

Case Study PBCS analysis and corrective action in NZZO

FIT-Asia/13
Bangkok
6-9 June, 2023



Introduction

- ATC communications have specified performance requirements to ensure safety objectives.
- The ICAO Performance Based Communication and Surveillance (PBCS) provision is a globally harmonized framework that prescribes a Required Communications Performance (RCP) specification to communication services (CPDLC) and a Required Surveillance Performance (RSP) specification to surveillance services (ADS-C) in specified airspace.
- An essential aspect of this PBCS framework involves post-implementation monitoring to ensure continued safe operations.
- This includes end-to-end monitoring of the performance of CPDLC and ADS-C, monitoring of system availability, and a robust problem reporting, investigation, and resolution mechanism to support continuous system improvement and hazard mitigation.
- In NZZO oceanic airspace performance is monitored against the CPDLC RCP240/RCP400 and ADS-C RSP180/RSP400 specifications.

ICAO requirements and guidance material

- ICAO Annex 11 Air Traffic Services paragraph 2.28 Safety Management requires that adequate provision shall be made for post-implementation monitoring to verify that the defined level of safety continues to be met.
- Annex 11 requires in paragraph 3.3.5.2 that where RCP specifications are applied, programmes shall be instituted for monitoring the performance of the infrastructure and the participating aircraft against the appropriate RCP specifications, to ensure that operations in the applicable airspace continue to meet safety objectives.
- Annex 11 3.3.5.2 requires that the scope of monitoring programmes shall be adequate to evaluate communication and/or surveillance performance, as applicable.
- Guidance material relating to the RCP and RSP specifications and monitoring of communication and surveillance performance is in the PBCS Manual (Doc 9869).

Industry guidance

- PBCS monitoring
 - ICAO PANS-ATM Doc 4444 specifies CPDLC at RCP240 and ADS-C at RSP180 for the performance based separation standards.
 - DO-306 Oceanic Safety and Performance Requirements Standard (Oceanic SPR) – Separation Assurance 2 (SA2) supports the use of CPDLC and ADS-C for the application of the ICAO performance based separation standards in ENR-2 oceanic airspace.
- Other Monitoring
 - DO-306 Oceanic SPR Standard defines performance requirements for:
 - ATC Communication (ATC Comm) in ENR-2 oceanic airspace with CPDLC at RCP400 and ADS-C at RSP400.
 - Separation Assurance 1 (SA1) in ENR-2 supporting lateral separation $\geq 50\text{NM}$ and longitudinal separation ≥ 10 minutes with CPDLC at RCP400 and ADS-C at RSP400.
 - HF Voice communications used as secondary communications for the application of the performance based separations standards is also monitored against RCP400.

PBCS monitoring and analysis in NZZO

- A monthly monitoring cycle is in use, involving:
 - Automated data extraction from the ATM in GOLD format .csv files.
 - Manual excel spreadsheet filtering of extracted data for:
 - Notified outages.
 - Flight sectors where HFDL is used instead of Satcom.
 - A web based analysis tool to process filtered data and:
 - Automatically extract RCP240 and RSP180 performance for each aircraft.
 - Create google earth files to visualise the location of delayed ADS-C reports.
 - Analyse poor performers identified by the web based tool:
 - Data inspection using excel.
 - Using google earth to visualise the location of delayed ADS-C reports.
 - Publication of a performance report for New Zealand CAA and Airways management.
 - Filing problem reports to the Central Reporting Agency (CRA) when required for further analysis of performance issues.
 - Filing non-compliance reports to PARMO for those aircraft not meeting 95% normal operating requirements.
 - Working with airline customers to resolve identified performance issues.

PBCS automated data extraction

- CPDLC and ADS-C data is extracted each month in GOLD format .csv files

ATSP	Tail_no	Ac_type	Ac_company	Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	OCS_time	Downlink_time
NZZO	9VSMI	A359	SIA	20230401	HLZ	P	-37.239	171.2607	00:00:23	00:00:26	3
NZZO	9VSMC	A359	SIA	20230401	CHC7	P	-42.7162	170.4103	00:01:38	00:01:41	3
NZZO	ZKNNF	A21N	ANZ	20230401	IGW1	W	-27.7903	176.1386	00:01:56	00:02:05	9
NZZO	ZKOKO	B77W	ANZ	20230401	APK1	P	-35.8971	167.2341	00:02:09	00:02:16	7
NZZO	DQFJU	A332	FJI	20230401	APK1	P	-31.6332	175.6123	00:02:40	00:02:53	13
NZZO	VHZNH	B789	QFA	20230401	AME1	P	-65.2727	-123.445	00:03:01	00:03:23	22
NZZO	ZKNHB	A20N	ANZ	20230401	IGW1	P	-32.6893	160.6028	00:03:16	00:04:41	85
NZZO	A6EUW	B77L	UAE	20230401	XXA	W	-39.8649	163.0139	00:03:36	00:04:00	24
NZZO	HL7764	B772	KAL	20230401	XXA	W	-28.2996	167.3705	00:04:44	00:04:55	11
NZZO	9VSMC	A359	SIA	20230401	CHC7	P	-42.5856	169.931	00:04:45	00:04:49	4
NZZO	ZKNNF	A21N	ANZ	20230401	IGW1	P	-28.1628	176.0889	00:05:00	00:05:13	13
NZZO	HL7764	B772	KAL	20230401	XXA	W	-28.2706	167.3492	00:05:01	00:05:39	38
NZZO	ECNCK	A332	PLM	20230401	AKL	P	-38.681	169.5523	00:05:38	00:05:41	3
NZZO	VPCJH	GLF6	PVT	20230401	AKL	W	-35.5655	171.0935	00:06:27	00:06:30	3
NZZO	VHZNH	B789	QFA	20230401	AME1	W	-65.1845	-124.773	00:07:18	00:07:41	23
NZZO	HL7764	B772	KAL	20230401	XXA	P	-27.9733	167.1292	00:07:56	00:08:10	14
NZZO	VPCJH	GLF6	PVT	20230401	AKL	W	-35.6723	171.4157	00:08:21	00:08:24	3
NZZO	9VSMC	A359	SIA	20230401	APK1	W	-42.417	169.3318	00:08:32	00:08:39	7

ATSP	Tail_no	Ac_type	Ac_comp	Date	RGS_MA	ATL_MAS	ATL_time	MAS_time	ATL_MAS	ATL_LAC_time	ATL_DCS_t	ATL_Round	ATL_downlink_time	"upmsgid"	"dnmsgid"	ACTP	ACP	PORT
NZZO	ECNCK	A332	PLM	20230401	AKL	AKL	00:00:12	00:00:15	3	00:00:32	00:00:35	22	3	"u169"	"d3"	4	22	18
NZZO	A6EUW	B77L	UAE	20230401	XXA	XXA	00:03:57	00:04:01	4	00:04:03	00:04:09	11	6	"u169"	"d3"	8	11	3
NZZO	ZKNNF	A21N	ANZ	20230401	IGW1	IGW1	00:05:00	00:05:20	20	00:05:19	00:05:29	28	10	"u118"	"d0"	20	28	8
NZZO	A6EUW	B77L	UAE	20230401	XXA	XXA	00:08:03	00:08:07	4	00:08:11	00:08:25	21	14	"u118"	"d0"	16	21	5
NZZO	ZKNNF	A21N	ANZ	20230401	IGW1	IGW1	00:12:39	00:13:09	30	00:13:01	00:13:18	38	17	"u118"	"d0"	32	38	6
NZZO	9VSMC	A359	SIA	20230401	APK1	APK1	00:13:21	00:13:26	5	00:13:47	00:13:54	32	7	"u0 u166 u169"	"d3"	9	32	23
NZZO	ZKNNF	A21N	ANZ	20230401	IGW1	IGW1	00:16:12	00:16:51	39	00:16:46	00:17:00	47	14	"u82 u127"	"d0"	33	47	14
NZZO	VHZNH	B789	QFA	20230401	AME1	AME1	00:24:51	00:24:59	8	00:24:59	00:25:05	13	6	"u169"	"d3"	10	13	3
NZZO	ZKNHB	A20N	ANZ	20230401	IGW1	IGW1	00:25:06	00:25:33	27	00:25:25	00:25:59	52	34	"u169"	"d3"	47	52	5
NZZO	VHZNH	B789	QFA	20230401	AME1	AME1	00:29:12	00:29:18	6	00:29:29	00:29:35	22	6	"u30"	"d0"	9	22	13
NZZO	ECNCK	A332	PLM	20230401	APK1	APK1	00:30:54	00:30:58	4	00:31:29	00:31:43	49	14	"u121"	"d0"	16	49	33
NZZO	ZKNHE	A20N	ANZ	20230401	IGW1	IGW1	00:31:45	00:32:04	19	00:32:07	00:32:12	26	5	"u169"	"d3"	14	26	12
NZZO	ZKNHE	A20N	ANZ	20230401	IGW1	IGW1	00:34:45	00:35:09	24	00:35:11	00:35:16	32	7	"u118"	"d0"	19	32	13
NZZO	VHEBN	A332	QFA	20230401	APK1	APK1	00:35:12	00:35:16	4	00:35:22	00:35:29	16	7	"u169"	"d3"	9	16	7
NZZO	ZKNHD	A20N	ANZ	20230401	IGW1	IGW1	00:35:27	00:36:02	35	00:35:50	00:36:16	48	26	"u169"	"d3"	43	48	5
NZZO	ZKNNB	A21N	ANZ	20230401	IGW1	IGW1	00:38:09	00:38:37	28	00:38:37	00:38:55	45	18	"u169"	"d3"	32	45	13
NZZO	9VSMC	A359	SIA	20230401	APK1	APK1	00:38:15	00:38:20	5	00:38:26	00:38:32	16	6	"u121"	"d0"	8	16	8
NZZO	ZKNZH	B789	ANZ	20230401	AKL8	AKL8	00:39:54	00:39:56	2	00:40:03	00:40:04	9	1	"u169"	"d3"	2	9	7
NZZO	ZKNNB	A21N	ANZ	20230401	IGW1	IGW1	00:41:54	00:42:21	27	00:42:22	00:42:29	34	7	"u118"	"d0"	20	34	14
NZZO	9VSMC	A359	SIA	20230401	APK1	APK1	00:42:06	00:42:14	8	00:42:34	00:42:41	34	7	"u0 u166 u169 u169"	"d3"	11	34	23
NZZO	ZKNHB	A20N	ANZ	20230401	IGW1	IGW1	00:43:36	00:43:57	21	00:43:50	00:44:06	29	16	"u118"	"d0"	26	29	3
NZZO	VHEBN	A332	QFA	20230401	APK1	APK1	00:52:27	00:52:32	5	00:52:38	00:52:45	17	7	"u118"	"d0"	9	17	8
NZZO	ZKNHD	A20N	ANZ	20230401	IGW1	IGW1	00:54:42	00:55:02	20	00:55:07	00:55:13	36	12	"u118"	"d0"	22	36	14
NZZO	ZKNZH	B789	ANZ	20230401	APK1	APK1	01:12:06	01:12:11	5	01:12:16	01:12:23	16	5	"u121"	"d0"	7	16	9
NZZO	ZKNZE	B789	ANZ	20230401	APK1	APK1	01:17:48	01:17:53	5	01:17:57	01:18:09	20	12	"u169"	"d3"	14	20	6



PBCS monitoring and analysis in NZZO

- The raw data is filtered before uploading to our PBCS analysis website e.g.:
 - CSP outages -

ATSP	Tail_no	Ac_type	Ac_comp	Date	RGS_MA	ATL_MAS	ATL_time	MAS_tim	ATL_MAS	ATL_LAC	ATL_LOC	ATL_roun	ATL_dowr	"upmsgid"	"dnmsgid"	ACTP	ACP	PORT
NZZO	A6EVO	A388	UAE	20230416	H05	H05	23:40:51	23:44:05	194	23:43:35	23:44:05	193	30	"u118"	"d0"	127	193	66
NZZO	A6EVO	A388	UAE	20230416	H05	H05	23:43:24	23:46:43	199	23:46:15	23:46:43	198	28	"u169"	"d3"	127	198	71
NZZO	N23983	B789	UAL	20230417	H05	H05	03:16:36	03:24:19	463	03:22:40	03:27:11	634	271	"u169"	"d3"	502	634	132
NZZO	9V5MA	A359	SIA	20230417	H05	H05	03:19:39	03:22:58	199	03:22:37	03:24:48	308	131	"u121"	"d0"	230	308	78
NZZO	CCBGC	B789	LAN	20230417	H05	H05	02:48:42	02:51:13	151	02:50:07	02:55:11	388	304	"u118"	"d0"	379	388	9
NZZO	CCBGC	B789	LAN	20230417	H05	H05	02:51:18	02:52:58	100	02:52:59	02:57:04	345	245	"u169"	"d3"	295	345	50
NZZO	N23983	B789	UAL	20230417	H05	XXW	04:25:54	04:27:12	78	04:26:46	04:35:03	548	497	"u82 u12"	"d0"	536	548	12
NZZO	A6EVN	A388	UAE	20230417	AKL	H13	09:34:15	09:34:29	14	09:34:38	09:41:05	409	387	"u169"	"d3"	394	409	15
NZZO	A6EVN	A388	UAE	20230417	H13	H13	09:45:00	09:45:54	54	09:45:58	09:49:55	294	237	"u121"	"d0"	264	294	30
NZZO	A6EVN	A388	UAE	20230417	H13	H13	09:58:54	10:04:38	344	10:04:26	10:06:42	467	136	"u82 u12"	"d62 d67"	308	467	159

- Aircraft operates an oceanic sector with no satcom -

NZZO	9MMTZ	A332	MAS	20230223	SYD	W	-37.0653	158.4793	14:52:46	15:15:20	1354
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- Aircraft has a satcom failure enroute -

NZZO	N78001	B772	UAL	20230113	H02	P	-18.016	-157.384	07:01:29	07:02:42	73
NZZO	N78001	B772	UAL	20230113	H02	W	-17.4805	-156.984	07:06:07	07:26:02	1195
NZZO	N78001	B772	UAL	20230113	H01	P	-13.4007	-154.059	07:41:22	08:11:47	1825
NZZO	N78001	B772	UAL	20230113	H01	P	-11.704	-152.881	07:56:18	08:30:27	2049
NZZO	N78001	B772	UAL	20230113	H01	W	-10.0067	-151.719	08:11:10	09:06:57	3347
NZZO	N78001	B772	UAL	20230113	H01	W	-5.00599	-148.374	08:54:01	09:26:17	1936
NZZO	N78001	B772	UAL	20230113	H02	PW	-1.25622	-145.908	09:25:56	09:55:12	1756
NZZO	N78001	B772	UAL	20230113	H02	P	0.484428	-144.768	09:40:52	10:04:19	1407
NZZO	N78001	B772	UAL	20230113	H02	P	5.603714	-141.249	10:25:41	10:37:13	692
NZZO	N78001	B772	UAL	20230113	H01	P	8.96244	-138.759	10:55:33	11:03:21	468
NZZO	N78001	B772	UAL	20230113	H01	W	9.993095	-137.984	11:04:27	11:24:09	1182
NZZO	N78001	B772	UAL	20230113	H01	P	10.68626	-137.441	11:10:29	11:33:45	1396
NZZO	N78001	B772	UAL	20230113	H01	P	12.38297	-136.097	11:25:26	11:47:37	1331
NZZO	N78001	B772	UAL	20230113	H01	P	14.04396	-134.76	11:40:22	12:10:21	1799

PBCS monitoring and analysis in NZZO

- A web based analysis tool is used for data analysis [PBCS Analysis](#)
- For example:
 - Extracting consolidated performance for the period

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	N717AN	136	99.26%	99.26%	32	96.88%	96.88%
AAL	B77W	N718AN	120	98.33%	99.17%	25	100.00%	100.00%
AAL	B77W	N727AN	90	96.67%	97.78%	24	95.83%	95.83%
AAL	B77W	N728AN	66	98.48%	98.48%	11	100.00%	100.00%
AAL	B77W	N729AN	65	100.00%	100.00%	12	100.00%	100.00%
AAL	B77W	N730AN	28	100.00%	100.00%	7	100.00%	100.00%
AAL	B77W	N731AN	73	95.89%	97.26%	13	100.00%	100.00%
AAL	B77W	N732AN	133	99.25%	99.25%	32	100.00%	100.00%
AAL	B77W	N733AR	155	99.35%	100.00%	30	96.67%	96.67%
AAL	B77W	N734AR	156	98.72%	100.00%	30	96.67%	96.67%
AAL	B77W	N735AT	49	97.96%	97.96%	5	100.00%	100.00%
AAL	B77W	N736AT	130	99.23%	100.00%	25	100.00%	100.00%
ACA	B77L	CFNNH	35	100.00%	100.00%	7	100.00%	100.00%
ACI	A20N	FOTIB	389	98.97%	100.00%	64	100.00%	100.00%
ACI	A339	FONET	287	98.61%	99.65%	35	100.00%	100.00%
ANC	A21N	GXATW	94	98.94%	100.00%	12	100.00%	100.00%
ANZ	A20N	ZKNHA	1350	98.22%	99.85%	276	99.64%	99.64%
ANZ	A20N	ZKNHB	1108	96.93%	99.73%	248	99.19%	99.60%
ANZ	A20N	ZKNHC	1239	98.39%	99.68%	283	99.65%	99.65%
ANZ	A20N	ZKNHD	1155	98.44%	100.00%	258	98.45%	98.45%
ANZ	A20N	ZKNHE	1154	98.18%	99.65%	257	99.22%	99.22%

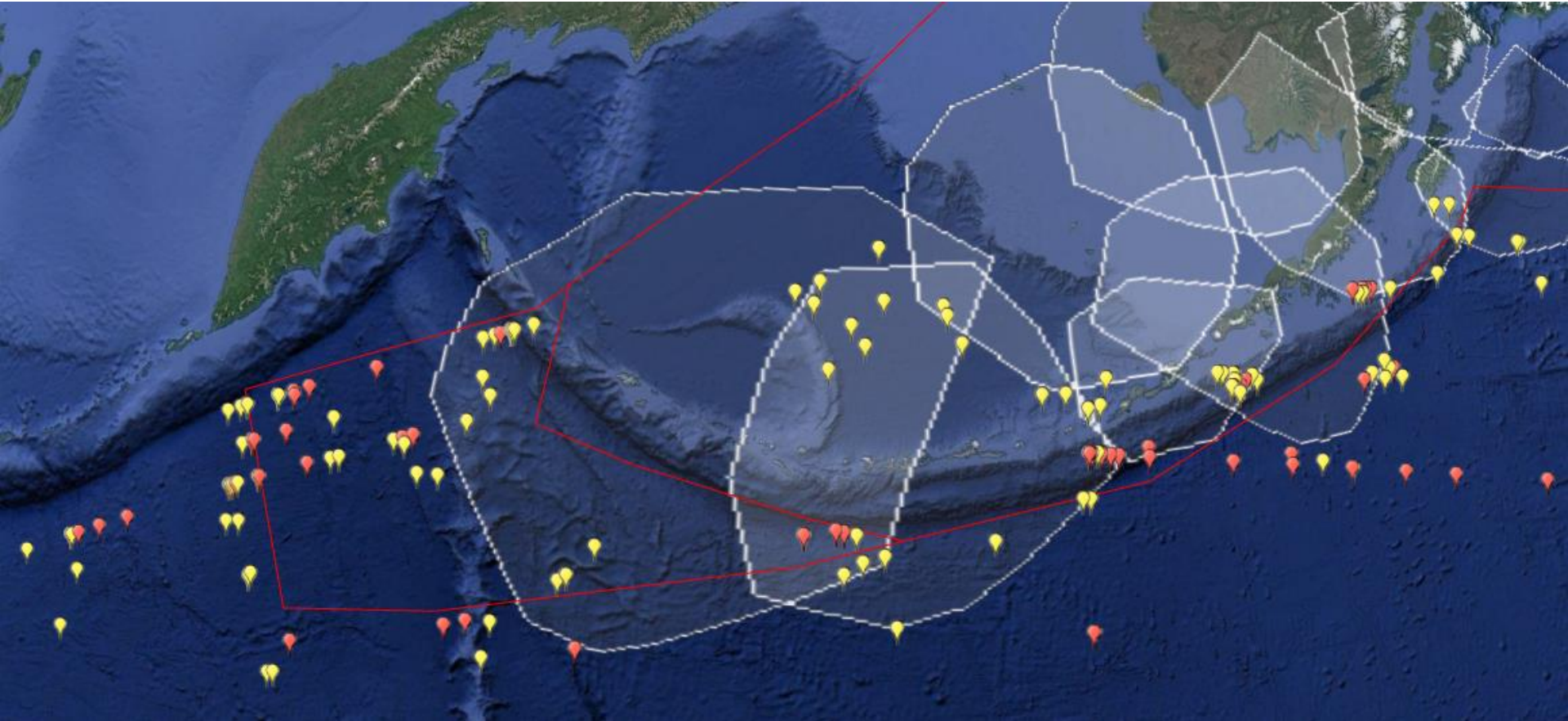
ADS-C Performance								
Period 1 Apr 2023 - 30 Apr 2023							95% RSP180 Benchmark	99.9% RSP180 Benchmark
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by RSP180								
All	All	B789	ANZ	ZKNZC	NZZO	265	98.49	100
All	All	B789	ANZ	ZKNZD	NZZO	854	99.88	99.88
All	All	B789	ANZ	ZKNZE	NZZO	632	99.52	100
All	All	B789	ANZ	ZKNZF	NZZO	950	99.78	99.89
All	All	B789	ANZ	ZKNZG	NZZO	984	98.57	99.79
All	All	B789	ANZ	ZKNZH	NZZO	864	99.18	99.76
All	All	B789	ANZ	ZKNZI	NZZO	895	98.99	100
All	All	B789	ANZ	ZKNZJ	NZZO	908	98.78	99.77
All	All	B789	ANZ	ZKNZK	NZZO	760	98.81	100
All	All	B789	ANZ	ZKNZL	NZZO	1481	99.72	100
All	All	B789	ANZ	ZKNZM	NZZO	1288	99.76	100
All	All	B789	ANZ	ZKNZN	NZZO	1122	99.82	100
All	All	B789	ANZ	ZKNZQ	NZZO	887	98.87	100
All	All	B789	ANZ	ZKNZR	NZZO	1273	99.45	100

- Extracting performance by fleet/tail



PBCS monitoring and analysis in NZZO

- The web based analysis tool is also used to create Google Earth plots to visualise ADS-C latency delays



PBCS monitoring and analysis in NZZO

- A monthly performance report is created which reviews the performance issues reported in the previous month and current performance issues from the current month.
- This is an extract from our April 2023 report:

PBCS Performance Summary – April 2023

Previous analysis update:

Air New Zealand (ANZ) A20N and A21N: Please refer updated analysis below.

Air New Zealand (ANZ) B789 ZKNZM: Meets performance requirements in April.

Kalitta Air (CKS) B77L N776CK: Meets performance requirements in April.

Fiji Airways (FJI) B38M: Please refer updated analysis below.

Icelandair (ICE) B752 TFLLL Non-PBCS: Did not operate in NZZO in April.

Korean Air (KAL) B77W HL8210, HL8217: Did not operate in NZZO in April. Airline is now using B772.

Wamos Air (PLM) A332 ECNCK: Please refer updated analysis below.

Private Operator FA7X N656FN: Did not operate in NZZO in April.

United Airlines (UAL) B772 N27015: Did not operate in NZZO in April.

United Airlines (UAL) B789 N15969, N29971, N28987: N28987 did not operate, others meet requirements in April.

Tasman Airways (TMN) B763 VHEXZ, VHXQU - Non-PBCS: Please refer updated analysis below.

China Airlines (CAL) A359 B18902: Insufficient data for analysis in April.

LAN Chile (LAN) B789 CCBGG – Non PBCS: Meets performance requirements in April.

April 2023 Analysis

Air New Zealand (ANZ) A20N (ZKNHD)

The fleet meets RSP180 requirements, ZKNHB is below the CPDLC RCP240 99.0% 210 second requirement when assessing all message transactions.

CPDLC Performance									
Colour Key		Period 1 Apr 2023 - 30 Apr 2023					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	
Analysis by RCP240									
All	All	A20N	ANZ	ZKNHD	NZZO	258	98.44	98.44	

PBCS monitoring and analysis in NZZO

- When required problem reports are filed on the CRA website to enable further investigation and non-compliance reports are filed with our regional monitoring agency (PARMO):
 - CRA Problem Report

ID	Reference	Date	Status	Title
ACNZ_2023_02	3486-RA	2023-01-08	Active	B772 using both Iridium and Inmarsat SATCOM

- Non-compliance report to PARMO

PBCS ATSP Non-compliance Report Form

Report Date:	21/05/2023						
Period of observed non-compliance:	June - October 2022						
Reporting Air Traffic Service Provider (ATSP):	Airways New Zealand						
Contact email address(es) at Reporting ATSP:	paul.radford@airways.co.nz						
Reporting to Regional Monitoring Agency (RMA):	PARMO						
ICAO CODE:							
Airline Operator:							
State of Operator/Registry:	USA						
PBCS Data							
FIR	4-letter ICAO Aircraft Type	Registration	ADS-C downlink Message Counts	95% RSP 180 Benchmark	CPDLC Transaction Counts (WILCO Received)	95% RCP 240 benchmark	Issue code
				ASP <=90 sec		ACP <=180 sec	
	FA7X		336	94.94%	67	89.55%	(*3)
NZZO							



Aircraft first starts operating in NZZO in June 2022. Performance below PBCS requirements first detected in our consolidated July-September analysis, which deteriorated further in the August - October analysis. Performance and message counts shown is for June-October.



Case Study #1 – ANZ A20N

- Between April 2020 and March 2021 the ANZ A20N fleet recorded performance below RSP180 requirements in the vicinity of Norfolk Island.
- The following series of slides illustrate our monthly reporting on the fleet performance during this period
- The slides are actual extracts from our monthly reports.

Case Study #1 – ANZ A20N

April 2020 Analysis

Air New Zealand A20N - ZKNHB

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	A20N	ZKNHB	225	96.89%	98.67%

Date	RGS	REP_TYPE	Latitude	Longitude	<u>AC time</u>	<u>OCS time</u>	<u>Downlink time</u>
20200425	IGW1	W	-29.025	167.5092	03:52:40	03:55:58	198
20200425	IGW1	P	-29.0214	167.4507	03:53:11	03:57:34	263
20200425	IGW1	P	-29.0118	167.2998	03:54:29	03:58:02	213

Slight degradation below 99.0% at 180 seconds was caused by 3 delayed reports on 25th April 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.

No operational impact. No further action.



Case Study #1 – ANZ A20N

PBCS Performance Summary – May 2020

Previous analysis update:

Air New Zealand A20N – ZKNHB. Performance OK in May.

June 2020 Analysis

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.



Case Study #1 – ANZ A20N

July 2020 Analysis

Air New Zealand A20N – ZKNHC

Slight degradation below 95% normal operating in June data with small data set below.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	A20N	ZKNHC	114	93.86%	100.00%

Aircraft is showing normal performance in the combined May-June data below.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
ANZ	A20N	ZKNHC	734	96.19%	99.46%

Date	RGS	REP_TYPE	Latitude	Longitude	AC time	OCS time	Downlink time
20200706	IGW1	W	-29.0297	167.9145	04:09:12	04:12:01	169
20200706	IGW1	P	-29.0908	167.794	04:11:30	04:14:10	160
20200706	IGW1	P	-29.1177	167.7084	04:12:38	04:15:36	178
20200706	IGW1	P	-29.4156	166.7445	04:22:39	04:23:05	26
20200706	IGW1	A	-29.533	166.3551	04:26:22	04:27:00	38
20200706	IGW1	P	-29.5709	166.2295	04:27:34	04:29:17	103
20200706	IGW1	P	-29.6123	166.091	04:28:53	04:31:02	129
20200706	IGW1	W	-29.0297	167.9145	04:09:12	04:12:01	169
20200711	IGW1	W	-28.9098	165.8125	01:43:03	01:45:00	117
20200711	IGW1	W	-29.0245	167.5079	03:44:42	03:46:54	132

Slight degradation below 95.0% at 90 seconds was caused by 6 delayed reports on 6th July in Norfolk Island area at 29S167E. Initial delayed report was a waypoint change followed by two periodic reports. Aircraft was meeting RSP180 performance in previous analysis. This occurrence very similar to that seen with ZKNHB on 25th April and ZKNHD on 15th June and reported in the April and June 2020 analysis.

Minimal operational impact. Raise FANS PR and further investigate operations in Norfolk Island area. Continue monitoring.



Case Study #1 – ANZ A20N – August 2020 (1)

August 2020 Analysis

Air New Zealand A20N – ZKNHC

The A20N operating in August (ZKNHA, ZKNHD) showed a deterioration in RSP performance with NHD indicating below 95% normal operating.

All Sectors -August 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO recieved)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	247	96.36%	97.57%	5	100.00%	100.00%
ZKNHD	369	91.60%	97.29%	10	100.00%	100.00%

Further analysis shows that we are observing significant deterioration around Norfolk Island. ZKNHA operated 4 sectors in and out of Norfolk during August and ZKNHD operated 14. The delayed messages for each tail are as follows:

Tail	Date	Type	Latitude	Longitude	Sent	Received	Latency	Sector
ZKNHA	20200817	P	-29.6092	166.1008	03:58:42	04:00:25	103	NF-SY
ZKNHA	20200817	P	-29.6215	166.0597	03:59:03	04:03:56	293	NF-SY
ZKNHA	20200829	P	-28.8331	164.82	01:50:53	01:52:35	102	BN-NF
ZKNHA	20200829	P	-28.9129	165.8537	01:56:34	01:58:10	96	BN-NF
ZKNHA	20200829	W	-29.0269	167.9135	03:55:07	03:59:10	243	NF-BN
ZKNHA	20200829	P	-29.0374	167.7389	03:57:46	04:02:02	256	NF-BN
ZKNHA	20200829	P	-29.0364	167.7228	03:57:58	04:02:21	263	NF-BN
ZKNHA	20200829	P	-29.0255	167.5274	04:00:02	04:03:28	206	NF-BN
ZKNHA	20200829	W	-29.0247	167.5089	04:00:13	04:03:43	210	NF-BN

Case Study #1 – ANZ A20N – August 2020 (2)

Tail	Date	Type	Latitude	Longitude	Sent	Received	Latency	Sector
ZKNHD	20200801	W	-28.674	163.0079	01:42:20	01:44:07	107	BN-NF
ZKNHD	20200801	W	-28.91	165.8129	02:00:12	02:02:43	151	BN-NF
ZKNHD	20200801	P	-29.0327	167.655	03:58:49	04:01:58	189	NF-BN
ZKNHD	20200801	W	-29.0245	167.5037	04:00:09	04:02:49	160	NF-BN
ZKNHD	20200801	P	-29.0231	167.4826	04:00:20	04:07:11	411	NF-BN
ZKNHD	20200801	W	-28.9091	165.8017	04:13:24	04:15:46	142	NF-BN
ZKNHD	20200801	P	-28.8908	165.5567	04:15:16	04:17:46	150	NF-BN
ZKNHD	20200803	P	-31.292	160.0169	01:43:59	01:48:16	257	SY-NF
ZKNHD	20200808	P	-28.3264	159.7634	01:18:46	01:20:30	104	BN-NF
ZKNHD	20200808	W	-29.0566	167.961	03:47:39	03:49:23	104	NF-BN
ZKNHD	20200808	A	-28.951	166.3864	04:04:13	04:08:57	284	NF-BN
ZKNHD	20200808	W	-28.909	165.8031	04:10:28	04:14:44	256	NF-BN
ZKNHD	20200809	P	-30.7947	160.0954	01:41:05	01:42:37	92	BN-AA
ZKNHD	20200815	W	-28.91	165.8156	01:52:45	01:54:38	113	BN-NF
ZKNHD	20200815	P	-29.0358	167.9432	03:39:11	03:45:33	382	NF-BN
ZKNHD	20200815	P	-29.036	167.9435	03:40:39	03:47:58	439	NF-BN
ZKNHD	20200815	P	-29.0364	167.9295	03:45:03	03:50:00	297	NF-BN
ZKNHD	20200815	A	-29.0364	167.9295	03:45:03	03:51:08	365	NF-BN
ZKNHD	20200815	P	-29.0393	167.9348	03:46:09	03:51:42	333	NF-BN
ZKNHD	20200815	W	-29.0554	167.9583	03:46:51	03:52:13	322	NF-BN
ZKNHD	20200815	W	-29.0243	167.5056	03:52:10	03:54:01	111	NF-BN
ZKNHD	20200815	P	-29.0173	167.392	03:53:09	03:55:06	117	NF-BN
ZKNHD	20200815	P	-28.9035	165.7272	04:08:07	04:10:21	134	NF-BN
ZKNHD	20200818	P	-19.3598	-170.143	01:59:06	02:01:25	139	NU-AA
ZKNHD	20200822	P	-28.3401	159.8796	01:08:32	01:10:33	121	BN-NF
ZKNHD	20200822	P	-28.8674	165.2519	01:38:29	01:40:14	105	BN-NF
ZKNHD	20200822	W	-28.9098	165.8117	01:41:45	01:43:47	122	BN-NF
ZKNHD	20200822	P	-29.0444	167.8812	03:37:53	03:40:18	145	NF-BN
ZKNHD	20200822	P	-29.0741	167.7295	03:39:57	03:41:37	100	NF-BN
ZKNHD	20200822	P	-28.9764	166.7589	03:49:58	03:51:52	114	NF-BN
ZKNHD	20200822	P	-28.9179	165.9232	03:57:38	03:59:27	109	NF-BN
ZKNHD	20200824	P	-29.6894	165.8716	01:32:04	01:34:28	144	SY-NF

The blue highlights in the Date column indicate the aircraft is flying a flight sector into or out of YSNF. ZKNHA has no delayed messages when not on a Norfolk sector, and ZKNHD only has two.

Case Study #1 – ANZ A20N – August 2020 (3)

When the Norfolk sectors are excluded from the performance [data](#) we see the aircraft meeting requirements as shown below.

YSNF Sectors excluded from ASP - August 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO recieved)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	238	100.00%	100.00%	5	100.00%	100.00%
ZKNHD	340	99.41%	100.00%	10	100.00%	100.00%

A FANS1/A problem report has been raised on the CRA website but following feedback from ANZ issue is most probably caused by aircraft having four ADS-C contracts on the YSNF-YBBN route established with NZZO, NFFF, YBBB, and Air New Zealand. All these contracts are being established around the same time with multiple contract requests occurring at the same time, causing the significant delays observed. Because performance is normal, other than on the YSNF-YBBN sectors, the deterioration observed is assessed as not having significant operational impact. It would be unusual to see performance-based separations applied on YSNF traffic.

Minimal operational impact. Advise Oceanic of the deterioration on the YSNF-YBBN sector and continue monitoring.

Case Study #1 – ANZ A20N

September 2020 Analysis

Air New Zealand A20N

Two A20N operated in September (ZKNHA & ZKNHD) with NHA showing a continuation of the poor RSP180 performance seen in previous months and indicating below the 95% normal operating requirements.

All Sectors - September 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	252	92.06%	96.83%	9	100.00%	100.00%
ZKNHD	224	95.09%	99.55%	4	100.00%	100.00%

As in previous months the deterioration seen with NHA can be attributed to poor performance in the vicinity of Norfolk Island and RSP180 is achieved in the remainder of NZZO when the NF flight sectors are excluded (see table below)

NF Sectors excluded from ASP - September 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	81	98.77%	100.00%	9	100.00%	100.00%
ZKNHD	172	96.51%	99.42%	4	100.00%	100.00%

Deterioration is particularly marked on departures from YSNF to YBBN via Nadi airspace. System automation on these short sectors in our OCS, Nandi's Aurora, and Brisbane's TAAAT's is causing a large number of near simultaneous AFN address forwarding, CPDLC connections, and ADS-C contract establishment by the three centres. This seems to be stretching the capability of the Iridium satcom at times. This is unlikely to be resolved until a VDL service is re-established at YSNF.

Minimal operational impact. Oceanic are aware of the deterioration on the YSNF-YBBN sector and we will continue monitoring.

Case Study #1 – ANZ A20N

October 2020 Analysis

Air New Zealand A20N

Three A20N operated in October (ZKNHA, ZKNHB, ZKNHD) with NHB and NHD showing a continuation of the poor RSP performance seen in previous months indicating below 95% normal operating.

All Sectors - October 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	102	96.08%	99.02%	1	100.00%	100.00%
ZKNHB	498	91.16%	96.99%	12	100.00%	100.00%
ZKNHD	190	88.42%	96.32%	6	100.00%	100.00%

Again, the deterioration can be attributed to poor performance in the vicinity of Norfolk Island and RSP is achieved in remainder of the NZZO FIR when the NF flight sectors are excluded – see table below.

NF sectors excluded from ASP - October 2020						
Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	99	100.00%	100.00%	1	100.00%	100.00%
ZKNHB	456	99.56%	100.00%	12	100.00%	100.00%
ZKNHD	168	99.40%	100.00%	6	100.00%	100.00%

Minimal operational impact other than in the vicinity of YSNF. Oceanic are aware of the deterioration in the YSNF area and we will continue monitoring.

Case Study #1 – ANZ A20N

November 2020 Analysis

Air New Zealand (ANZ) A20N

Four A20N operated in November (ZKNHA, ZKNHB, ZKNHC, ZKNHD) with NHA, NHB, and NHD showing a continuation of the poor RSP performance seen in previous months indicating below 95% normal operating.

Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts (WILCO received)	ACP <= 180 sec	ACP <= 210 sec
ZKNHA	233	94.85%	97.85%	13	100.00%	100.00%
ZKNHB	208	93.75%	98.56%	6	100.00%	100.00%
ZKNHC	13	100.00%	100.00%	0	-	-
ZKNHD	294	91.16%	96.94%	9	100.00%	100.00%

Again, the deterioration can be attributed to poor performance in the vicinity of Norfolk Island and RSP is achieved in remainder of the NZZO FIR when the NF flight sectors are excluded – see table below.

Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec
All	709	97.74	99.72

Minimal operational impact other than in the vicinity of YSNF. Oceanic are aware of the deterioration in the YSNF area and we will continue monitoring.

Case Study #1 – ANZ A20N

December 2020 Analysis

Air New Zealand (ANZ) A20N

Three A20N operated in December (ZKNHA, ZKNHC, ZKNHD) with only NHA and NHD having more than 100 ADS-C datapoints. Aircraft are showing a continuation of the poor RSP performance seen in previous months with both indicating below 95% normal operating.

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	
ANZ	A20N	ZKNHA	428	89.25%	96.26%	14	100.00%	100.00%		
ANZ	A20N	ZKNHC	34	88.24%	97.06%	1	100.00%	100.00%		
ANZ	A20N	ZKNHD	339	89.97%	96.76%	18	100.00%	100.00%		

Again, the deterioration can be attributed to poor performance in the vicinity of Norfolk Island and RSP is achieved in remainder of the NZZO FIR when the NF flight sectors are excluded – see table below.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	Colour Key	
ANZ	A20N	All	723	99.17%	100.00%		

We have had no feed-back from the CRA problem report raised on this issue. Deterioration points to overloaded Iridium SATCOM with YBBB, NFFN, and NZZO all establishing contracts as the aircraft operates in and out of YSNF. The NF VDL station has been out of service for some time. If this was restored we suspect the issue would be resolved.

Minimal operational impact other than in the vicinity of YSNF. Oceanic are aware of the deterioration in the YSNF area and we will continue monitoring. CRA problem report will be updated.

Case Study #1 – ANZ A20N

January 2021 Analysis

Air New Zealand (ANZ) A20N

Four A20N operated in January (ZKNHA, ZKNHB, ZKNHC, ZKNHD) with only NHA, NHC, and NHD having more than 100 ADS-C datapoints. NHA, NHB, and NHC are showing a continuation of the poor RSP performance seen in previous months.

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	
ANZ	A20N	ZKNHA	328	93.29%	97.86%	11	100.00%	100.00%		
ANZ	A20N	ZKNHB	46	100.00%	100.00%	2	100.00%	100.00%		
ANZ	A20N	ZKNHC	429	89.97%	95.80%	12	100.00%	100.00%		
ANZ	A20N	ZKNHD	322	92.85%	96.58%	5	100.00%	100.00%		

The deterioration on NHA, NHC, and NHD can be attributed to poor performance in the vicinity of Norfolk Island and RSP is achieved in remainder of the NZZO FIR when the NF flight sectors are excluded – see table below. NHB did not operate any YSNF sectors in January.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	Colour Key	
ANZ	A20N	All	1045	99.23%	100.00%		

As noted last month we have had no feed-back from the CRA problem report raised on this issue. Deterioration points to overloaded Iridium SATCOM with YBBB, NFFN, and NZZO all establishing contracts as the aircraft operates in and out of YSNF. The NF VDL station has been out of service for some time. If this was restored we suspect the issue would be resolved.

Minimal operational impact other than in the vicinity of YSNF. Oceanic are aware of the deterioration in the YSNF area and we will continue monitoring. CRA problem report will be updated.

Case Study #1 – ANZ A20N

February 2021 Analysis

Air New Zealand (ANZ) A20N

Four A20N operated in February (ZKNHA, ZKNHB, ZKNHC, ZKNHD). NHA, NHC, and NHD are showing a continuation of the poor RSP performance seen in previous months.

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
ANZ	A20N	ZKNHA	48	51.00%	35.00%	29	100.00%	100.00%
ANZ	A20N	ZKNHB	212	96.69%	100.00%	35	97.14%	97.14%
ANZ	A20N	ZKNHC	270	91.11%	95.55%	51	98.03%	100.00%
ANZ	A20N	ZKNHD	233	90.98%	96.13%	48	97.91%	97.91%

The deterioration on NHA, NHC, and NHD is attributed to poor performance in the vicinity of Norfolk Island and RSP is achieved in remainder of the NZZO FIR when the NF flight sectors are excluded – see table below. NHB operated some NF sectors with delays observed between 90-180”.

Operator	Aircraft Type	Tail No	ADS-C downlink Message counts	ASP <= 90 sec	ASP <= 180 sec	Colour Key		
ANZ	A20N	All	855	98.83%	99.65%	Meets Criteria	99.0%-99.84%	Under Criteria
						PBCS Qualified		

As noted last month we have had no feed-back from the CRA problem report raised on this issue. Deterioration points to overloaded Iridium SATCOM with YBBB, NFFN, and NZZO all establishing contracts as the aircraft operates in and out of YSNF. The NF VDL station has been out of service for some time. If this was restored, we suspect the issue would be resolved.

Minimal operational impact other than in the vicinity of YSNF. Oceanic are aware of the deterioration in the YSNF area and we will continue monitoring. CRA problem report will be updated.

Case Study #1 – ANZ A20N

PBCS Performance Summary – March 2021

Previous analysis update:

Air New Zealand A20N. Fleet did not operate to YSNF in March and a reduction in NZZO operations. Observed 112 ADS-C datapoints with the fleet meeting RSP180 requirements.

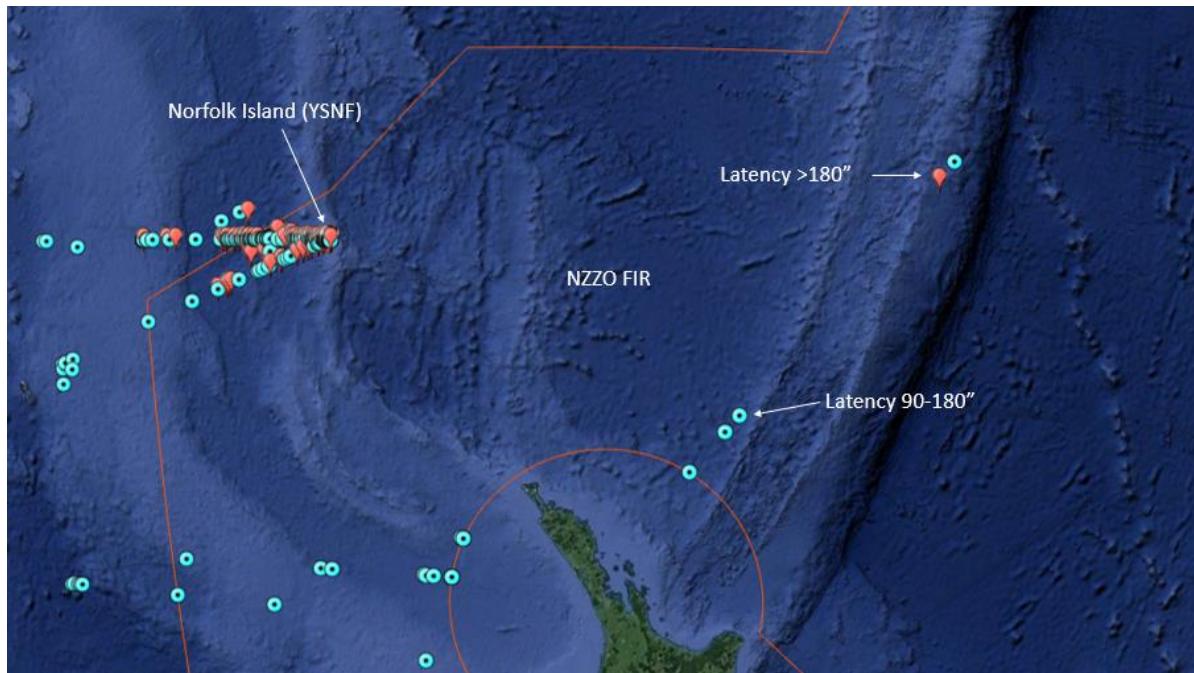
- The ANZ A20N fleet no longer operate on Norfolk Island sectors.
- The Norfolk Island VHF RGS (NLK1) was restored to service in July 2022.



Case Study #1 – ANZ A20N – Google Earth display

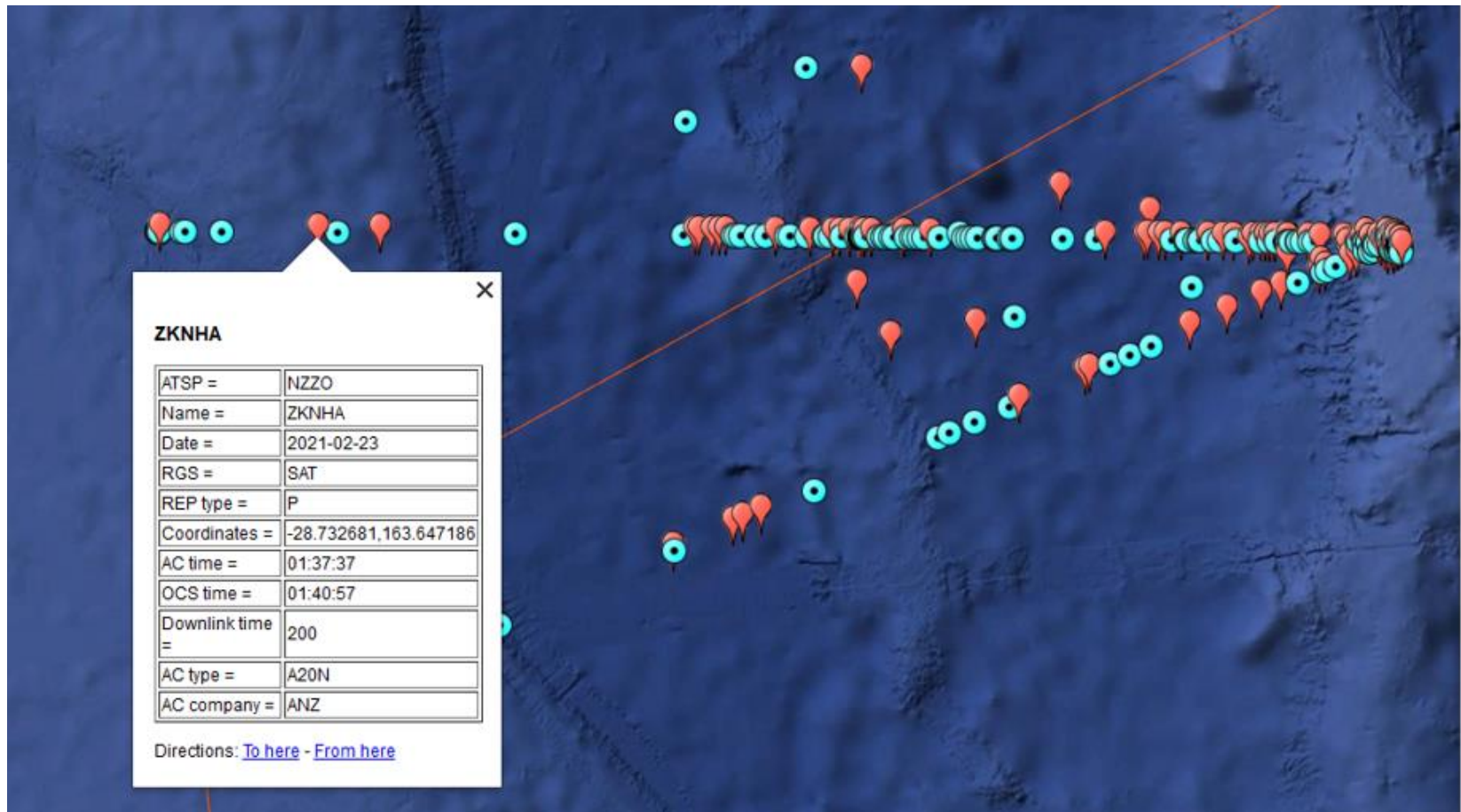
Airways finds that the ability to display the latency observed with each ADS-C data point on Google Earth is useful when investigating performance problems. Our PBCS analysis tool enables the creation of Google Earth formatted files that display selected ADS-C data points from our on-line database or from imported .csv files.

An example of a Google Earth display helping identify a performance problem is illustrated below. This is a Google Earth display of the delayed reports observed from ANZ A20N aircraft in early 2021 in the vicinity of Norfolk Island.



Case Study #1– ANZ A20N – Google Earth display

A more detailed display of the delays observed around Norfolk Island is illustrated below. This also shows the information that can be displayed for each data point which is accessible by a mouse click on the data point.



Google Earth displays - Additional Information

The interface used to create the Google Earth files from the database or imported .csv files is illustrated below. The interface allows the user to select data points from the database or import a .csv file in GOLD format. The user then names the Google Earth file and selects the required icons and colours for each of three latency ranges (<90”, 90-180”, >180”) that can be displayed.

The screenshot shows the 'PBCS Analysis' web application interface. The top navigation bar includes 'Profile' and a user icon. A left sidebar contains menu items: Overview, Import ADS-C CSV, Clean Imported ADS-C Data, ADS-C Graphs, ADS-C Tabular, ADS-C Plot (highlighted in red), Import CPDLC CSV, Clean Imported CPDLC Data, CPDLC Graphs, CPDLC Tabular, Combined Reports, Delete ADS-C Data, Delete CPDLC Data, and Admin Interface. The main content area is titled 'Creating ADS-C plots for Google Earth' and is divided into three sections:

- Top Section:** Fields for Aircraft Company (ANZ), Aircraft Type (A20N), Tail Number, ATSP (NZZO), Date From (2020-10-01), and Date To (2021-03-30). Below these fields, it states 'GE points to be generated : 4523'.
- Middle Section:** A 'Select CSV File to import:' section with a 'Choose File' button, 'No file chosen' text, an 'Import' button, a settings gear icon, a 'Delete' button, and a 'Stop' button. Below this, it states 'GE points to be generated : Select file to calculate'.
- Bottom Section:** A configuration section for the Google Earth file. It includes a 'File Name' field with 'ANZ A20N 202010-202103' and a '.kml' dropdown. Below this is a green 'Export GE File (Database)' button and a red 'Stop' button. To the right, there are three latency categories with their respective icon and color settings:
 - Less than 90 (secs):** Icon: None, Colour: None
 - Between 90 and 180 (secs):** Icon: Circle, Colour: Light Blue
 - Greater than 180 (secs):** Icon: Paddle, Colour: RedAt the bottom of this section, it states 'GE points generated: 368 / 4523. Ready for download...'.

Case Study #2 – FJI A332

	Message Counts	%<= 90sec	%<= 180sec	Message Counts	%<= 90sec	%<= 180sec
FJI/A332	1211	95.62	98.43	1480	95.61	98.45

The FJI A332 fleet had ongoing performance issues through 2021 with PBCS non-compliance reports filed with PARMO in January and February 2021 and a CRA problem report raised and updated.

We also worked directly with Fiji Airways and appraised them of the monthly performance results as they worked on the issue through 2021.

The latency delays observed were associated with excessive switching between the AME1, AME2, APK1, and APK2 satellite RGS. This issue was resolved by Fiji Airways and the consolidated performance from the FJI A332 fleet for the period December 2021 to February 2022 is 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
FJI	A332	DQFJT	342	97.95%	100.00%	5	100.00%	100.00%
FJI	A332	DQFJU	298	97.32%	100.00%	4	100.00%	100.00%
FJI	A332	DQFJV	134	99.25%	100.00%	2	100.00%	100.00%

Case Study #3 – FJI A333

	Message Counts	%<= 90sec	%<= 180sec	Message Counts	%<= 90sec	%<= 180sec
FJI/A333	1137	93.84	98.24	1485	94.95	99.12

The FJI A333 aircraft had ongoing issues through 2020 and a CRA problem report was raised and a PBCS non-compliance report filed with PARMO in 2020. Fiji Airways stopped filing PBCS status for the aircraft during 2020.

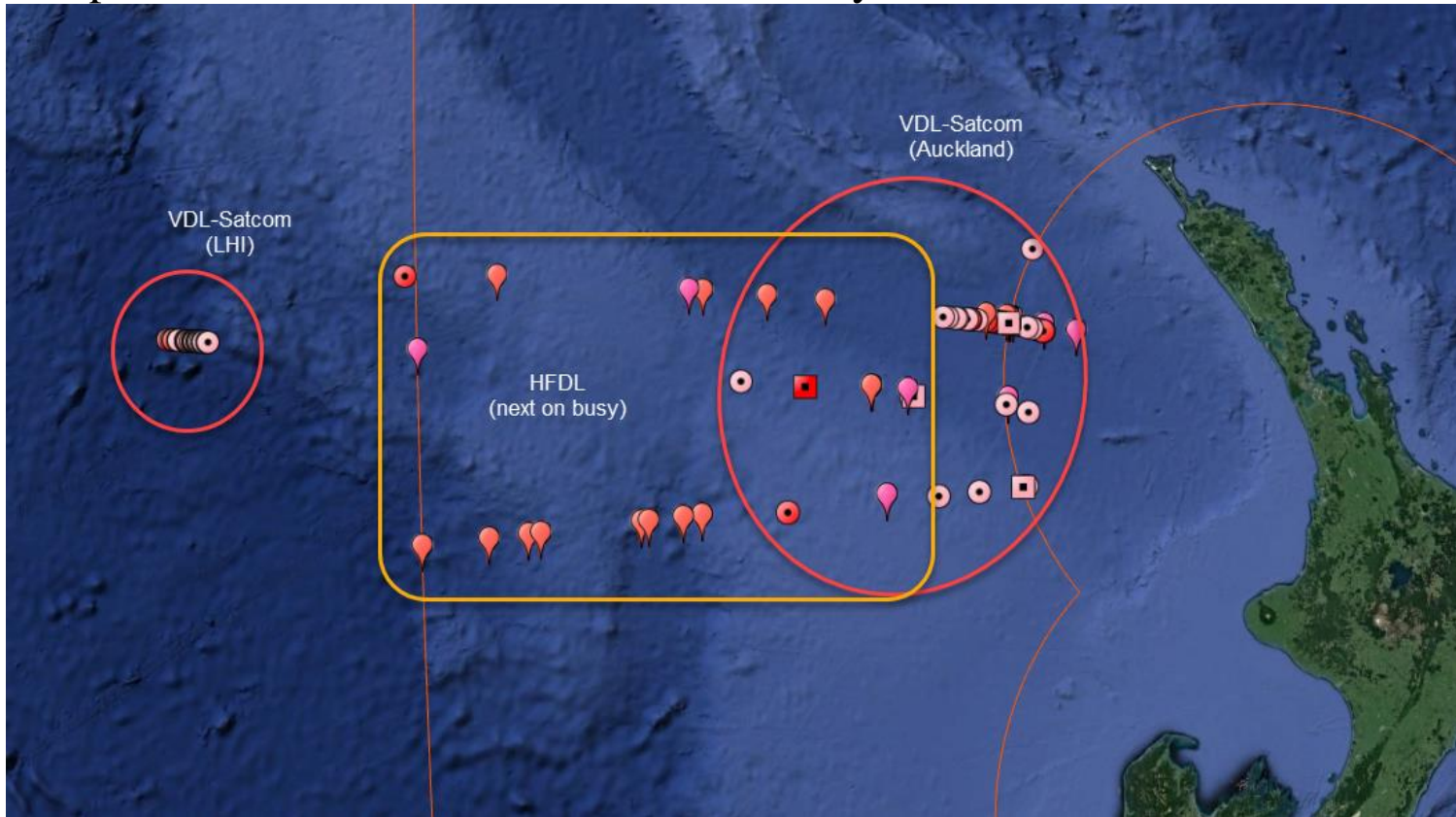
The airline continued working towards a resolution and in October 2022 were again filing PBCS RSP180 status. Performance observed since that time continues to meet PBCS requirements.

ADS-C Performance								
Colour Key		Period 1 Oct 2022 - 30 Apr 2023					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 RSP180								
All	All	A333	FJI	DQFJW	All	5205	98.3	99.65

Case Study #4 – TMN B763

	Message Counts	%<= 90sec	%<= 180sec	Message Counts	%<= 90sec	%<= 180sec
TMN/B763	3238	96.94	98.98	3641	97.01	98.30

The aircraft is not PBCS certified. The performance degradation observed is due to two reasons: first the aircraft uses HF DL in a “next on busy” mode with satcom; and second, latency delays caused by VHF Satcom transition issues when departing New Zealand airspace and in the Tasman Sea in the vicinity of Lord Howe Island.

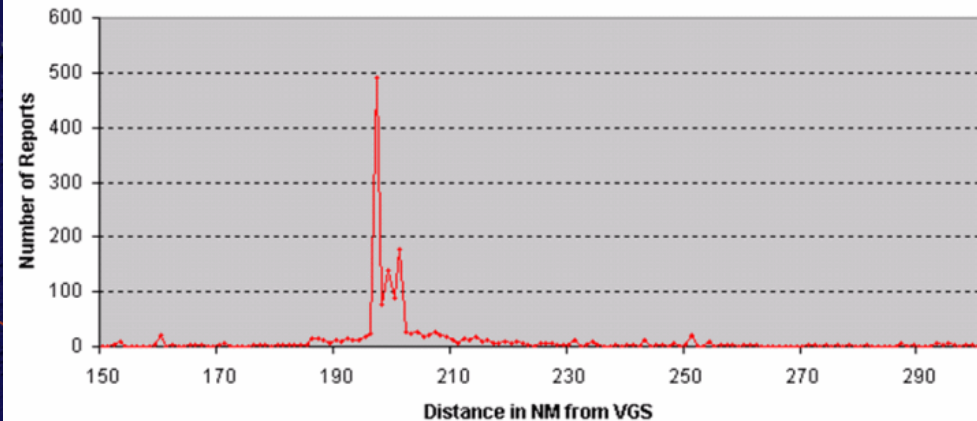
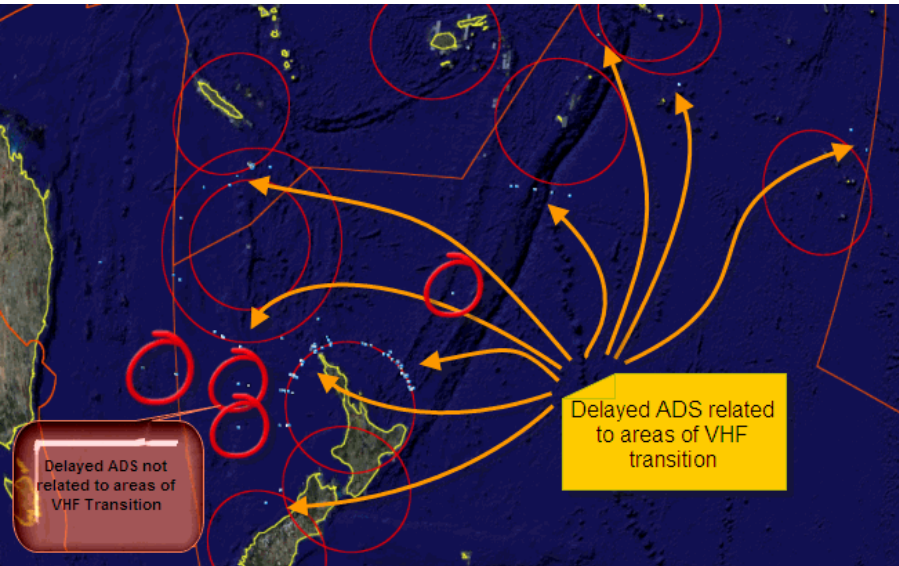


Paddle = HF
 Circle = Satcom
 Square = VHF

Pink = 90"-180"
 Red = >180"

Case Study #5 – Pre-PBCS B777 VDL-Satcom transition delays

- In 2009 Airways filed a CRA problem report on significant ADS-C downlink delays from B777 using SITA RGS in VHF transition areas

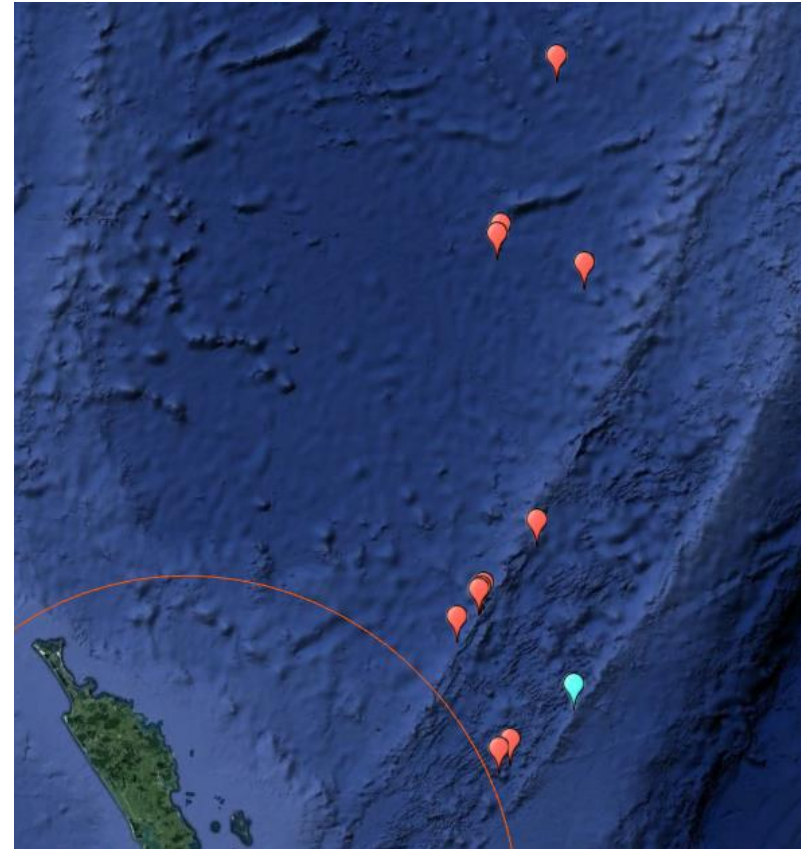


- Boeing subsequently identified an issue with transitions into SATCOM from SITA VHF coverage and a software fix was implemented in the AIMS Block Point 14 upgrade.



Case Study #6 – ANZ B77W

- In our June 2022 performance report Airways reported on a deterioration with ANZ B77W. Fleet had recently been re-activated from long term storage during the pandemic.
- Investigation showed that the delays were associated with late satellite RGS transitions occurring on southbound routes from North America when the aircraft transitions from the Americas (AME) satellite to the Asia-Pacific (APK) satellite as illustrated.



Case Study #6 – ANZ B77W

- A check of the Tahiti data showed the aircraft meeting PBCS requirements in NTAA.

ADS-C Performance								
Colour Key		Period 1 Jun 2022 - 30 Jun 2022					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								
All	All	B77W	ANZ	ZKOKN	NZZO	387	97.93	98.7
All	All	B77W	ANZ	ZKOKN	NTTT	121	99.17	100
All	All	B77W	ANZ	ZKOKQ	NZZO	611	97.7	98.19
All	All	B77W	ANZ	ZKOKQ	NTTT	334	100	100

- Air New Zealand investigation showed that the late transition from the Americas to the Pacific I4 satellite was caused by the Aircraft ORT having the MTSAT satellite with priority for Pacific coverage.



Case Study #6 – ANZ B77W

- The MTSAT satellite had been withdrawn from service while the aircraft were in storage.
- The aircraft ORT were modified between July and September to remove MTSAT and PBCS requirements are now met.

ADS-C Performance								
Colour Key		Period 1 Dec 2022 - 30 Apr 2023					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 RSP180								
All	All	B77W	ANZ	ZKOKN	All	5644	99.18	99.66
All	All	B77W	ANZ	ZKOKO	All	4615	99.63	99.93
All	All	B77W	ANZ	ZKOKP	All	6329	99.24	99.74
All	All	B77W	ANZ	ZKOKQ	All	6339	99.35	99.7
All	All	B77W	ANZ	ZKOKR	All	2800	99.64	99.85
All	All	B77W	ANZ	ZKOKS	All	5796	99.46	99.72



Thank you

