

Agenda Item #3

PBCS post- implementation monitoring



FIT Asia 10
Virtual meeting
03 -05 August 2020



Summary

- This paper describes 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.

Introduction

- 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 (please refer to Attachment 4 of the IP).
- To satisfy this guidance Airways monitors PBCS RCP240/RSP180 performance on a monthly basis.
- A monthly PBCS performance report is then submitted to the responsible authority (New Zealand Civil Aviation Authority) and any PBCS performance degradations are raised as problem reports to the ISPACG CRA through the CRA website.

Discussion

- 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.

Discussion

	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

Discussion

- Excel reports of observed ASP and ACP are created from the raw combined report .csv data as illustrated below.

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	
AAL	B77W	N723AN	99	100.00%	100.00%	2	100.00%	100.00%	Meets Criteria	
AAL	B77W	N725AN	106	98.11%	99.06%	5	100.00%	100.00%	99.0%-99.84%	
ACA	B77W	CFIVR	105	100.00%	100.00%	3	100.00%	100.00%	Under Criteria	
ACA	B789	CFVLU	23	100.00%	100.00%	0	-	-	PBCS Qualified	
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%		

- 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.

Discussion

- 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

Discussion

- 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.*

- The performance degradations assessed each month are consolidated into a report for the CAA. The NZZO June report is attached to the IP as Attachment 1.

Discussion

- 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 below 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

- 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.
- 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.

Thank you

