AIRWAYS

Post Implementation Monitoring

Post-implementation monitoring of FANS1/A performance in the Auckland Oceanic FIR (NZZO) to enable FANS1/A operations and the application of performance-based separation minima

FIT-Asia/15
PBCS Seminar
26 June 2025

ICAO requirements

Annex 11 Air Traffic Services

2.29 Safety Management

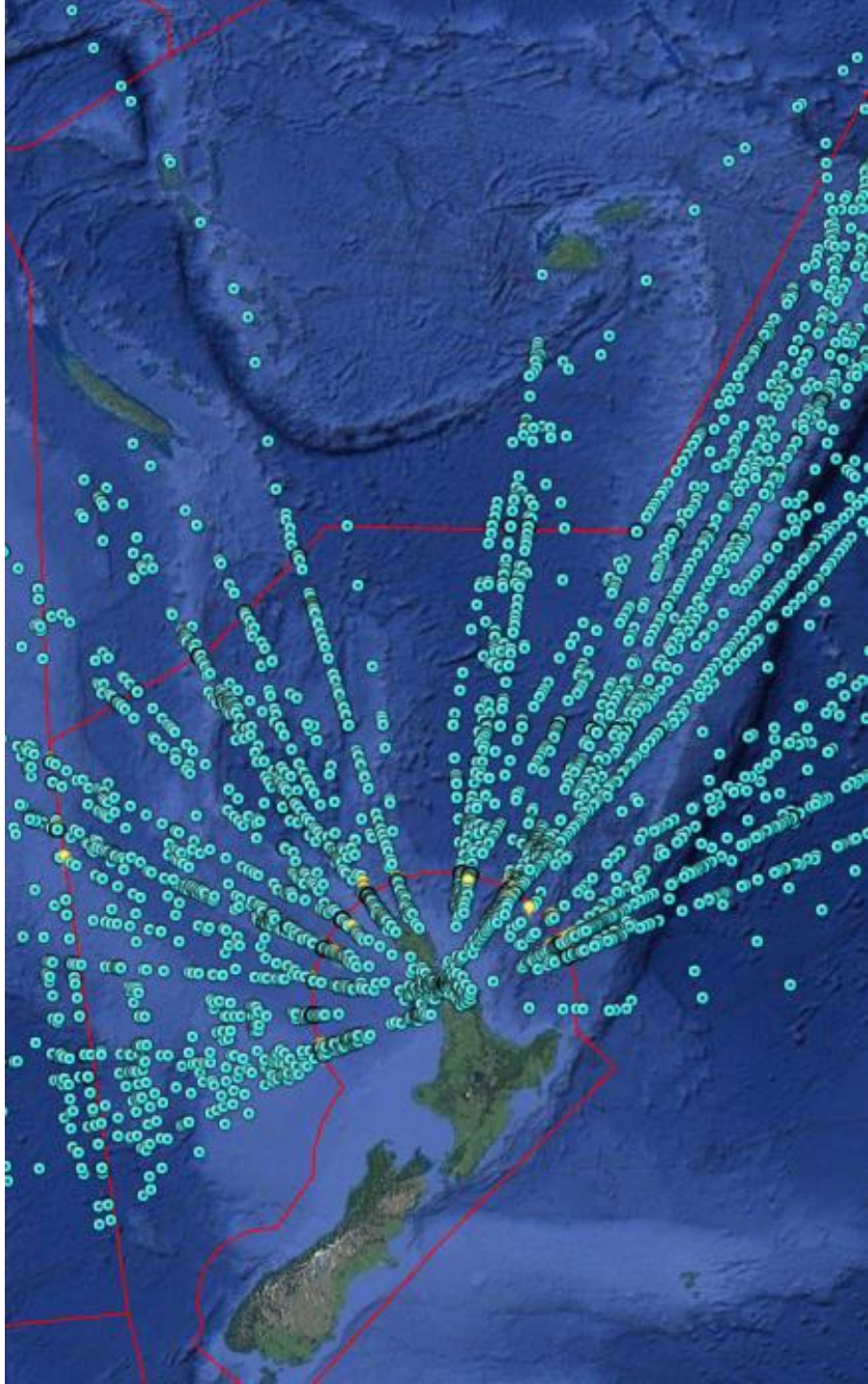
Any significant safety-related change to the ATS system, including the implementation of a reduced separation minimum or a new procedure, shall only be affected after a safety assessment has demonstrated that an acceptable level of safety will be met, and users have been consulted. When appropriate, the responsible authority **shall ensure** that **adequate provision** is made for **post-implementation monitoring to verify that the defined level of safety continues to be met**.

3.3 Operation of ATC service

3.3.5.2 Where RCP/RSP specifications are applied, **programmes shall be instituted for monitoring the performance of the infrastructure and the participating aircraft against the appropriate RCP/RSP specifications, to ensure that operations in the applicable airspace continue to meet safety objectives.** The scope of monitoring programmes shall be adequate to evaluate communication and/or surveillance performance, as applicable.

PANS-ATM Doc 4444

Specifies CPDLC at RCP240 and ADS-C at RSP180 for the performance-based separation standards.



AIRWAYS

ICAO guidance

Reference : APAC Electronic Documents – ATM – Safety monitoring

Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Data Link Systems in the Asia/Pacific Region

Chapter 2. – Requirements for Safety and Performance monitoring.

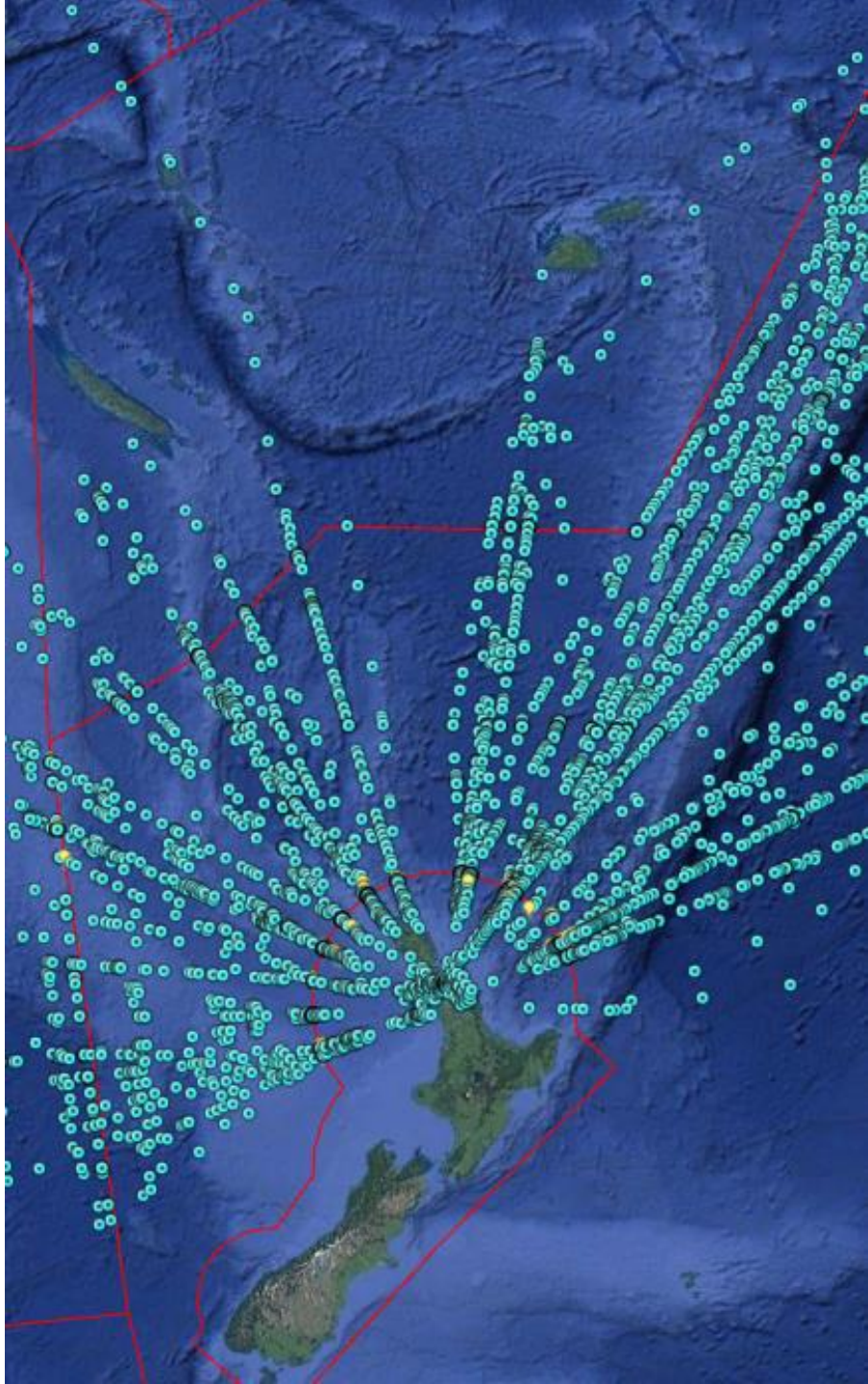
NAT Doc 011 – PBCS Monitoring and Reporting Guidance North Atlantic (NAT) Region

Chapter 2. – Local PBCS Monitoring and Reporting.

ICAO Doc 9869 Performance-based Communication and Surveillance Manual

Chapter 4. 5 - Continued Operational Compliance – PBCS Monitoring Programmes.

Appendix D – Post-implementation monitoring and corrective action (CPDLC and ADS-C)



AIRWAYS

Industry documents

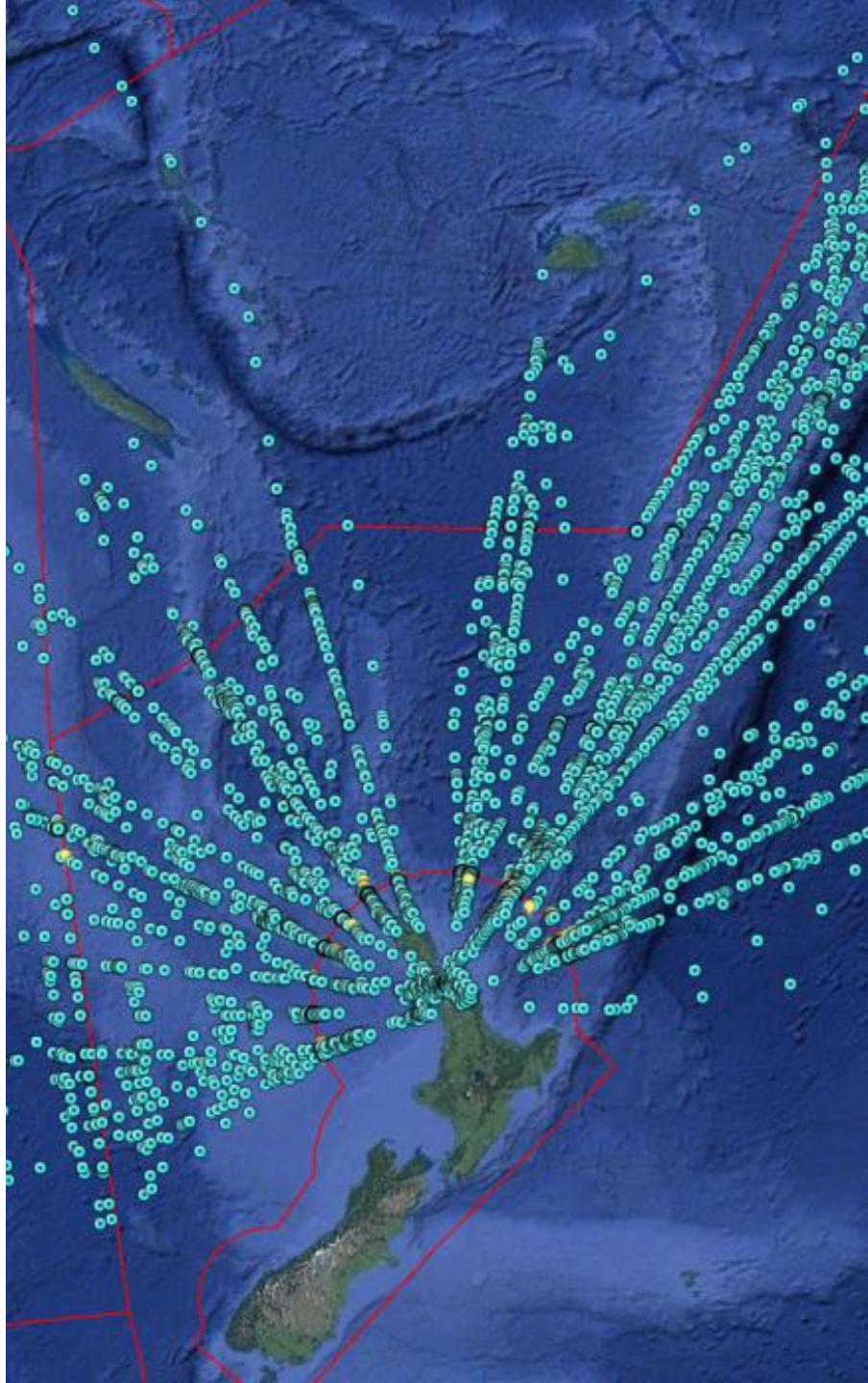
RTCA DO-306 Oceanic Safety and Performance Requirements (Oceanic SPR)

Supports the use of CPDLC at RCP240 and ADS-C at RSP180 in ENR-2 oceanic airspace for the application of the ICAO performance-based separation standards.

Supports the use of CPDLC at RCP400 and ADS-C at RSP400 in ENR-2 oceanic airspace for lateral separation >= 50NM and longitudinal separation >= 10 minutes

Defines performance requirements for ATC Communication (ATC Comm) in ENR-2 oceanic airspace with CPDLC at RCP400 and ADS-C at RSP400.

Note: HF Voice communications used as secondary communications for the application of the performance-based separations standards is also monitored against RCP400



AIRWAYS

ICAO ASIA/PAC – ANSP action items for PBCS

Reference : APAC Electronic Documents – ATM – Data-link

1.1 Register on CRA website at www.fans-cra.com.

1.2 Establish means to extract FANS1A analysis data for CPDLC and ADS-C using guidance provided in ICAO Doc 9869 PBCS Manual Appendix D.

1.3 Filter extracted data FANS1A analysis data for CPDLC and ADS-C using guidance in PBCS Manual Appendix D.

1.4 Establish means to perform analysis of CPDLC RCP and ADS-C RSP at a suitable interval (usually monthly, but specific interval will be determined by local factors such as volume of data).

1.5 Investigate any performance degradation identified during monthly analysis.

1.6 Report non-compliance with RCP/RSP specifications to CRA.

1.7 Support CRA non-compliance investigations.

1.8 Report any aircraft that are filing as PBCS qualified but showing non-compliance with RCP and RSP 95% normal operating criteria to your state CAA and RMA.

1.9 Withdraw the use of performance-based separation minima requiring PBCS where aircraft data link performance is not compliant with RCP and RSP 95% operating criteria.

1.10 Implement an analysis of service availability to determine the impact of reported unplanned outages in your airspace (usually annually).

1.11 Implement local procedures and training to ensure operational staff log FANS1/A problems identified during operations to enable subsequent investigation.

1.12 Implement local investigation process for reported FANS1/A problems.

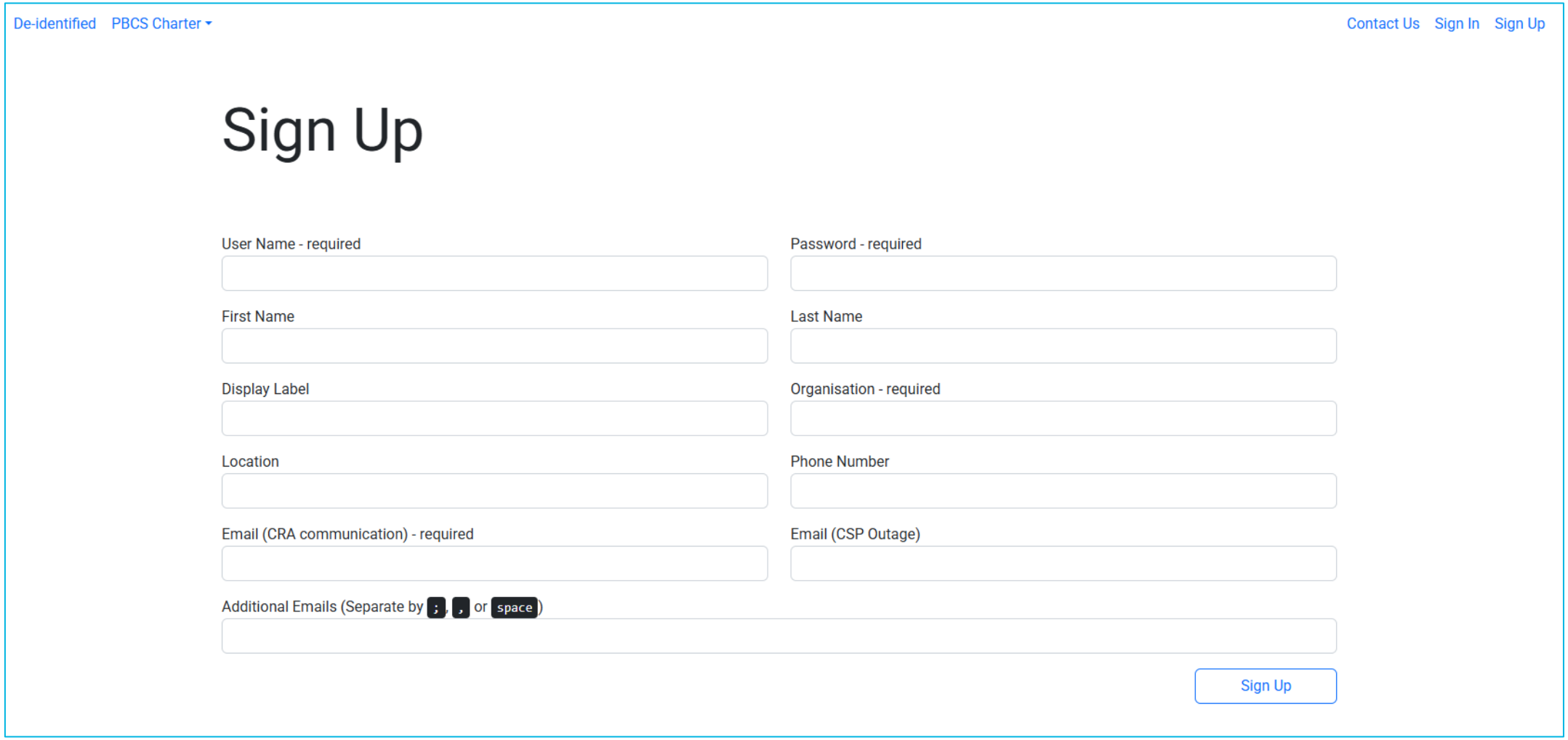
1.13 Implement CRA website reporting of confirmed FANS1/A problems.

1.14 If implementing PBCS, sign up to Global PBCS Charter on CRA website.

1.15 Submit PBCS non-compliance report to designated EMA/RMA by 20th of every month (if falls on a weekend then the next available working day).

1.16 Submission of Nil report is required.

Register on CRA website at www.fans-cra.com



AIRWAYS

Extract FANS1/A analysis data

Automated data extraction from the ATM system in PBCS Manual format .csv files.

ADS-C

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

Reference: Doc 9869 PBCS Manual Appendix D

CPDLC

ATSP	Tail_no	Ac_type	Ac_comp	Date	RGS_MA	AT1_MAS	AT1_time	MAS_tim	AT1_MAS	AT1_AC_tim	AT1_OCS_t	AT1_round	AT1_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	ZKNNG	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	00:35:18	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	00:55:19	36	12	"u118"	"d0"	22	36	14
NZZO	ZKNZH	B789	ANZ	20230401	APK1	APK1	01:12:06	01:12:11	5	01:12:18	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

AIRWAYS

Filter extracted data

The raw extracted data is filtered before uploading to our analysis website.

- CSP outages -

NZZO	DQFAE	B38M	FJI	20250130	IGW1	P	-28.8719	176.0123	21:14:12	21:35:12	1260
NZZO	9VSMK	A359	SIA	20250130	APK1	W	-43.0333	167.5034	21:14:17	21:35:12	1255
NZZO	ZKNNA	A21N	ANZ	20250130	IGW1	P	-34.9877	170.1115	21:14:29	21:35:13	1244
NZZO	ZKOKQ	B77W	ANZ	20250130	APK1	P	-36.14	167.5017	21:14:37	21:35:13	1236
NZZO	ZKOKU	B77W	ANZ	20250130	IGW1	L	-39.2451	164.8753	21:14:49	21:35:14	1225
NZZO	ZKNZN	B789	ANZ	20250130	APK1	P	-32.3322	-175.866	21:15:12	21:35:15	1203
NZZO	ZKNZD	B789	ANZ	20250130	APK1	P	-35.1993	170.1681	21:15:52	21:35:17	1165
NZZO	9VSMK	A359	SIA	20250130	APK1	P	-43.0994	168.0827	21:17:09	21:35:20	1091
NZZO	GOATW	A21N	AWC	20250130	IG1	A	-20.7427	-167.337	21:18:53	21:26:20	447
NZZO	GOATW	A21N	AWC	20250130	IG1	P	-20.7468	-167.368	21:19:07	21:28:22	555
NZZO	ZKJCJ	CL60	PVT	20250130	IGW1	P	-34.1203	-179.148	21:19:55	21:35:29	934
NZZO	ZKNHB	A20N	ANZ	20250130	IGW1	P	-38.9766	166.0692	21:20:51	21:35:30	879
NZZO	FOTOA	B789	THT	20250130	AME2	P	-5.43892	-166.954	21:21:06	21:35:31	865
NZZO	ZKNZN	B789	ANZ	20250130	APK1	W	-31.8298	-174.994	21:21:11	21:35:31	860
NZZO	ZKOKU	B77W	ANZ	20250130	IGW1	P	-39.3951	163.5399	21:24:09	21:35:38	689
NZZO	FOTOA	B789	THT	20250130	AME2	W	-4.99706	-167.504	21:26:24	21:35:44	560
NZZO	CFVNF	B789	ACA	20250130	AKL2	P	-33.7517	176.9463	21:27:09	21:35:45	516
NZZO	ZKOKU	B77W	ANZ	20250130	IGW1	W	-39.4177	162.9966	21:27:50	21:35:47	477
NZZO	DQFAE	B38M	FJI	20250130	IGW1	P	-30.7609	175.7514	21:29:11	21:32:24	193
NZZO	ZKNNA	A21N	ANZ	20250130	IGW1	P	-33.9756	168.3955	21:29:26	21:35:51	385
NZZO	ZKOKQ	B77W	ANZ	20250130	APK1	P	-35.9274	165.3436	21:29:33	21:35:51	378
NZZO	CFVNF	B789	ACA	20250130	AKL8	W	-34.0705	176.7453	21:30:02	21:35:52	350
NZZO	ZKNZN	B789	ANZ	20250130	APK1	P	-31.0789	-173.726	21:30:08	21:35:53	345
NZZO	DQFAE	B38M	FJI	20250130	IGW1	W	-30.9071	175.731	21:30:21	21:32:42	141
NZZO	ZKNZD	B789	ANZ	20250130	APK1	P	-34.3913	168.2132	21:30:48	21:35:54	306

Filter extracted data

The raw extracted data is filtered before uploading to our analysis website.

- Aircraft has a satcom failure enroute or operates no satcom with HFDL -

NZZO	9VSMR	A359	SIA	20250121	H05	P	-36.0051	160.369	09:54:31	09:55:45	74
NZZO	9VSMR	A359	SIA	20250121	H05	P	-36.5017	162.884	10:09:28	10:20:12	644
NZZO	9VSMR	A359	SIA	20250121	H05	W	-36.5235	163.0029	10:10:10	10:23:31	801
NZZO	9VSMR	A359	SIA	20250121	H05	P	-36.59	163.5269	10:13:11	10:24:06	655
NZZO	9VSMR	A359	SIA	20250121	H05	P	-36.8157	165.4723	10:24:24	10:26:41	137
NZZO	9VSMR	A359	SIA	20250121	AKL	P	-37.0677	168.0934	10:39:20	10:44:00	280
NZZO	9VSMR	A359	SIA	20250121	AKL	P	-37.2074	169.9106	10:49:45	10:52:59	194
NZZO	B1293	B789	CSN	20250126	H05	P	-29.2446	161.1583	01:33:32	01:36:50	198
NZZO	B1293	B789	CSN	20250126	H05	W	-30.4905	163.0029	01:48:01	01:48:11	10
NZZO	B1293	B789	CSN	20250126	H05	P	-30.5252	163.0623	01:48:28	01:49:09	41
NZZO	B1293	B789	CSN	20250126	AKL	P	-31.6339	165.0919	02:03:24	02:37:12	2028
NZZO	B18915	A359	CAL	20250118	H02	P	-35.2222	170.1714	09:02:23	09:11:38	555
NZZO	B18915	A359	CAL	20250118	H05	P	-34.4188	168.1121	09:17:20	09:22:09	289
NZZO	B18915	A359	CAL	20250118	H05	P	-33.583	166.0959	09:32:15	09:57:45	1530

Filter extracted data

The raw extracted data is filtered before uploading to our analysis website.

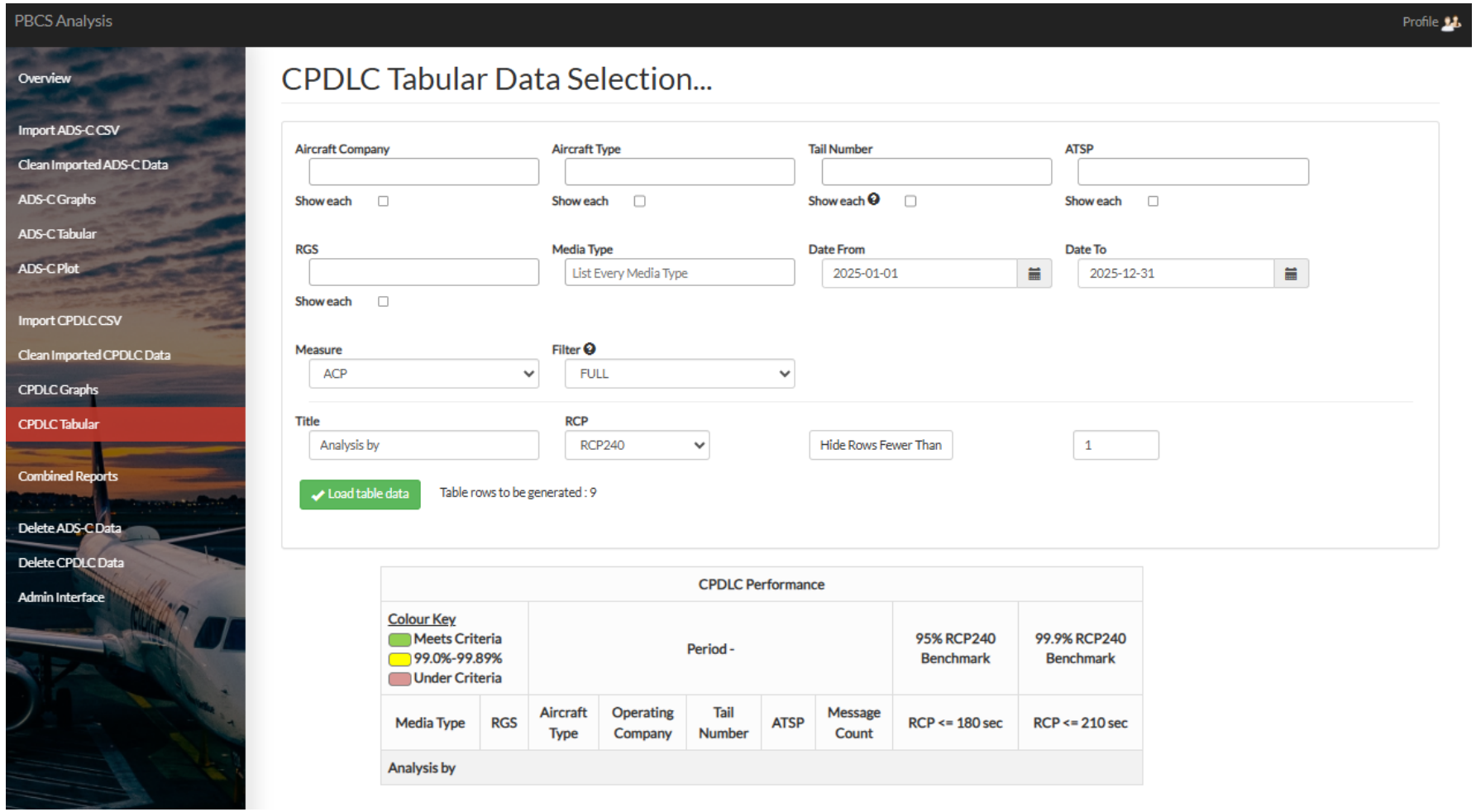
- Aircraft operates no satcom without HFDL -

NZZO	9VSFO	B744	SQC	20250506	AKL2	P	-38.139	170.5418	23:54:06	23:54:12	6
NZZO	9VSFO	B744	SQC	20250507	CBR2	PW	-38.3402	168.0398	01:09:02	01:57:26	2904

In this example the aircraft departs New Zealand Airspace using VDL RGS AKL2 and operates across the Tasman Sea without satcom. The next report (delayed) is received via the Australian VDL RGS CBR2.

Perform analysis

Airways uses a web-based tool for our analysis. The tool is available on a subscription basis and is currently in use by Fiji, New Zealand, Tahiti, and Malaysia.



AIRWAYS

Perform analysis

Airways uses a web-based tool to assist analysis.

The tool allows users to:

- Import ADS-C data files
- Create ADS-C performance reports in tabular and graphical format
- Create ADS-C plots on Google Earth
- Import CPDLC data files
- Create CPDLC performance reports in tabular and graphical format
- Create combined ADS-C and CPDLC performance reports for individual aircraft or airline fleets over selected time periods

AIRWAYS

Perform analysis

Airways uses a web-based tool for our analysis.

Extracting a combined RCP240 and RSP180 performance report for each aircraft

Operator	Aircraft Type	Tail No	ADS-C Message counts	ASP <= 90 sec	ASP <= 180 sec	CPDLC Transaction Counts	ACP <= 180 sec	ACP <= 210 sec
AAL	B77W	N733AR	248	97.58%	98.79%	42	100.00%	100.00%
AAL	B77W	N734AR	39	100.00%	100.00%	4	100.00%	100.00%
AAL	B77W	N735AT	105	99.05%	99.05%	13	100.00%	100.00%
ACA	B77L	CFIUF	12	100.00%	100.00%	3	100.00%	100.00%
ACA	B77W	CFIUL	36	100.00%	100.00%	5	100.00%	100.00%
ACI	A20N	FONEA	299	99.67%	100.00%	48	100.00%	100.00%
ACI	A339	FONEO	75	98.67%	100.00%	15	100.00%	100.00%
ANZ	A20N	ZKNHD	986	97.87%	99.90%	216	99.07%	99.54%
ANZ	A20N	ZKNHE	1011	97.33%	98.91%	216	98.15%	98.61%
ANZ	A20N	ZKNHF	1197	97.74%	99.92%	238	99.58%	100.00%
ANZ	A21N	ZKNNE	352	98.58%	100.00%	85	100.00%	100.00%
ANZ	A21N	ZKNNF	775	98.84%	99.87%	154	98.05%	98.70%
ANZ	A21N	ZKNNG	1236	99.19%	100.00%	234	100.00%	100.00%
ANZ	B77W	ZKOKM	917	99.24%	99.89%	172	100.00%	100.00%
ANZ	B77W	ZKOKN	640	99.53%	99.84%	111	98.20%	98.20%
ANZ	B77W	ZKOKO	995	98.89%	99.70%	201	98.51%	98.51%
ANZ	B77W	ZKOKP	1037	99.23%	99.71%	189	98.94%	98.94%
ANZ	B77W	ZKOKQ	540	98.15%	99.26%	104	99.04%	100.00%
ANZ	B789	ZKNZC	520	97.88%	99.62%	109	100.00%	100.00%
ANZ	B789	ZKNZD	790	99.11%	100.00%	127	100.00%	100.00%
ANZ	B789	ZKNZE	927	99.57%	100.00%	150	100.00%	100.00%
ANZ	B789	ZKNZF	820	99.15%	99.88%	161	100.00%	100.00%

AIRWAYS

Perform analysis

Airways uses a web-based tool for our analysis.

Extracting performance by fleet or tail number

ADS-C Performance								
Colour Key Meets Criteria 99.0%-99.89% Under Criteria		Period 1 May 2025 - 31 May 2025					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	A21N	ANZ	ZKNNA	NZZO	1287	98.91	100
All	All	A21N	ANZ	ZKNNB	NZZO	1179	98.98	99.83
All	All	A21N	ANZ	ZKNNC	NZZO	1286	98.52	99.53
All	All	A21N	ANZ	ZKNND	NZZO	1302	98.46	99.92
All	All	A21N	ANZ	ZKNNE	NZZO	352	98.57	100
All	All	A21N	ANZ	ZKNNF	NZZO	775	98.83	99.87
All	All	A21N	ANZ	ZKNNG	NZZO	1236	99.19	100

AIRWAYS

Investigate performance degradations

ADS-C – data inspection to identify reasons for degradation.

Example: Near FIR boundary operations – particularly Waypoint Event Reports (delays are caused by multiple contracts with different FIR)

N733AR	B77W	AAL	20250529	XXA	W	-30.4917	163.0052	00:45:48	00:49:08	200
N733AR	B77W	AAL	20250529	XXA	A	-30.4587	163.1252	00:46:28	00:49:17	169

Example: VDL/Satcom transition delays (common with FANS1/A)

B789	CCA	20250524	XXA	P	-36.0096	174.2969	08:00:03	08:00:09	6
B789	CCA	20250524	HLZ	P	-35.5978	174.1177	08:03:22	08:03:24	2
B789	CCA	20250524	XXA	P	-34.0684	173.4686	08:14:59	08:18:03	184
B789	CCA	20250524	XXA	W	-33.8741	173.3833	08:16:28	08:19:17	169

Investigate performance degradations

Example: Satcom RGS transition delays (common with FANS1/A)

A332	FJI	20250519	APK2	W	-29.9973	176.3584	04:14:40	04:14:50	10
A332	FJI	20250519	APK2	P	-28.7395	176.6123	04:23:46	04:26:50	184
A332	FJI	20250519	APK2	P	-26.6403	177.0225	04:38:42	04:38:55	13
A332	FJI	20250519	AME2	W	-24.9958	177.3281	04:50:18	04:52:03	105
A332	FJI	20250519	AME1	P	-24.528	177.3087	04:53:38	04:55:10	92

Example: HFDL use (common during RGS transitions)

B789	CCA	20250522	AKL	W	-33.8837	173.3934	04:56:13	04:56:15	2
B789	CCA	20250522	H13	P	-36.9041	174.5892	07:45:12	07:51:46	394
B789	CCA	20250522	XXA	P	-35.3465	173.9599	08:00:08	08:00:22	14

B788	LAN	20250512	APK1	W	-48.0032	-149.992	08:35:25	08:35:36	11
B788	LAN	20250512	H13	P	-48.2564	-148.132	08:43:35	08:47:29	234
B788	LAN	20250512	AME1	P	-48.6428	-144.704	08:58:31	08:58:37	6

Investigate performance degradations

Example: HFDL use (next-on-busy mode – common for those equipped)

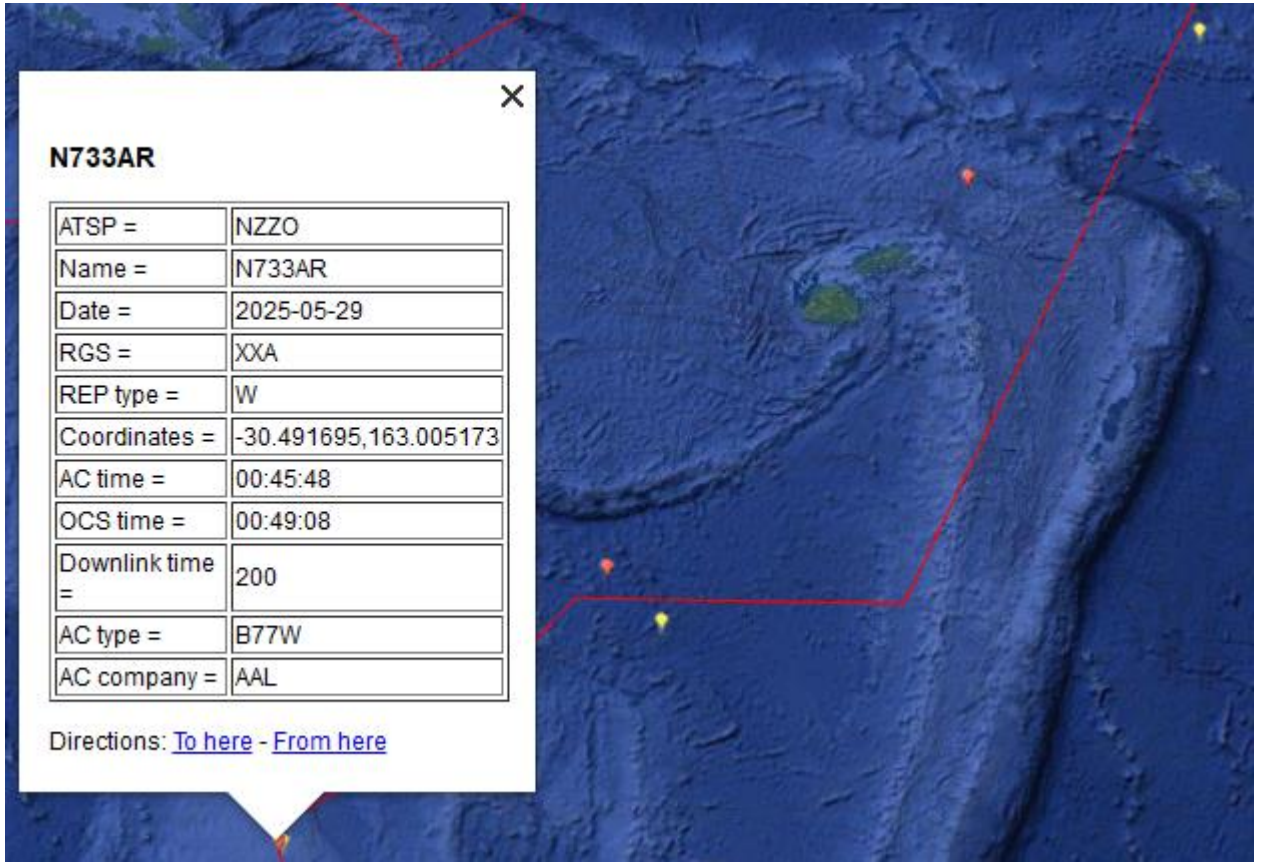
B763	TMN	20250424	XXA	W	-38.5807	163.0028	12:50:46	12:50:57	11
B763	TMN	20250424	H02	P	-38.5182	164.8383	13:01:39	13:05:19	220
B763	TMN	20250424	XXA	W	-38.475	165.7832	13:07:11	13:07:33	22

B789	CCA	20250403	XXA	P	-26.9189	168.9639	03:57:02	03:57:12	10
B789	CCA	20250403	H05	W	-27.095	169.0674	03:58:33	04:00:59	146
B789	CCA	20250403	XXA	P	-28.6427	169.9947	04:11:58	04:12:16	18

Investigate performance degradations

ADS-C – Google Earth display of delayed reports.

Example: Near FIR boundary operations – particularly Waypoint Event Reports (delays caused by multiple contracts)

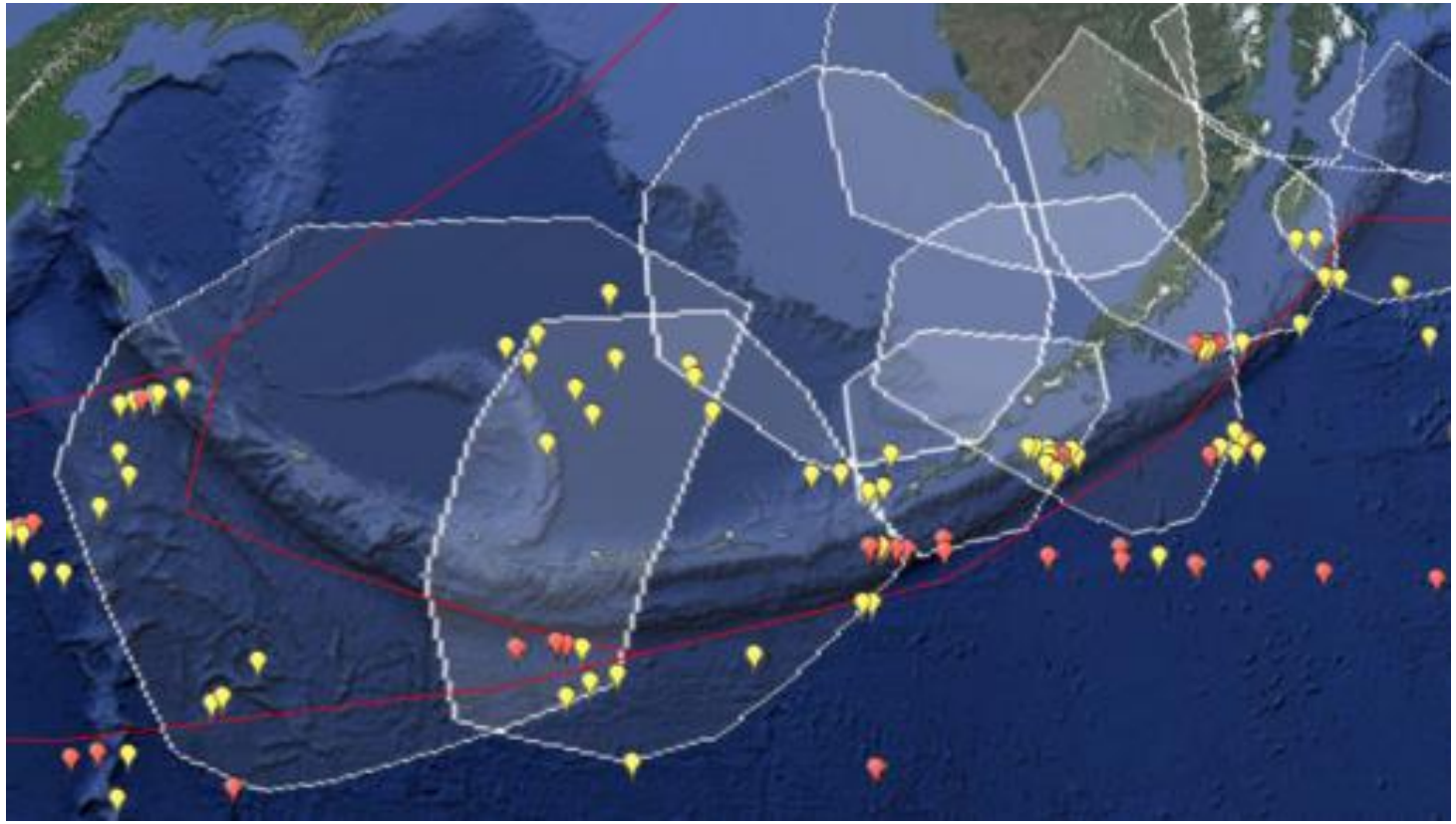


AIRWAYS

Investigate performance degradations

ADS-C – Google Earth display of delayed reports.

Example: RGS transition delays



AIRWAYS

Investigate performance degradations

CPDLC – Investigate delayed transactions.

Example: ANZ B77W 202504

Tail_no	Date	RGS_MAS	AT1_MAS	time	downlink_time	"upmsgid"	ACTP	ACP	PORT
ZKOKR	20250408	APK1	APK1	09:17:08	7	"u169"	8	224	216
ZKOKR	20250414	APK1	APK1	05:05:29	7	"u169"	9	251	242
ZKOKV	20250428	APK1	APK1	00:47:23	495	"u121"	497	501	4
ZKOKV	20250405	APK1	APK1	23:55:50	7	"u169"	11	556	545
ZKOKU	20250405	IGW1	IGW1	21:43:11	19	"u169 u169 u169"	112	222	110
ZKOKU	20250418	IGW1	IGW1	10:44:02	50	"u121"	215	381	166
ZKOKU	20250420	IGW1	IGW1	13:26:38	340	"u118"	353	381	28
ZKOKU	20250403	IGW1	IGW1	21:14:20	582	"u121"	651	718	67

- Analysis shows 8 delayed transactions all either free text or communications transfer instructions.
- OKR and OKV using Inmarsat satcom have 4 delayed transactions 3 are showing excessive PORT and one is showing network delays in the downlink path.
- OKU is using Iridium satcom and has 4 delayed transactions, 3 are showing excessive PORT and all 4 are showing network delays with 2 in the downlink path and 2 in the uplink path.

Report non-compliance to CRA

ID	Reference	Date	Status	Title
ACNZ_2025_03	3796-MM	2025-02-07	Active	GA7C using both iridium and Inmarsat satcom on same flight sector
ACNZ_2025_02	3792-CJ	2025-03-31	Active	Aircraft software load correlates with performance drop below PBCS RSP180/RCP240 requirements
ACNZ_2025_01	3772-MM	2025-01-20	Active	CPDLC Clearance Request Received when not CDA or NDA
ACNZ_2024_03	3667-RA	2024-01-27	Open	B77W using only RC/ARINC RGS shows ADS-C satcom latency delays when entering coverage of SITA VDL RGS NLK
ACNZ_2024_02	3665-CJ	2024-01-08	Active	Aircraft not meeting RSP180 95% normal operating requirements due satellite RGS transition issues
ACNZ_2023_08	3583-CJ	2023-09-30	Active	PBCS certified A333 with significantly delayed ADS-C reports on two flight sectors

Report non-compliance below 95% to CAA and RMA

A monthly performance report is provided to NZ CAA and Airways Management

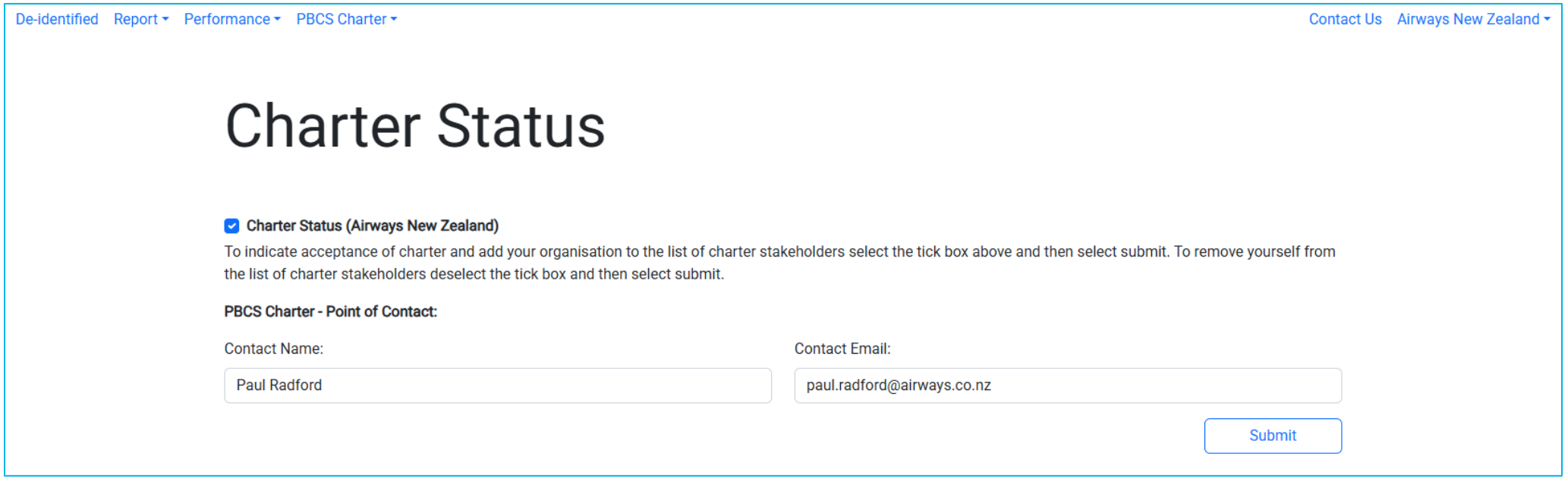
- The report provides combined performance report for the month and the previous 3-months.
- For CPDLC all transactions with a WILCO, ROGER, or UNABLE response are assessed.
- A report on all aircraft non-conformance with the PBCS 99.9% and 95% requirements is provided.
- An update on reported non-conformance aircraft the previous month is provided.

A monthly PBCS non-performance report is provided to NZ CAA and our RMA – PARMO (please refer to slide 21 below)

Implement CRA website reporting of confirmed FANS1/A problems.

ID	Reference	Date	Status	Title
ACNZ_2025_03	3796-MM	2025-02-07	Active	GA7C using both iridium and Inmarsat satcom on same flight sector
ACNZ_2025_02	3792-CJ	2025-03-31	Active	Aircraft software load correlates with performance drop below PBCS RSP180/RCP240 requirements
ACNZ_2025_01	3772-MM	2025-01-20	Active	CPDLC Clearance Request Received when not CDA or NDA
ACNZ_2024_03	3667-RA	2024-01-27	Open	B77W using only RC/ARINC RGS shows ADS-C satcom latency delays when entering coverage of SITA VDL RGS NLK
ACNZ_2024_02	3665-CJ	2024-01-08	Active	Aircraft not meeting RSP180 95% normal operating requirements due satellite RGS transition issues
ACNZ_2023_08	3583-CJ	2023-09-30	Active	PBCS certified A333 with significantly delayed ADS-C reports on two flight sectors

If implementing PBCS, sign up to Global PBCS Charter on CRA website



AIRWAYS

Submit PBCS non-compliance report to designated EMA/RMA by 20th of every month

Reference : APAC Electronic Documents – ATM – Data-link

N71Z is below RSP180 requirements in April from a small dataset of 108 datapoints.Similar results are observed in the consolidated 3-month data again from a small dataset. This aircraft was last investigated mid-2024 for non-compliance. At that time Oakland reported the aircraft was meeting RSP180 95% normal operating requirements in their airspace. The aircraft has consistently been below RSP180 95% normal operating requirements in NZZO in the 12 month period May 2024 - April 2025.

PBCS ATSP Non-compliance Report Form

Report Date:	9/06/2025
Period of observed non-compliance:	May 2024 - April 2025
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:	N71Z
Airline Operator:	IGA
State of Operator/Registry:	USA

PBCS Data

FIR	4-letter ICAO Aircraft Type	Registration	ADS-C downlink Message Counts	95% RSP 180 Benchmark ASP <=90 sec	CPDLC Transaction Counts (WILCO Received)	95% RCP 240 benchmark ACP <=180 sec	Issue code
NZZO	GA7C	N71Z	671	92.84%	32	87.50%	(*4)

AIRWAYS

Submit PBCS non-compliance report – issue codes

Reference: non-compliance report form – issue codes

Notes by numbers	Explanation	Recommendation(s)
(*1) Delayed reports around VHF/SAT transitions.	This note is used when ADS-C or CPDLC reports are observed with delays when there is mixed media usage in the sequence of reports before, at or after the delayed reports (ex.: VHF/VHF/SAT/VHF/SAT).	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #2).
(*2) Delayed reports via HF media.	This note is used when delayed ADS-C or CPDLC reports are observed to be delivered via HF data link (HFDL) or near reports delivered via HFDL. Check whether this appears to be a SATCOM failure with one flight or a period during the flight, or more continuous, intermittent use of HFDL. Potential issue with aircraft media priority settings.	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #1, #4, #9). - Review all Service Information Letters (SILs) and Software Bulletins (SBs) released from Satcom avionics manufacturers, particularly advice on Operator Requirement Table (ORT) set-up.
(*3) Delayed reports due to Inmarsat satellite to satellite transition (aircraft) or satellite problems (network).	This note is used when ADS-C or CPDLC reports are observed with delays and its noticed that there is a switch sequence between different or same Inmarsat satellite paths (Ex.: XXF/XXH/XXF/XXH). One known area where this occurs in the NAT is at 30W longitude. If multiple aircraft observed with same issue around same time, may be a network-related issue and ATSP may want to report to FANS-CRA/DLMA.	- Review all Service Information Letters (SILs) and Software Bulletins (SBs) released from Satcom avionics manufacturers, particularly advice on Operator Requirement Table (ORT) set-up. - Check with contracted Data Link Service Provider and Satellite Service Provider for possible coverage problems.

Submit PBCS non-compliance report – issue codes

Reference: non-compliance report form – issue codes

(*4) Delayed reports due to Iridium avionics (aircraft) or satellite problems (network).	This note is used when ADS-C or CPDLC reports are observed with delays via Iridium satellite paths (IG1, IGW1). If multiple aircraft observed with same issue around same time, may be a network-related issue and ATSP may want to report to FANS-CRA/DLMA.	- Check for SATCOM radio/unit problems.
(*5) Reported only on VHF and/or HF.	This note is used when delayed ADS-C reports or CPDLC messages are observed via VHF and/or HF only (no SATCOM). This might indicate that SATCOM unit is defective or became unavailable during flight. Check if this issue is observed during one flight or part of one flight only, or whether it is an ongoing problem. If not observed on subsequent flights, the issue may have been addressed.	- Operator should not declare PBCS if SATCOM not available. - Check for SATCOM radio/unit problems. - Flight crew should inform ATC if SATCOM becomes unavailable during flight.
(*6) Poor ACP due to high PORT.	This note is used when its found that the delayed CPDLC transactions are caused by high pilot operational response time (PORT).	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #6).

Submit PBCS non-compliance report – issue codes

Reference: non-compliance report form – issue codes

(*7) Aircraft data link connection problems detected.	This note is used when we can identify that delays happened on periods that disconnections and reconnections have been performed. Check whether this appears to be a problem with one flight or a period during one flight, or whether it is an ongoing problem. If problem is not observed on later flights, the issue may have been addressed.	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #8 unknown cause).
(*8) Delays related to specific VHF station.	This note is used when the delayed ADS-C reports and CPDLC messages are observed via a specific VHF ground station. If multiple aircraft observed with same issue, ATSP may want to report to FANS-CRA/DLMA as a VHF station issue.	- Review "NAT OPS Bulletin 2019_003: Data Link Performance Improvement Options" and recommended solutions/actions (Problem/Issue #2).
(*9) FMS time before ATC uplink time. Clock setting not syncronized with GPS.	This note is used when its found that the FMS response time is earlier than the ATC uplink time. According to aircraft manufacturers this happens when clock is set manually and not being set by synchronization with GPS source.	- Review procedures for clock settings to be set to GPS clock instead of manual set of clock.

Case Study – Dual Iridium/Inmarsat satcom degradation

In January 2023, a performance degradation was observed on two UAL B772 aircraft. This was Investigated, and reported to NZ CAA in the monthly report.

United Airlines (UAL) B772 (N27015, N37018)

Both aircraft are meeting the RSP180 95% normal operating requirements but are below the 99.0% requirement.

ADS-C Performance								
Colour Key Meets Criteria 99.0%-99.84% Under Criteria		Period 1 Jan 2023 - 31 Jan 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								
All	All	B772	UAL	N27015	NZZO	143	97.2	98.6
All	All	B772	UAL	N37018	NZZO	269	97.76	98.88

This fleet normally operates Inmarsat SATCOM however on 8th/9th January N37018 was operating both Inmarsat and Iridium SATCOM and on 6th/7th January N78002 was operating Iridium SATCOM.

On 8th/9th January ADS-C reports from N37018 were duplicated with the same reports sent by both Iridium and Inmarsat.

AIRWAYS

Case Study – Dual Iridium/Inmarsat satcom degradation

Further investigation showed the same ADS-C reports were sent by both Iridium and Inmarsat

Date	RGS	REP_TYPE	Latitude	Longitude	AC_time	ATM_time	Latency
20230215	IG1	P	-15.7601	-160.912	15:47:36	15:50:14	158
20230215	XXA	P	-15.7601	-160.912	15:47:36	15:49:59	143
20230215	IG1	P	-15.8244	-160.988	15:48:20	15:51:42	202
20230215	XXA	P	-15.8244	-160.988	15:48:20	15:51:32	192

Further investigation showed CPDLC uplinks via Iridium and the downlink responses via Inmarsat with significant deterioration in Actual Communication Performance.

Date	RGS_MAS	AT1_MAS	Time	ACP
20230215	IG1	XXA	16:03:56	169
20230215	IG1	XXA	16:49:14	242
20230215	IG1	XXA	17:55:35	314
20230215	IG1	XXA	18:36:05	211
20230215	IG1	XXA	18:39:29	226
20230216	IG1	IG1	03:42:53	184
20230216	IG1	XXA	04:40:50	222
20230216	IG1	IG1	04:56:08	219
20230216	IG1	XXA	06:19:23	225
20230216	IG1	XXA	06:43:32	198

Case Study – Dual Iridium/Inmarsat satcom degradation

A FANS1/A problem report was filed in February 2023 to enable CRA investigation

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

In March 2023, the CRA reported back: ACARS message log analysis shows that two SDUs appear to be installed (Inmarsat and Iridium), and both are configured as the primary SDU on the A429 output bus and are operational at the same time. Duplicate downlinks (identical content, MSN, and DBI) are sent at the same time from the DCMF on both Iridium and Inmarsat. On the other side, uplinks appear to be reaching DCMF through the Iridium SDU – however, DCMF is acknowledging these uplinks through both Inmarsat and Iridium. Uplinks sent through Inmarsat are not being acknowledged by DCMF. This appears to be an issue with the SDU installation. Boeing advises UAL to investigate their SDU installation so that only one SDU is powered up and connected to AIMS.

Case Study – Dual Iridium/Inmarsat satcom degradation

The Problem Report was closed by the CRA in early 2025 after no further occurrences.

The current performance of the two aircraft meets PBCS requirements.

ADS-C Performance								
Colour Key Meets Criteria 99.0%-99.89% Under Criteria		Period 1 Jan 2025 - 31 May 2025					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								
All	All	B772	UAL	N27015	NZZO	168	98.8	100
All	All	B772	UAL	N37018	NZZO	149	99.32	100

AIRWAYS

AIRWAYS

Thank You

FIT-Asia/15
PBCS Seminar
26 June 2025