

# FANS1/A Performance Based Communications and Surveillance On-Line Analysis Tool



Operational Data Link Seminar  
ICAO Asia and Pacific Office  
Bangkok, Thailand  
2-4 May 2016



# What we will cover today

- Need for on-line analysis tool
- Development timeline
- Discussion around availability/access/licencing.
- Need for future upgrades
- Overview of functionality.
- On-line demonstration.



- Airways has been carrying out PBCS analysis since 2009 using Excel spreadsheet based analysis supplemented with occasional analysis using the FAA provided GPAT tool.
- Excel spreadsheet based analysis of system ADS-C and CPDLC performance data in the .csv format provided in the GOLD/PBCS Manual guidance is very time consuming and resource intensive.
- Airways is currently developing an on-line analysis tool which will give us more efficient processing using less resource.
- The tool imports .csv files for CPDLC and ADS-C as described in the PBCS post implementation monitoring guidance material.

- The tool has been designed so that it may be used by more than one ANSP
- We see it in use by other small ANSP's like ourselves who may find it difficult to justify the development of automation.
- Tool does permit aggregating regional performance data.
- The tool outputs data in graphical format (cumulative frequency distributions) and also in tabular form similar to the formats described in the PBCS guidance material.
- We expect to have an “initial” production version completed by the end of June but development has progressed to the stage where we can share it with the seminar.
- This presentation will provide an overview of the capability of the tool and an on-line demonstration.

# Access - Availability

- We are still discussing internally how the tool can be made available to other interested ANSP or other stakeholders in the FANS1/A community that need access to the performance data.
- A possible solution if we receive any interest from other stakeholders is to licence use for a free “trial” period such as 6-12 months to enable those interested to have a reasonable time to assess the tool.
- Following the trial period we anticipate that a small licence fee will be required to cover maintenance and upgrade costs.



- We anticipate that upgrades will be required to the initial release of the tool. These upgrades will be required because:
  - The formats required for the tabular analysis are changing as more people become involved and we move towards PBCS implementation .
  - There are different needs for different users:
    - Manufacturers of different aircraft types
    - Airline users needing certification material.
    - ANSP post implementation monitoring.
    - ICAO regional overview.
- The quantum of the upgrades and changes required may drive the licence fee required after any trial period.
- Our intention is to keep the licence fee as small as possible to enable all interested to have access.



# Importing .csv data

- Overview
- Import ADS-C CSV**
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

## Import Data

Select CSV File to upload :

Choose File to Upload

Organize New folder

Name	Date modified	Type	Size
ADS 2015 RSP400 Different M...a.xlsx	4/07/2014 3:23 p.m.	Microsoft Excel W...	771 KB
ADS ACI LAN THT by mont...5.xlsx	5/07/2014 5:07 a.m.	Microsoft Excel W...	448 KB
ADS ANZ by month 2015.xls	22/01/2016 11:07 a...	Microsoft Excel W...	734 KB
ADS FJI CAL CSN HAL by m...h 2015.xlsx	5/07/2014 5:10 a.m.	Microsoft Excel W...	976 KB
ADS JST QFA by month 2015...	5/07/2014 5:14 a.m.	Microsoft Excel W...	1,092 KB
ADS SIA MAS KAL THA by m...th 2015.xl...	5/07/2014 5:17 a.m.	Microsoft Excel W...	1,078 KB
ADS UAE by month 2015.xls	5/05/2015 7:50 a.m.	Microsoft Excel W...	891 KB
ADS UAL DAL OTHER MIL b...h 201...	5/07/2014 5:21 a.m.	Microsoft Excel W...	811 KB
ADS VOZ CPA CLX by mon...3.xlsx	5/07/2014 5:23 a.m.	Microsoft Excel W...	509 KB
ads_downlink_201501.csv	5/03/2016 9:41 a.m.	Microsoft Excel C...	2,578 KB
ads_downlink_201501_xl...	2/02/2015 11:16 a.m.	Microsoft Excel 97...	8,541 KB
ads_downlink_201501_data.xlsx	5/03/2016 9:42 a.m.	Microsoft Excel W...	27,289 KB
<b>ads_downlink_201502.csv</b>	10/03/2016 6:32 a...	Microsoft Excel C...	2,360 KB
ads_downlink_201502.xls	3/03/2015 10:08 a...	Microsoft Excel 97...	7,029 KB
ads_downlink_201502_data.xlsx	2/03/2016 12:24 p...	Microsoft Excel W...	26,510 KB
ads_downlink_201503.csv	10/03/2016 6:48 a...	Microsoft Excel C...	2,420 KB

File name: ads\_downlink\_201502.csv All Files (\*.\*)

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

# Import Data

Select CSV File to upload :

S:\FANS1AIRCP Monitoring\2015\A

Browse...

Import

Downlink Delay Analysis

Settings

Profile

Help

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

## Importing CSV Data



23537 of 33453 records loaded

Time to completion : 1 minute 6 seconds





# Clean/Filter imported data

- Shows all imported data , sort, review , view invalid records
- Fix missing type/company for tail number.
- Find and designate bad tails and outages.

Downlink Delay Analysis Settings Profile Help

Overview

Import ADS-C CSV

**Clean Imported ADS-C Data**

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

## Clean Imported Data

[Copy Imported Data to Main Database](#)

### Imported Raw ADS-C Data

Show  entries Search:

Line	ATSP	AC Company	AC Type	Tail No	Date	RGS	Latitude	Longitude	Report Type	Aircraft Time	OCS Time	Duration	Designation	RGS type
1	NZZO	ACA	B77W	CFITU	20150102	XXP	-32.312508	160.530334	P	02:58:33	02:59:01	28	NORMAL	SAT
2	NZZO	ACA	B77W	CFITU	20150102	XXP	-31.017151	162.30188	P	03:12:30	03:12:45	15	NORMAL	SAT
3	NZZO	ACA	B77W	CFITU	20150102	XXP	-30.494614	163.007065	W	03:18:04	03:18:11	7	NORMAL	SAT
4	NZZO	ACA	B77W	CFITU	20150102	XXP	-30.409813	163.296143	P	03:19:53	03:20:00	7	NORMAL	SAT
5	NZZO	ACA	B77W	CFITU	20150102	NLK1	-29.426022	166.709457	P	03:41:14	03:41:18	4	NORMAL	VHF
6	NZZO	ACA	B77W	CFITU	20150102	NLK1	-29.042358	167.933746	W	03:48:59	03:49:04	5	NORMAL	VHF
7	NZZO	ACA	B77W	CFITU	20150102	NLK1	-27.960205	169.850861	P	04:02:34	04:02:39	5	NORMAL	VHF
8	NZZO	ACA	B77W	CFITU	20150102	XXP	-26.227112	172.743179	P	04:23:54	04:24:01	7	NORMAL	SAT
9	NZZO	ACA	B77W	CFITU	20150102	XXP	-23.378735	177.165863	P	04:57:21	04:57:36	15	NORMAL	SAT
10	NZZO	ACA	B77W	CFITU	20150102	XXP	-22.646427	178.247513	P	05:05:37	05:06:02	25	NORMAL	SAT
11	NZZO	ACA	B77W	CFITU	20150102	XXP	-21.425056	-179.996399	W	05:19:21	05:19:38	17	NORMAL	SAT
12	NZZO	ACA	B77W	CFITU	20150102	XXP	-20.736694	-179.043503	P	05:26:57	05:27:04	7	NORMAL	SAT
13	NZZO	ACA	B77W	CFITU	20150102	XXP	-19.520645	-177.3983	W	05:40:12	05:40:28	16	NORMAL	SAT




- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

97	NZZO	ACI	A332	FOHSD	20150101	POR1	-24.08083	-174.376541	P	01:57:14	01:57:29	15	NORMAL	SAT
98	NZZO	ACI	A332	FOHSD	20150101	POR1	-24.023151	-170.768219	P	02:18:34	02:18:50	16	NORMAL	SAT
99	NZZO	ACI	A332	FOHSD	20150101	POR1	-23.997402	-169.995224	W	02:23:07	02:23:27	20	NORMAL	SAT
100	NZZO	ACI	A332	FOHSD	20150101	POR1	-23.515892	-167.232681	P	02:39:55	02:40:09	14	NORMAL	SAT

Showing 1 to 100 of 33,453 entries

### Find Outages/Bad-Tails

Duration Range : 

From Line (Click): 
 To (Alt-Click):

Selected\_Tail: 
 To (Ctrl-Click):

### Fix missing AC Type/AC Company

Tail Number: 
 AC Type: 
 AC Company:

## Invalid data to be discarded

Show  entries Search:

Line	ATSP	AC Company	AC Type	Tail No	Date	RGS	Latitude	Longitude	Report Type	Aircraft Time	OCS Time	Duration	Designation	RGS type
No data available in table														

Showing 0 to 0 of 0 entries

Copy Imported Data to Main Database

Search:

Report Type	Aircraft Time	OCS Time	Duration	Designation	RGS type
P	02:58:33	02:59:01	28	NORMAL	SAT
P	03:12:30	03:12:45	15	NORMAL	SAT
W	03:18:04	03:18:11	7	NORMAL	SAT
P	03:19:53	03:20:00	7	NORMAI	SAT

Copy Imported Data to Main Database



Once you have finished correcting and errors you may copy this data to the main database.

Are you sure you wish to proceed?

Copy data

Continue cleaning data

### Downlink Delay Analysis

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

## Data Transfer Complete



All data transferred from Import table to Main database.

Moved 33453 records.



# ADS-C Graphical RSP Analysis

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

Series 1

Series Name	Aircraft Company	Aircraft Type	Tail Number
<input type="text" value="Series 1"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Designation	RGS Type	ATSP	Display Series
<input type="text" value="*NORMAL *"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

Series 2

Series 3

Series 4

Series 5

Series 6

Series 7

Series 8

Series 9

ADS-C Graphical data page:

- Select RSP180 or RSP400.
- Select display of 9 series to graph by company, type, tail, RGS type, ATSP
- Name title/subtitle
- Select date range
- Select graph Y axis range

Chart Title	Sub-title	Date From	Date To
<input type="text" value="Title"/>	<input type="text" value="Chart Sub-title"/>	<input type="text" value="2016-11-01"/>	<input type="text" value="2016-12-31"/>
Chart Minimum Y-value	Chart Minimum Y-value	RSP	
<input type="text" value="90"/>	<input type="text" value="240"/>	<input type="text" value="RSP180"/>	

# ADS-C Graphical RSP Analysis

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

## Graphical Data Selection

ANZ B772 - SATCOM			
<b>Series Name</b>	<b>Aircraft Company</b>	<b>Aircraft Type</b>	<b>Tail Number</b>
ANZ B772 - SATCOM	*ANZ	*B772	
<b>Designation</b>	<b>RGS Type</b>	<b>ATSP</b>	<b>Display Series</b>
*NORMAL x	*SAT x	*NZZO	<input checked="" type="checkbox"/>

ANZ B772 - VHF			
<b>Series Name</b>	<b>Aircraft Company</b>	<b>Aircraft Type</b>	<b>Tail Number</b>
ANZ B772 - VHF	*ANZ	*B772	
<b>Designation</b>	<b>RGS Type</b>	<b>ATSP</b>	<b>Display Series</b>
*NORMAL x	*VHF x	*NZZO x	<input checked="" type="checkbox"/>

Series 3

Series 4



# ADS-C Graphical RSP Analysis

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

## ANZ B772 VHF

<b>Series Name</b>	<b>Aircraft Company</b>	<b>Aircraft Type</b>	<b>Tail Number</b>
<input type="text" value="ANZ B772 VHF"/>	<input type="text" value="* ANZ"/>	<input type="text" value="* B772"/>	<input type="text"/>

<b>Designation</b>	<b>RGS Type</b>	<b>ATSP</b>	<b>Display Series</b>
<input type="text" value="* NORMAL"/> x	<input type="text" value="* VHF"/> x	<input type="text" value="* NZZO"/> x	<input checked="" type="checkbox"/>

- Series 3
- Series 4
- Series 5
- Series 6
- Series 7
- Series 8
- Series 9

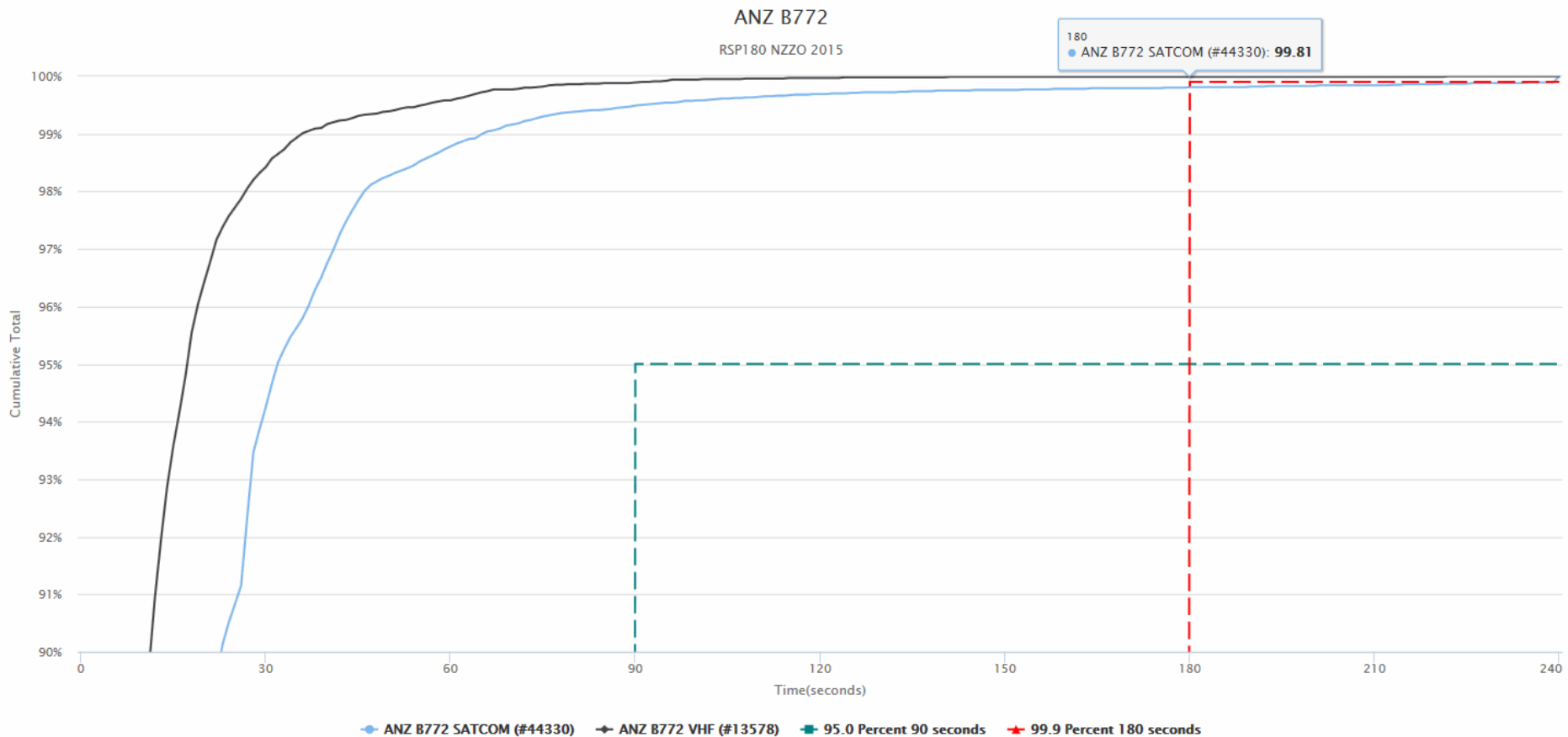
<b>Chart Title</b>	<b>Sub-title</b>	<b>Date From</b>	<b>Date To</b>
<input type="text" value="ANZ B772"/>	<input type="text" value="RSP180 NZZO 2015"/>	<input type="text" value="2015-01-01"/>	<input type="text" value="2015-12-31"/>

<b>Chart Minimum Y-value</b>	<b>Chart Minimum Y-value</b>	<b>RSP</b>
<input type="text" value="90"/>	<input type="text" value="240"/>	<input type="text" value="RSP180"/>



# ADS-C Graphical RSP Analysis

## Selected Graph



Highcharts.com



# ADS-C Tabular RSP Analysis

## ADS-C Tabular data page

- Select company,
- Select Aircraft Type,
- Select RGS,
- Select media type.
- Date range

## ADS-C Tabular Data Selection

The screenshot shows a web interface for selecting ADS-C tabular data. It features several input fields and a 'Display Table' button. Blue arrows from the text above point to the following elements:

- Aircraft Company:** A dropdown menu with 'ANZ' selected.
- Aircraft Type:** A dropdown menu with 'B772' selected.
- RGS:** An empty text input field.
- Show each:** A checkbox, currently unchecked.
- Title:** A text input field containing 'ANZ B772 RSP 01 JANUARY 2015'.
- Date From:** A date input field with '2015-01-01'.
- Date To:** A date input field with '2015-12-31'.
- Media Type:** A dropdown menu with 'SATCOM All' and 'VHF All' selected.
- Display Table:** A button at the bottom left.

- Add Title
- Display Selected Table





# ADS-C Tabular data page

- Filter displayed table to remove rows of less than specified number of messages.

Media Type

× SATCOM All × VHF All

Display Table

Hide Rows Fewer Than




1



ADS-C performance in NZZO FIR						
Colour Key		Period 01 Jan 15 - 31 Dec 15			95% RSP180 Benchmark	99.9% RSP180 Benchmark
<span style="color: green;">■</span> Meets Criteria						
<span style="color: yellow;">■</span> 99.0%-99.84%						
<span style="color: red;">■</span> Under Criteria						
Media Type	RGS	Aircraft Type	Operating Company	Message Count	RSP <= 90 sec	RSP <= 180 sec
<b>ANZ B772 RSP180 NZZO 2015</b>						
SATCOM All	All	B772	ANZ	44330	99.49	99.81
VHF All	All	B772	ANZ	13578	99.90	99.99




# Typical ADS-C Tabular RSP Analysis

## ADS-C performance in NZZO FIR

Colour Key		Period 01 Jan 15 - 31 Dec 15			95% RSP180 Benchmark	99.9% RSP180 Benchmark
 Meets Criteria						
 99.0%-99.84%						
 Under Criteria						
Media Type	RGS	Aircraft Type	Operating Company	Message Count	RSP <= 90 sec	RSP <= 180 sec
<b>ANZ B772 RSP180 NZZO 2015</b>						
SATCOM All	All	B772	ANZ	44330	99.49	99.81
VHF All	All	B772	ANZ	13578	99.90	99.99



# Typical ADS-C Tabular RSP Analysis

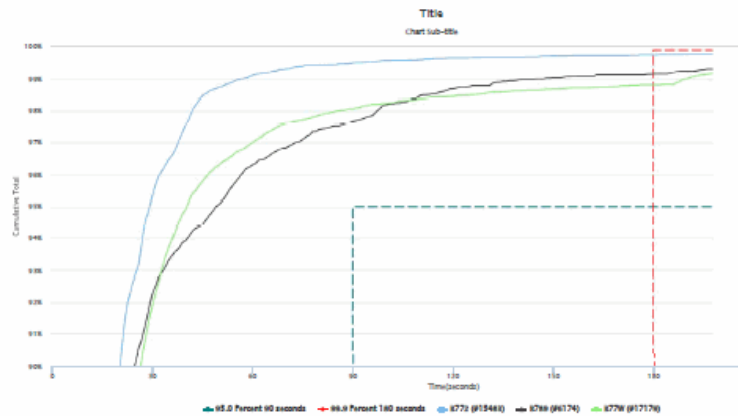
ADS-C performance in NZZO FIR						
Media Type	Period 01 Jan 15 - 31 Dec 15				95% RSP180 Benchmark	99.9% RSP180 Benchmark
	RGS	Aircraft Type	Operating Company	Message Count	RSP <= 90 sec	RSP <= 180 sec
<b>Colour Key</b>						
 Meets Criteria  99.0%-99.84%  Under Criteria						
<b>Analysis by</b>						
SATCOM All	All	A332	CAL	5612	99.11	99.41
SATCOM All	All	A332	CCA	127	98.43	98.43
SATCOM All	All	A332	CES	1349	99.48	99.78
SATCOM All	All	A332	CSN	4651	99.57	99.68
VHF All	All	A332	CAL	1709	99.59	99.71
VHF All	All	A332	CCA	122	99.18	99.18
VHF All	All	A332	CES	1328	99.62	99.85
VHF All	All	A332	CSN	1712	99.47	99.77
HF All	All	A332	CCA	21	80.95	95.24
HF All	All	A332	CES	118	88.14	97.46
HF All	All	A332	CSN	153	76.47	91.50

# Printing graphs and tables

- Tool uses the normal print capability available in most browsers

## Graphical Data Selection

### Selected Graph



## ADS-C Tabular Data Selection

ADS-C performance in NZZO FIR						
<u>Colour Key</u>					95%	99.9%
<input type="checkbox"/> Meets Criteria		Period 01 Mar 16 - 31 Mar 16			RSP180	RSP180
<input type="checkbox"/> 99.0% -99.84%					Benchmark	Benchmark
<input type="checkbox"/> Under Criteria						
Media Type	RGS	Aircraft Type	Operating Company	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by						
SATCOM I4	APK1	B789	ANZ	185	94.59	95.68
SATCOM I4	AME1	B77W	ANZ	471	99.58	100.00
SATCOM I4	APK1	B77W	ANZ	4679	97.67	98.31
SATCOM MTSAT	MTS1	B789	ANZ	1904	98.74	99.79

1/05/2016



# Delete imported records

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

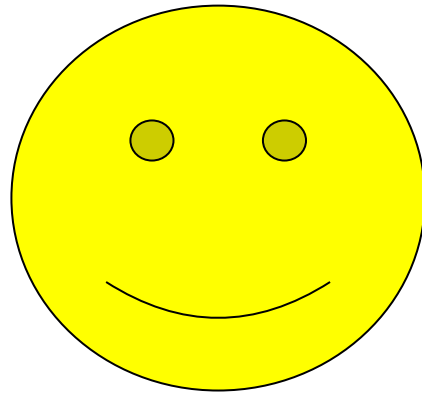
## ADS-C Files Imported

Filename	Imported	Records	Copied	Records	Select
ads_downlink_201506.csv	April 30, 2016, 7:22 a.m.	40071	April 30, 2016, 7:35 a.m.	35360	<input type="checkbox"/>
ads_downlink_201603_data.csv	April 30, 2016, 8:54 a.m.	51073	April 30, 2016, 8:58 a.m.	44465	<input type="checkbox"/>
ads_downlink_201510.csv	April 30, 2016, 8:08 a.m.	45445	April 30, 2016, 8:21 a.m.	39977	<input type="checkbox"/>
ads_downlink_201501.csv	April 30, 2016, 6:35 a.m.	33453	April 30, 2016, 6:43 a.m.	33453	<input type="checkbox"/>
ads_downlink_201505.csv	April 30, 2016, 7:16 a.m.	30249	April 30, 2016, 7:22 a.m.	30249	<input type="checkbox"/>
ads_downlink_201503.csv	April 30, 2016, 7:02 a.m.	30354	April 30, 2016, 7:08 a.m.	30354	<input type="checkbox"/>
ads_downlink_201509.csv	April 30, 2016, 8:01 a.m.	42134	April 30, 2016, 8:08 a.m.	37054	<input type="checkbox"/>
ads_downlink_201508.csv	April 30, 2016, 7:47 a.m.	43381	April 30, 2016, 8:01 a.m.	38245	<input type="checkbox"/>
ads_downlink_201504.csv	April 30, 2016, 7:09 a.m.	28643	April 30, 2016, 7:16 a.m.	28641	<input type="checkbox"/>
ads_downlink_201502.csv	April 30, 2016, 6:49 a.m.	34887	April 30, 2016, 7:01 a.m.	29858	<input type="checkbox"/>
ads_downlink_201507.csv	April 30, 2016, 7:36 a.m.	43720	April 30, 2016, 7:46 a.m.	38554	<input type="checkbox"/>
ads_downlink_201601_data.csv	April 30, 2016, 8:37 a.m.	51966	April 30, 2016, 8:46 a.m.	43983	<input type="checkbox"/>
ads_downlink_201512.csv	April 30, 2016, 8:28 a.m.	50816	April 30, 2016, 8:36 a.m.	44707	<input type="checkbox"/>
ads_downlink_201511.csv	April 30, 2016, 8:21 a.m.	44342	April 30, 2016, 8:27 a.m.	38884	<input type="checkbox"/>
ads_downlink_201602_data.csv	April 30, 2016, 8:47 a.m.	50030	April 30, 2016, 8:54 a.m.	43959	<input type="checkbox"/>

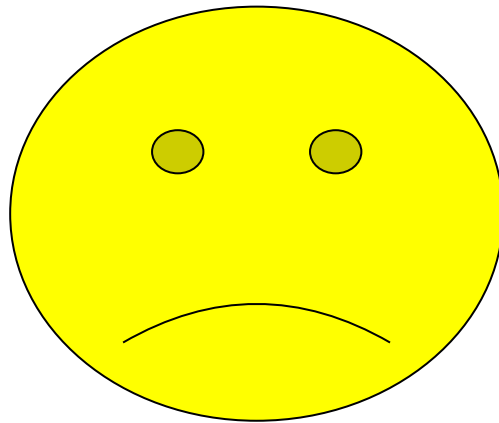


Delete Selected Data

# PLAN A : On-line demonstration



# PLAN B : See next slide



# Thank you

