

Agenda Item 3- PBCS Implementation

Communicating Observed PBCS performance

ISPACG FIT 24 – PBCS Workshop
Honolulu, Hawaii
6-7 March 2017



Communicating PBCS performance – current status in NZZO

- Historically Airways has monitored by operating company and aircraft type on a monthly basis.
- In NZZO this analysis was driven by the number of data points available and resource availability balanced against the need to promptly detect issues.
- When performance issues are observed a more detailed analysis is carried out by individual tail number.
- Performance issues observed are co-ordinated with the affected airline and/or a FANS 1/A problem report is raised.

Communicating PBCS performance – in a PBCS environment

- Considerable discussion has already taken place in the NAT, and the FAA is providing co-ordination with the PAC and the OPDLWG PBCS team on this work. Current items under discussion include:
 - That PBCS performance data is published for stakeholders at 6 monthly intervals.
 - Need for a summary of “non-performing” aircraft in the reported data.
 - An option for publishing the data is to use the existing CRA website.
 - For PBCS certification – information on individual tail numbers may be required by some regulators.

Communicating PBCS performance – in a PBCS environment

- In this presentation we will:
 - Review current analysis in NZZO.
 - Review 6 monthly publication of performance data.
 - Review type of data published.
 - Review need for on-going monthly evaluation by ATSP.
 - Discuss publication of data on CRA website
 - Discuss and provide feedback to OPDLWG and NAT on current proposals.

PBCS Implementation – NZZO current analysis RSP180

ADS-C Performance										
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark		
Meets Criteria 99.0%-99.84% Under Criteria		Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
NZZO RSP180 (Greater than 100 data points)										
All	All	B77W	AAL	All	NZZO	7681	99.53	99.76		
All	All	B788	AAL	All	NZZO	10038	99.64	99.77		
All	All	B77L	ACA	All	NZZO	103	98.05	100		
All	All	A320	ACI	All	NZZO	1658	93.72	97.58		
All	All	A332	ACI	All	NZZO	1632	99.57	99.87		
All	All	B772	ANZ	All	NZZO	36326	99.62	99.85		
All	All	B77W	ANZ	All	NZZO	37813	99.51	99.76		
All	All	B789	ANZ	All	NZZO	29957	98.75	99.62		
All	All	A332	CAL	All	NZZO	3016	99.33	99.43		
All	All	A333	CAL	All	NZZO	2660	99.24	99.43		
All	All	A332	CCA	All	NZZO	1784	99.38	99.83		
All	All	B789	CCA	All	NZZO	1334	99.62	99.7		
All	All	A332	CES	All	NZZO	3840	99.47	99.73		
All	All	A359	CPA	All	NZZO	1168	99.65	100		
All	All	B77W	CPA	All	NZZO	516	97.48	99.41		
All	All	A332	CRK	All	NZZO	1394	99.13	99.71		

- RSP180 tabular analysis by operating company fleet.
- This is a six month period as proposed for PBCS reporting.
- NZZO carries out this analysis on a monthly basis
- Identified performance issues such as with the ACI A320 can be investigated further.
- Experience indicates that you need around 100 data points as a minimum set for evaluation – gut feel not based on statistics.
- In NZZO we get enough data points on a monthly basis on most airline fleets operating in NZZO.

PBCS Implementation – NZZO current analysis RSP180

ADS-C Performance										
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark		
<p>Meets Criteria</p> <p>99.0%-99.84%</p> <p>Under Criteria</p>		Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
NZZO RSP180 (Greater than 100 data points)										
SATCOM Iridium	All	A320	ACI	FOZNC	NZZO	954	89.83	96.12		
VHF All	All	A320	ACI	FOZNC	NZZO	704	99	99.57		
All	All	A320	ACI	FOZNC	NZZO	1658	93.72	97.58		

- ACI operate a single A320 aircraft using iridium satcom.
- The iridium fit on this aircraft is not meeting RSP180 at either the 95% or 99.9% level and does not qualify for RSP180.
- Raise CRA problem reports on aircraft not meeting performance standards.

PBCS Implementation – NZZO current analysis RCP240

CPDLC Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RCP240 Benchmark	99.9% RCP240 Benchmark
Meets Criteria		Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count
99.0%-99.84%				RCP <= 180 sec			RCP <= 210 sec	
Under Criteria		NZZO ACP (Greater than 100 data points)						
All	All	B77W	AAL	All	NZZO	316	100	100
All	All	B788	AAL	All	NZZO	376	100	100
All	All	B772	ANZ	All	NZZO	1825	99.83	99.89
All	All	B77W	ANZ	All	NZZO	1810	99.61	99.72
All	All	B789	ANZ	All	NZZO	872	99.42	99.54
All	All	B77L	DAL	All	NZZO	145	100	100
All	All	A332	HAL	All	NZZO	239	100	100
All	All	B763	HAL	All	NZZO	138	100	100
All	All	B789	LAN	All	NZZO	594	99.32	99.66
All	All	A388	QFA	All	NZZO	582	99.48	99.48
All	All	B744	QFA	All	NZZO	538	99.25	99.44
All	All	A343	THT	All	NZZO	191	100	100
All	All	A388	UAE	All	NZZO	136	100	100
All	All	B772	UAL	All	NZZO	223	100	100
All	All	B788	UAL	All	NZZO	120	98.33	98.33
All	All	B789	UAL	All	NZZO	843	99.05	99.4
All	All	B77W	VAU	All	NZZO	210	100	100

- RCP240 ACP tabular analysis by operating company fleet.
- This is a six month period as proposed for PBCS reporting.
- NZZO carries out this analysis on a monthly basis
- Identified performance issues such as with the UAL B788 can be investigated further.
- This analysis is based on the “pure” intervention message analysis per PBCS manual.
- In NZZO we struggle to get enough data points on a monthly basis on most airline fleets operating in NZZO.
- Normally use a restricted set that adds communication transfer messages.

PBCS Implementation – NZZO current analysis RCP240

CPDLC Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RCP240 Benchmark	99.9% RCP240 Benchmark
Meets Criteria		Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count
99.0%-99.84%								
Under Criteria								
UAL B788 Full Message Set								
All	All	B788	UAL	N20904	NZZO	12	100	100
All	All	B788	UAL	N26902	NZZO	23	100	100
All	All	B788	UAL	N26909	NZZO	2	100	100
All	All	B788	UAL	N26910	NZZO	11	100	100
All	All	B788	UAL	N27901	NZZO	10	100	100
All	All	B788	UAL	N27903	NZZO	7	100	100
All	All	B788	UAL	N27908	NZZO	17	88.23	88.23
All	All	B788	UAL	N28912	NZZO	15	100	100
All	All	B788	UAL	N30913	NZZO	13	100	100
All	All	B788	UAL	N45905	NZZO	10	100	100
UAL B788 Restricted Message Set								
All	All	B788	UAL	N20904	NZZO	23	100	100
All	All	B788	UAL	N26902	NZZO	42	100	100
All	All	B788	UAL	N26909	NZZO	6	100	100
All	All	B788	UAL	N26910	NZZO	22	100	100
All	All	B788	UAL	N27901	NZZO	25	100	100
All	All	B788	UAL	N27903	NZZO	16	100	100
All	All	B788	UAL	N27908	NZZO	35	94.28	94.28
All	All	B788	UAL	N28912	NZZO	33	100	100
All	All	B788	UAL	N30913	NZZO	24	100	100
All	All	B788	UAL	N45905	NZZO	20	100	100

- This is a 6 month analysis of the UAL B788 fleet that was indicating below the RCP240 99.9% benchmark in the previous slide.
- This analysis by tail number indicates the difficulty smaller ATSP have with low message counts.
- In this analysis one poor performer has dragged down the whole fleet.
- However, the small number of data points casts doubt on the accuracy of this evaluation:
 - Full “pure” set = 17 data points
 - Increased “restricted” set = 35 data points.
 - Neither really give enough data.
- Regional aggregation may be required to obtain enough information.

PBCS Implementation – NZZO current analysis RCP240

CPDLC Performance										
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RCP240 Benchmark	99.9% RCP240 Benchmark		
Meets Criteria 99.0%-99.84% Under Criteria		Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RCP <= 180 sec	RCP <= 210 sec
UAL B788 Restricted Message Set - NZZO + KZAK										
All	All	B788	UAL	N26909	All	107	99.06	99.06		
All	All	B788	UAL	N26910	All	121	98.34	98.34		
All	All	B788	UAL	N27908	All	151	97.35	98.01		
All	All	B788	UAL	N28912	All	216	99.53	100		
All	All	B788	UAL	N27901	All	185	99.45	100		

UAL B788 Full Message Set - NZZO + KZAK										
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RCP <= 180 sec	RCP <= 210 sec		
All	All	B788	UAL	N26909	All	64	98.43	98.43		
All	All	B788	UAL	N26910	All	69	100	100		
All	All	B788	UAL	N27908	All	88	95.45	96.59		
All	All	B788	UAL	N28912	All	130	99.23	100		
All	All	B788	UAL	N27901	All	99	98.98	100		

- This illustrates aggregated message counts from KZAK and NZZO.
- Tail numbers displayed here were those that differed using the aggregate data from the previous slide.
- We think aggregation has value but may be limited by privacy concerns from some ATSP.
- Regional aggregation is mentioned in the ICAO material and should be investigated further.
- The capability for regional aggregation already exists as indicated here.

PBCS Implementation – ANZ Case Study – 6 monthly report

ADS-C Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria								
99.0%-99.84%								
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
NZZO ANZ RSP180								
All	All	B789	ANZ	All	NZZO	29957	98.75	99.62
All	All	B77W	ANZ	All	NZZO	37813	99.51	99.76
All	All	B772	ANZ	All	NZZO	36326	99.62	99.85

By operating company and aircraft type for the 6 month period all looks good.

ADS-C Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria								
99.0%-99.84%								
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
NZZO ANZ B789 RSP180								
All	All	B789	ANZ	ZKNZC	NZZO	3823	99.21	99.79
All	All	B789	ANZ	ZKNZD	NZZO	4145	97.41	98.91
All	All	B789	ANZ	ZKNZE	NZZO	3804	99.13	99.78
All	All	B789	ANZ	ZKNZF	NZZO	3934	98.88	99.66
All	All	B789	ANZ	ZKNZG	NZZO	3351	98.89	99.7
All	All	B789	ANZ	ZKNZH	NZZO	3721	99.11	99.89
All	All	B789	ANZ	ZKNZI	NZZO	3149	98.63	99.74
All	All	B789	ANZ	ZKNZJ	NZZO	2386	98.82	99.66
All	All	B789	ANZ	ZKNZK	NZZO	1644	98.84	99.51

By operating company, aircraft type, and tail number. Report indicates an issue with one tail.

PBCS Implementation – ANZ Case Study – 6 monthly report

ADS-C Performance								
Colour Key		Period 1 Apr 2016 - 30 Jun 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria	99.0%-99.84%							
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by								
SATCOM I4	AME1	B789	ANZ	ZKNZD	NZZO	79	100	100
SATCOM MTSAT	MTS1	B789	ANZ	ZKNZD	NZZO	1011	99.2	99.9

← Evaluation Apr-Jun = All OK

ADS-C Performance								
Colour Key		Period 1 Jul 2016 - 30 Sep 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria	99.0%-99.84%							
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by								
SATCOM I4	AME1	B789	ANZ	ZKNZD	NZZO	117	97.43	99.14
SATCOM I4	APK1	B789	ANZ	ZKNZD	NZZO	6	100	100
SATCOM MTSAT	MTS1	B789	ANZ	ZKNZD	NZZO	1235	98.54	99.67

Jul - Sep = All OK →

ADS-C Performance								
Colour Key		Period 1 Oct 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria	99.0%-99.84%							
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by								
SATCOM I4	AME1	B789	ANZ	ZKNZD	NZZO	293	93.51	96.58
SATCOM MTSAT	MTS1	B789	ANZ	ZKNZD	NZZO	1177	94.39	97.53

← Oct - Dec = Not OK

PBCS Implementation – ANZ Case Study – 6 monthly report

ADS-C Performance								
Colour Key		Period 21 Nov 2016 - 12 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria								
99.0%-99.84%								
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
NZZO Air New Zealand B789 RSP180 by tail								
All	All	B789	ANZ	ZKNZD	NZZO	686	90.67	94.89

Email to ANZ:

“I see poor datalink performance on this aircraft from middle of November through mid-December. Could you check the logs and see if there was any datalink equipment maintenance around mid-December?”

Email from ANZ:

“I went through the Technical Log records and found a number of reports of DATALINK LOST from mid to late November. Investigation showed high resistance in the High Gain Antenna cable and ultimately the Coax Cable and High Gain Antenna were replaced on 11th December. There has been no further problem reports since then.”

PBCS Implementation – ANZ Case Study – 6 monthly report

- Case study illustrates that ATSP should try and maintain monthly analysis as recommended by PBCS Manual guidance.
- Also illustrates benefit of close co-ordination between the operator and the airline.
- Also need for close co-ordination within the airline between technical and operational staff.



PBCS Implementation – CRA website

- PBCS performance data needs to be published to enable both regulators and operators access to the reported performance of their aircraft.
- One avenue available for publishing this data is to make use of the existing CRA website.
- All stakeholders have access to this website controlled by giving username/password access to approved stakeholders,
- The existing website has the capability of uploading performance data and this is being enhanced to allow ATSP to upload their performance data into regional repositories.
- This work is underway now and should be completed by the end of March 2017.
- We support the use of the CRA website as a means to communicate PBCS performance data to required stakeholders.

PBCS Implementation – International General Aviation

ADS-C Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria								
99.0%-99.84%								
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
GLF6 by tail number								
All	All	GLF6	All	BKEY	NZZO	30	96.66	100
All	All	GLF6	All	N1AL	NZZO	59	100	100
All	All	GLF6	All	N305CC	NZZO	39	100	100
All	All	GLF6	All	N650AB	NZZO	156	98.71	99.35
All	All	GLF6	All	N650EW	NZZO	17	100	100
All	All	GLF6	All	N650PA	NZZO	19	100	100
All	All	GLF6	All	N720LF	NZZO	9	100	100
All	All	GLF6	All	N912GG	NZZO	8	100	100
All	All	GLF6	All	N946JB	NZZO	428	98.13	98.36
All	All	GLF6	All	N998PB	NZZO	103	99.02	100
All	All	GLF6	All	OELZM	NZZO	13	92.3	100
All	All	GLF6	All	VPCJR	NZZO	85	94.11	98.82

- Reporting on IGA is problematic for smaller ATSP because of restricted data sets caused by infrequent appearances of IGA tails.

PBCS Implementation – International General Aviation

ADS-C Performance								
Colour Key		Period 1 Jul 2016 - 31 Dec 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
Meets Criteria								
99.0%-99.84%								
Under Criteria								
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
GLF6 by tail number								
All	All	GLF6	All	BKEY	All	112	99.1	100
All	All	GLF6	All	N650AB	All	317	99.36	99.68
All	All	GLF6	All	N946JB	All	609	97.7	98.19
All	All	GLF6	All	N998PB	All	123	99.18	100
All	All	GLF6	All	VPCJR	All	115	95.65	99.13

- This shows aggregated message counts from KZAK and NZZO for those GLF6 in the previous slide that were observed in both KZAK and NZZO.
- We see this as another illustration of the need for regional aggregation.

PBCS Implementation – Published data

- The amount of information published in each six monthly cycle is going to be considerable.
- There has been some discussion around the need for a summary of “non-performers” that will be included in this data.
- We support this concept and would think that at least initially this would form part of each individual ATSP’s report.

PBCS Implementation – PBCS monitoring - Summary

- Agree with concept of a six monthly reporting period for PBCS performance reporting.
 - However, ANZ case study shows need for continuation of monthly analysis by ATSP.
- We agree with concept of reporting PBCS performance by tail number if required by regulators.
 - Note issues with small number of data points particularly with RCP analysis.
 - Should consider regional aggregation of performance data.
 - Would prefer to see continued reporting by operator/aircraft type.
- Agree with concept of using CRA website to communicate performance analysis.
- Agree with proposal to include a summary of non-performers either on a regional basis or by each ATSP

Thank you

