSP specification.

Note.— Typically, an ANSP will conduct its analysis on data taken at monthly intervals. However, the specific interval will depend on local factors, such as volume of data accumulated and confidence level in the stability of performance over time.

4.5.2.7 The ANSP should also perform an analysis of service availability at an interval suitable to verify the acceptable number and duration of unplanned service outages affecting a significant portion of flights in the applicable airspace.

4.5.2.8 The ANSP should report to the regional PBCS monitoring programme any problems that may have a regional or global impact, or affect aircraft operators in its airspace, including any non-compliance with an RCP/RSP specification.