

FANS Interoperability Team Meeting (FIT/18)

Honolulu, Hawaii, USA, 22-23 March 2011

Agenda Item 4 – Working Papers

FANS 1/A Performance

Presented by Airways New Zealand

SUMMARY

The observed performance of FANS1/A aircraft and network availability in the NZZO Oceanic FIR continues to improve. Network availability, CPDLC and ADS-C performance is measured against the criteria specified in the ICAO Global Operational Data Link Document (GOLD).

1. INTRODUCTION

- 1.1. Post implementation monitoring provides performance data on the FANS1/A ADS-C and CPDLC applications that can be measured against Required Communications Performance (RCP) and Required Surveillance Performance (RSP).
- 1.2. The measurement of availability is based on outages that are notified by the CSP's and outages that are detected by observation of the collected FANS1/A data.
- 1.3. These measurements provides verification that system safety objectives that rely on the FANS1/A communications and surveillance infrastructure are met, and provide the basis for system performance improvement where deficiencies are found.
- 1.4. This paper provides a summary of current performance. Detailed performance data is available at the ISPACG CRA website at <http://www.ispacg-cra.com/>

2. DISCUSSION

ADS-C Performance

- 2.1. Figure 2-1 below illustrates the performance improvement seen in SATCOM ADS-C latency since July 2009. In November 2009 98.5% of messages were being delivered within the RSP180 Overdue Time (OT) criteria of 180 seconds. In February 2011 this has improved to 99.7% of messages delivered within 180 seconds. We suspect that this improvement has been mainly driven by the BP14 and subsequent upgrades to the B777 fleets and the GES upgrade known as Release 15

that resolved the conflict between Data2 FANS1/A and Data3 cabin services transmissions. We suspect that at least three of the B777 fleets operating in NZZO have not yet upgraded to BP14 and further overall improvement is anticipated.

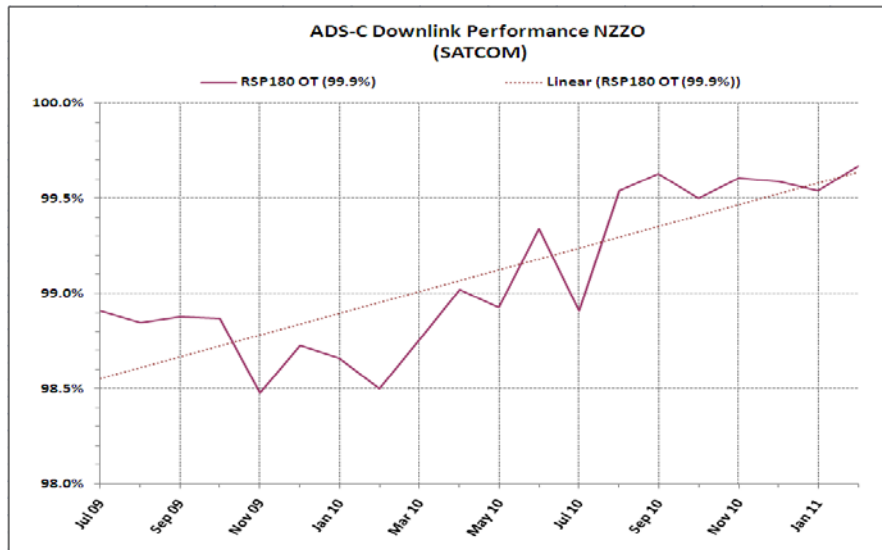


Figure 2-1 ADS-C Latency (July 2009 – February 2011)

2.2. Figure 2-2-below illustrates the performance by operator and aircraft type as measured during January and February 2011. 98% of messages met the normal operations delivery requirement (DT) that 95% of messages be delivered within 90 seconds. 27% of messages were delivered within the RCP180 overdue time (OT) 99.9% 180 second requirement with a further 63% achieving between 99.5-99.9% at 180 seconds.

Operator	Type	# Messages	% of Total	% DT 95% 90sec	% OT 99.9% 180sec	ADS-C NZZO Jan-Feb 2011 RSP180 Analysis
TIT	A332	157	0.40%	100.00%	100.00%	26.65% messages achieved OT 99.9% 180 sec
WWW	A343	141	0.36%	100.00%	100.00%	
ABA	B773	57	0.15%	100.00%	100.00%	
AAA	A343	1148	2.93%	99.83%	100.00%	
OOO	B77W	1147	2.93%	99.39%	100.00%	
A2A	B772	507	1.29%	99.01%	100.00%	
JJJ	A332	476	1.22%	98.32%	100.00%	
HHH	B744	154	0.39%	97.40%	100.00%	
YYY	B77W	504	1.29%	97.02%	100.00%	
XXX	B744	5403	13.80%	99.67%	99.91%	
EEE	B772	746	1.90%	98.39%	99.87%	63.2% messages between 99.5 - 99.9% 180sec
LLL	B77L	615	1.57%	99.67%	99.84%	
ZZZ	A343	3310	8.45%	99.76%	99.82%	
MMM	A332	2925	7.47%	99.52%	99.73%	
SSS	A388	737	1.88%	98.78%	99.73%	
QQQ	B77W	2424	6.19%	99.50%	99.71%	
NNN	B744	2633	6.72%	99.35%	99.62%	
GGG	B744	5536	14.14%	99.21%	99.57%	
DDD	B772	4905	12.52%	98.59%	99.51%	
PPP	B77W	1669	4.26%	99.28%	99.46%	
VVV	B772	941	2.40%	97.56%	99.26%	5.42% messages between 99% - 99.5% 180 sec
AAA	B77L	118	0.30%	99.15%	99.15%	
UUU	A388	451	1.15%	98.23%	99.11%	
OTHER	VARIOUS	625	1.56%	98.40%	99.04%	4.71% messages less than 99%
CCC	B744	687	1.75%	97.53%	98.84%	
FFF	B772	400	1.02%	95.25%	98.75%	
RRR	B772	387	0.99%	92.25%	97.67%	
KKK	B744	371	0.95%	93.26%	95.69%	

Figure 2-2 ADS-Latency by Operator and Aircraft Type (January-February 2011)

- 2.3. Around 40% of the scheduled airline passenger fleets meet the RCP180 99.9% 180 second delivery requirement with around a further 30% achieving between 99.5-99.9% at 180 seconds.
- 2.4. The monthly data link performance report for February 2011 by NZZO is attached at Appendix A.

CPDLC Performance

- 2.5. Figure 2-3 below illustrates the performance improvement seen in SATCOM CPDLC Actual Communications Technical Performance (ACTP) since July 2009. The graph depicts the percentage of messages delivered against the RCP240 ACTP 99.9% 150 second expiry time requirement. In February 2011 SATCOM ACTP meets the RCP240 requirement.
- 2.6. Figure 2-3 does not graph the RCP240 ACTP normal operations transaction time (TT) requirement of 95% completion within 120 seconds. However, this is being consistently achieved and in February 2011 99.59% of messages were delivered within this period.
- 2.7. The monthly data link performance report for February 2011 by NZZO is attached at Appendix A.

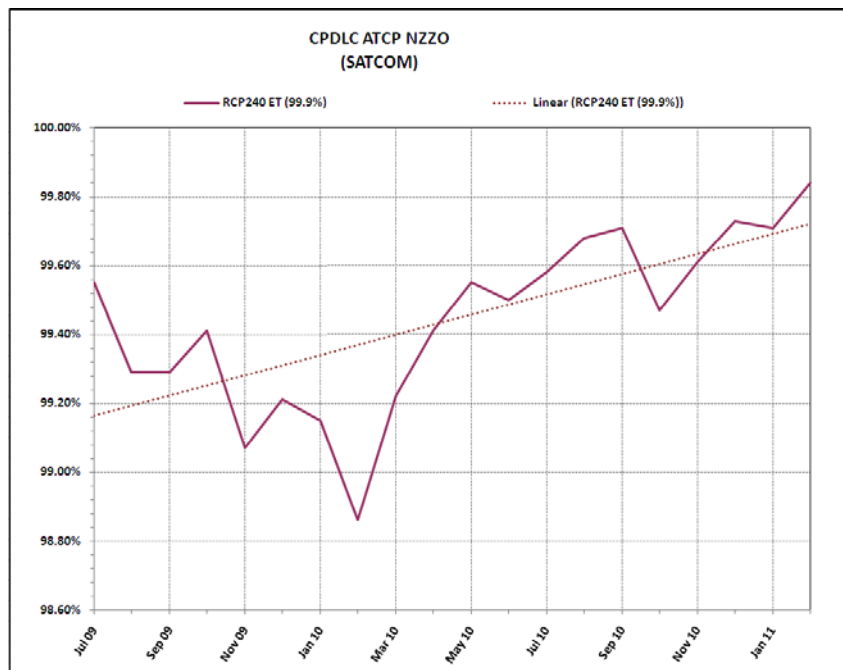


Figure 2-3 ATCP SATCOM Jul 09 – Feb 11

- 2.8. Figure 2-4 below illustrates ACTP performance by operator and aircraft type. All fleets meet the RCP240 normal operation 95% 120 second requirement. 19 of the

observed fleets also meet the RCP240 expiry time (ET) 99.9% 150 second requirement, with a further 5 fleets achieving over 99.5% at 150 seconds.

Operator	Type	# Messages	% of Total	RCTP 95% 120sec	RCTP 99.9% 150sec	CPDLC NZZO Jan-Feb 2011 RCP240 ANALYSIS
PPP	B77W	386	5.48%	100.00%	100.00%	50.48% messages achieved RCTP 99.9% 150sec
VVV	B772	242	3.44%	100.00%	100.00%	
OOO	B77W	197	2.80%	100.00%	100.00%	
AAA	A343	175	2.49%	100.00%	100.00%	
UUU	A388	131	1.86%	100.00%	100.00%	
SSS	A388	130	1.85%	100.00%	100.00%	
FFF	B772	93	1.32%	100.00%	100.00%	
A2A	B772	84	1.19%	100.00%	100.00%	
MIL	VAR	84	1.19%	100.00%	100.00%	
KKK	B744	60	0.85%	100.00%	100.00%	
JJJ	A332	49	0.70%	100.00%	100.00%	
HHH	B744	43	0.61%	100.00%	100.00%	
WWW	A343	30	0.43%	100.00%	100.00%	
TTT	A332	27	0.38%	100.00%	100.00%	
XXX	B744	1075	15.27%	99.91%	100.00%	
QQQ	B77W	402	5.71%	99.75%	100.00%	
EEE	B772	152	2.16%	99.34%	100.00%	
RRR	B772	94	1.34%	98.94%	100.00%	
OTHER	VAR	99	1.41%	98.28%	100.00%	
DDD	B772	937	13.31%	98.72%	99.79%	45.58% messages between 99.5% - 99.9%
NNN	B744	486	6.91%	99.38%	99.59%	
ZZZ	A343	454	6.45%	99.34%	99.56%	
GGG	B744	764	10.86%	99.35%	99.48%	
MMM	A332	567	8.06%	99.47%	99.47%	3.94% messages between 99% - 99.5%
CCC	B744	140	1.99%	99.29%	99.29%	
YYY	B77W	137	1.95%	99.27%	99.27%	

Figure 2-4 ATCP SATCOM by Operator

2.9. Figure 2-5 below illustrates the performance improvement seen in SATCOM CPDLC ACP since July 2009. In February 2011 SATCOM ACP observed in NZZO did not meet the RCP240 99.9% 210 second expiry time (ET) requirement.

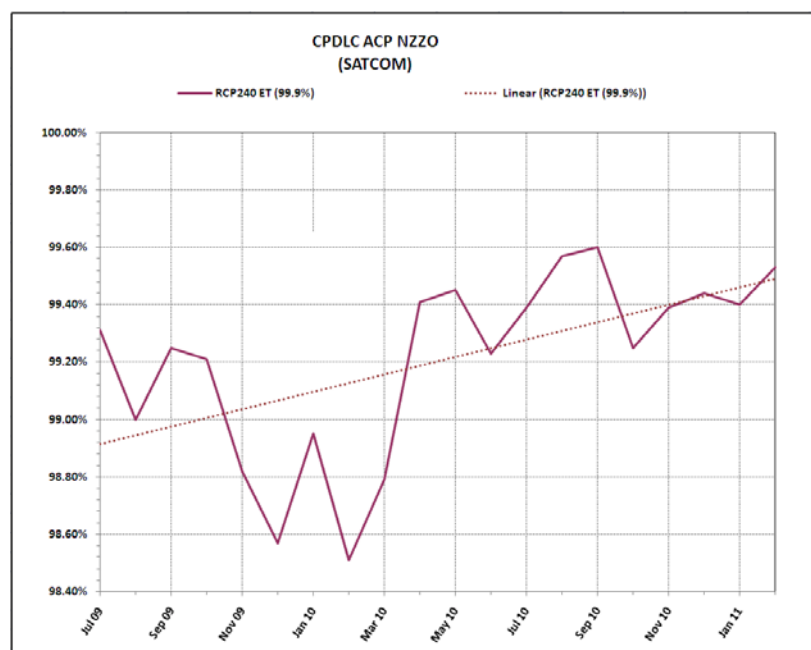


Figure 2-5 ACP SATCOM Jul 09 – Feb 11

2.10. Figure 2-5 does not graph the RCP240 ACP normal operations transaction time (TT) requirement of 95% completion within 180 seconds. However, this is being consistently achieved and in February 2011 99.25% of messages were delivered within the required period.

2.11. The monthly data link performance report for February 2011 by NZZO is attached at Appendix A.

Operator	Type	# Messages	% of Total	RCP 95% 180sec	RCP 99.9% 210sec	CPDLC NZZO Jan-Feb 2011 RCP240 ANALYSIS
QQQ	B77W	402	5.71%	100.00%	100.00%	24.41% messages achieved RCP 99.9% 210 sec
VVV	B772	242	3.44%	100.00%	100.00%	
AAA	A343	175	2.49%	100.00%	100.00%	
EEE	B772	152	2.16%	100.00%	100.00%	
SSS	A388	130	1.85%	100.00%	100.00%	
RRR	B772	94	1.34%	100.00%	100.00%	
FFF	B772	93	1.32%	100.00%	100.00%	
A2A	B772	84	1.19%	100.00%	100.00%	
KKK	B744	60	0.85%	100.00%	100.00%	
JJJ	A332	49	0.70%	100.00%	100.00%	
HHH	B744	43	0.61%	100.00%	100.00%	
WWW	A343	30	0.43%	100.00%	100.00%	
TTT	A332	27	0.38%	100.00%	100.00%	
YYY	B77W	137	1.95%	99.27%	100.00%	
DDD	B772	937	13.31%	99.57%	99.79%	36.1% messages between 99.5% - 99.9%
ZZZ	A343	454	6.45%	99.12%	99.56%	
OOO	B77W	197	2.80%	99.49%	99.49%	
PPP	B77W	386	5.48%	99.48%	99.48%	26.13% messages between 99% - 99.5%
MMM	A332	567	8.06%	99.12%	99.47%	
GGG	B744	764	10.86%	99.21%	99.35%	13.36% messages less than 99%
XXX	B744	1075	15.27%	99.16%	99.35%	
NNN	B744	486	6.91%	97.74%	98.97%	
MIL	VAR	84	1.19%	98.80%	98.80%	
CCC	B744	140	1.99%	98.57%	98.57%	
UUU	A388	131	1.86%	98.47%	98.47%	
OTHER	VAR	99	1.41%	96.55%	96.55%	

Figure 2-6 ACP SATCOM by Operator

2.12. Figure 2-6 above illustrates ACP performance by operator and aircraft type. All fleets meet the RCP240 normal operation 95% 180 second transaction time (TT) requirement. 14 of the observed fleets also meet the RCP240 expiry time (ET) 99.9% 210 second requirement, with a further 5 fleets achieving over 99.5% at 210 seconds.

Availability

2.13. Figures 2-7 and 2-8 below graph observed availability and network outages between December 2008 and February 2011. The system is meeting the availability safety requirement of 99.9% and is almost meeting the efficiency target of 99.99%.

2.14. The data for NZZO is based on outage reports from ARINC and SITA and unreported outages detected from data analysis.

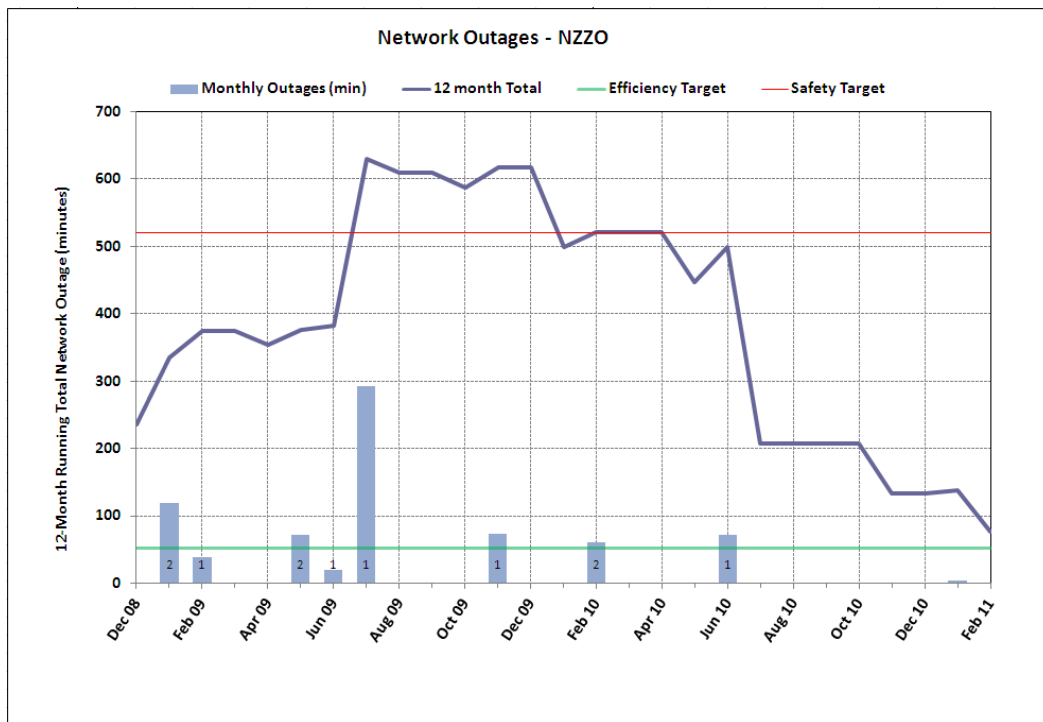


Figure 2-6 Network Outages NZZO December 2008- February 2011

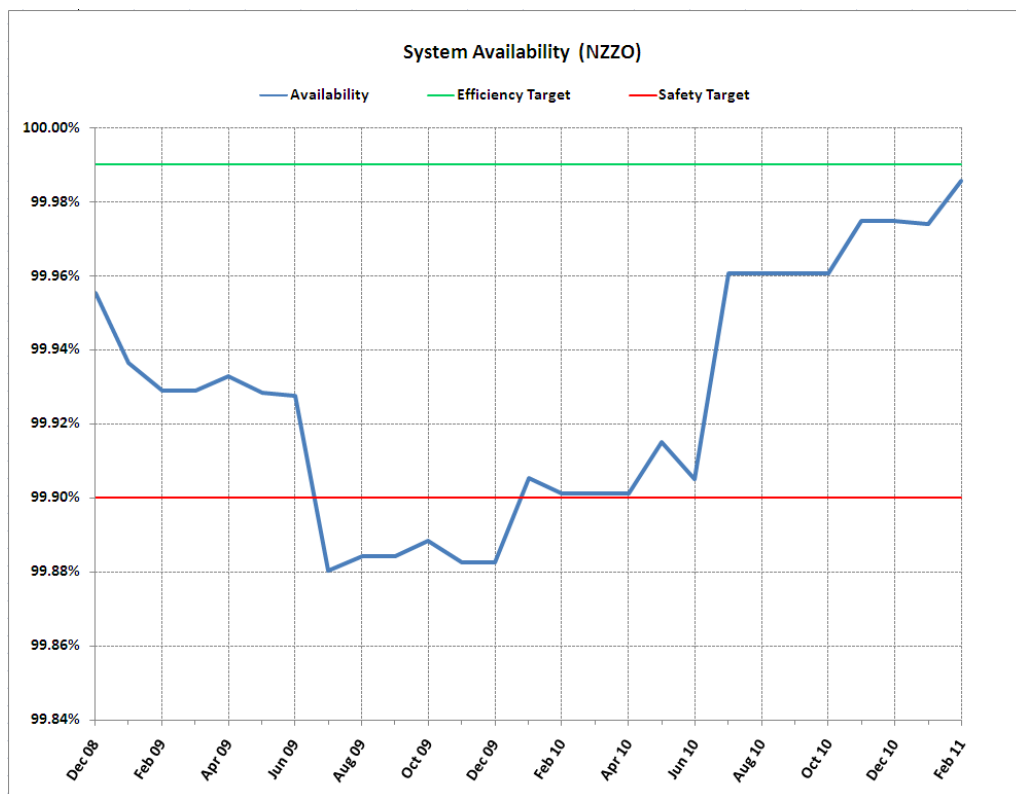


Figure 2-7 System Availability December 2008- February 2011

2.15.No outage reports are received at NZZO from Iridium. We have seen limited Iridium traffic in NZZO and further trials are planned in 2011. The ISPACG FIT



should ensure that all ISPACG ANSP receive outage reports on the Iridium network before further operations are implemented.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Note the performance and availability improvements observed.
- b) Agree the need for ANSP receipt of Iridium network outages information before further Iridium operations commence.

Appendix 1- NZZO Monthly Performance Report February 2011

Monthly Report of Datalink Performance by Airways New Zealand NZZO FIR, February 2011					
Section 1: Availability					
CSP Notification	CSP Name	Outage Type	Start	End	Duration (Mins)
		No Outages Reported or Observed			
Section 2: CPDLC					
ALL RGS # 3571			SATCOM # 3204		
ACTP RCP240	120sec	99.61%	ACTP RCP240	120sec	99.59%
	150sec	99.86%		150sec	99.84%
ACP RCP240	180sec	99.33%	ACP RCP240	180sec	99.25%
	210sec	99.58%		210sec	99.53%
PORT	60sec	96.47%			
ACTP RCP400	260sec	100.00%	ACTP RCP400	260sec	100.00%
	310sec	100.00%		310sec	100.00%
ACP RCP400	320sec	99.89%	ACP RCP400	320sec	99.88%
	370sec	99.92%		370sec	99.91%
VHF # 322			HF # 0		
ACTP RCP240	120sec	100.00%	ACTP RCP240	120sec	
	150sec	99.69%		150sec	
ACP RCP240	180sec	100.00%	ACP RCP240	180sec	
	210sec	100.00%		210sec	
ACTP RCP400	260sec	100.00%	ACTP RCP400	260sec	
	310sec	100.00%		310sec	
ACP RCP400	320sec	100.00%	ACP RCP400	320sec	
	370sec	100.00%		370sec	
SATCOM + HF # 3209			Note: 1. ALL RGS - Performance measured using all WILCO responses where MAS RGS and WILCO RGS are any RGS type. 2. SATCOM/VHF/HF - Performance measured using all WILCO responses where both MAS and WILCO RGS are from the media type under analysis. 3. SATCOM + HF- Performance measured using all WILCO responses where either MAS or WILCO are from a SATCOM or HF RGS.		
ACTP RCP240	120sec	99.59%			
	150sec	99.84%			
ACP RCP240	180sec	99.25%			
	210sec	99.53%			
ACTP RCP400	260sec	100.00%			
	310sec	100.00%			
ACP RCP400	320sec	99.88%			
	370sec	99.91%			
Section 3: ADS-C					
ALL RGS #22380			SATCOM # 18083		
RSP 180	90sec	99.07%	RSP 180	90sec	99.06%
	180sec	99.70%		180sec	99.67%
RSP 400	300sec	99.92%	RSP 400	300sec	99.92%
	400sec	99.95%		400sec	99.95%
VHF # 4151			HF #146		
RSP 180	90sec	99.52%	RSP 180	90sec	86.99%
	180sec	99.93%		180sec	96.58%
RSP 400	300sec	99.98%	RSP 400	300sec	98.63%
	400sec	99.98%		400sec	98.63%
SATCOM + HF #18229			Note: Performance measured for RGS media types indicated using all ADS-C downlinks where an FMS timestamp can be extracted to determine the downlink latency.		
RSP 180	90sec	98.96%			
	180sec	99.65%			
RSP 400	300sec	99.91%			
	400sec	99.92%			