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- **Summary of ENAIRE monitoring activities related to FANS 1/A service in the EUR/SAM Corridor part lying within Canarias airspace**
 - FANS services performance and use during the first 10 months of 2016*: traffic data, data link usage, CPDLC exchange, etc.
 - Description of potential issues, to be further investigated and for which actions might be agreed
- **Data received from CAA Brazil, ASA Cape Verde and ASECNA Dakar. Comparison with data corresponding to ENAIRE**

* The last two months of 2016 not included in the analysis as SACCAN functionality was integrated into ENAIRE global Automated Air traffic Control System (SACTA) in November 2016. This integration implies some data management changes.

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Scope

Results based on the analysis of performance and use of FANS services in the EUR/SAM Corridor within the Canarias airspace (SACCAN system data)

For Canarias data analysis, "EUR/SAM Corridor flights" are considered as following:

- Those flights either overflying EDUMO, TENPA, IPERA or GUNET, or flying those routes with NELSO and/or ROSTA as route waypoints and with XIGLU as entry/exit point at the south of Canarias airspace.
- Those flights overflying the DCT Area over FL295, with the following criteria:
 - Flights overflying ROSTA and with GOBEG, INSAD, IXIKU, KUXOV or LAPTU as entry/exit waypoints at the west of Canarias airspace;
 - Flights overflying OCE sector entering the FIR by RIPOD, PIBIL, OSLEV, NEXUX or KETID and leaving by GOBEG, INSAD, IXIKU, KUXOV or LAPTU, or the other way round.



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Use of FANS Services (1/3)

Traffic data

- FANS connected flights: Aprox. 78% of total EUR/SAM Corridor flights*.
- Most of FANS equipped flights connect to SACCAN (89.90%)
- Around 92% of connected flights exchange CPDLC information
- The number of different airframes flying over EUR/SAM Corridor connected to SACCAN is 259-354 per month

Traffic Data Summary	2016 Mean Value	Max Value	Min Value
Number of connected flights (Monthly average)	1080	1324 [Aug]	894 [Apr]
Percentage referred to total of flights in the EUR/SAM Corridor*	78%	[Sep]	[Feb]
Percentage referred to flights in the EUR/SAM Corridor indicating data link and ADS-C capacity in the Flight Plan	89.90%	91.85% [Jun]	87.13% [Apr]
Number of flights with CPDLC connection (Monthly average)	995	1227 [Aug]	808 [Apr]
Number of different aircraft (aircraft registration) connecting to SACCAN (Monthly average)	301	354 [Aug]	259 [Apr]

* Flights Cape Verde-Canarias no included
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Use of FANS Services (2/3)



Airlines data

- Leading airlines: TAP Portugal, Air France and Iberia, comprising almost 58% out of the total connected flights between the three of them
- Along with Air Europa and TAM Brazil they comprise about 78% of the total number of connected flights
- Adding British Airways, Lufthansa, KLM and Thomsonfly to the previous five ones, percentage increases up to about 95%

Airline (% referred to connected flights)

TAP Portugal	Air France	Iberia	Air Europa	TAM Brazil	British Airways	Lufthansa	KLM	Thomsonfly
25.10%	16.51%	16.37%	14.08%	6.45%	5.30%	4.98%	3.96%	2.52%

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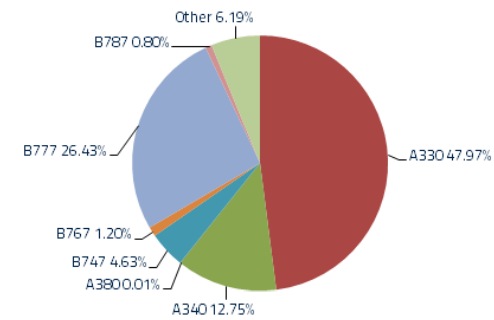
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Use of FANS Services (3/3)



Aircraft data

A330 and B777 are the most common types of long range connected aircraft



Total percentage of different types of connected aircraft

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Link Utilisation and Message Delays

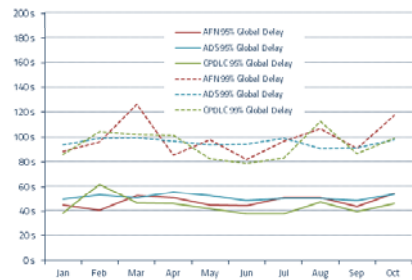


Link utilisation

Utilization of satellite link around 57%. VHF link used for around 37%-47% of air/ground transmissions. HF link slightly used (about 0.06%)

Downlink messages delays

On average 95% of the global calculated delays are not greater than 60 s whilst 99% of calculated delays are usually well below 180 s



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ADS-C Application



Contracts

The most commonly requested contracts are the initial ADS-C contracts currently established in the Canaries FIR (15 minute periodic contract, requesting the transmission of earth reference and predicted route groups with every periodic report, and an event contract including waypoint change and lateral deviation events, the latter with a 5 nautical mile threshold)

Data Accuracy

99.97% of ADS-C messages reported a FOM value equal to or better than 6 (position error lower than 0.25NM with a probability of 95%)

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CPDLC Application



Most frequent uplink messages

The free text element, message elements related to CPDLC communications transfer and contact message and are the most common uplink messages

Most frequent downlink messages

Responses "WILCO" and "ROGER", followed by the "Position Report" are the most common downlink messages

	Message element	Percentage referred to total		
		2016 Mean Value	Max Value	Min Value
Uplink	[freetext]	27.53%	31.73% [May]	24.15% [Apr]
	CONTACT [icaounitname] [frequency]	18.66%	19.95% [Oct]	16.16% [Mar]
	NEXT DATA AUTHORITY [icaofacilitydesignation]	18.07%	20.77% [Jul]	14.78% [Feb]
	END SERVICE	14.46%	15.80% [Sep]	13.25% [Feb]
	SQUAWK [beaconcode]	10.71%	14.02% [Feb]	8.44% [Sep]
Downlink	Wilco	41.81%	44.69% [Oct]	38.92% [Mar]
	Roger	28.28%	32.63% [Aug]	23.49% [Apr]
	POSITION REPORT [positionreport]	9.26%	11.00% [Jan]	7.83% [Oct]
	[freetext]	6.86%	9.23% [Mar]	5.53% [Jul]

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Potential issues identified (1/3)



- Several issues detected during the analysed period
- All of them already identified during previous analysis
- Issues allocated to two categories:
 - Operational (operative)
 - Technical or related to Interoperability
- Coordination between stakeholders should be established in order to investigate them appropriately
- Effective ongoing coordination examples:
 - Issue regarding the declaration of ATN capacity in the Flight Plan solved after being communicated during 2014 to affected airlines
 - Coordination between SITA and ENAIRE for the periodic monitoring of some technical issues (repeated messages, high delays, communication problems, etc.)

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Potential issues identified (2/3)



Operative Issues

- Issues dealing with the operation of FANS services
- Subdivided in two categories:
 - **Air side:**
 - Log-On messages with incorrect identification
 - Log-On from aircraft that are not flying towards Canarias airspace or from aircraft flying far away prior to enter an airspace where ADS-C/CPDLC is operational
 - Aircraft ADS-C connected long after exiting Canarias airspace
 - Sending of Character-Oriented applications messages (RCLs, RAIs, RCDs)
 - Aircraft not declaring ADS-C or CPDLC capability in their Flight Plans
 - Emergency reports while no unusual or emergency situation is detected
 - **Ground side**
 - Flight Plans with incorrect aircraft registration
 - Sending of ACARS Free Text messages
 - "END SERVICE" CPDLC messages sent with additional message elements which response attribute is not Wilco/Unable
 - Uplink CPDLC connect requests replied with a CPDLC disconnect request message notifying the aircraft is CPDLC connected to another ATS authority

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Potential issues identified (3/3)



Technical or interoperability Issues

- Issues entailing some technical aspects or concerning the interaction of aircraft and ground systems
- Subdivided in three categories:
 - **General:**
 - Messages with incoherent time stamps
 - Uplink and downlink messages probably being sent more than once by the DSP
 - Unexpected Service Messages
 - Messages with excessively high delays
 - Communication/connection problems
 - **Concerning ADS-C:**
 - Different reports with different time stamps sent together in the same ADS-C message
 - Identical reports of Waypoint Change event received within an ADS-C message
 - ADS-C reports notifying FOM equal to zero (0)
 - **Concerning CPDLC:**
 - Incorrect CPDLC messages
 - Aircraft not accepting a connection request (CR) message after receiving an uplink CPDLC disconnection request (DR) message
 - Aircraft ignoring uplink disconnection request (DR) messages

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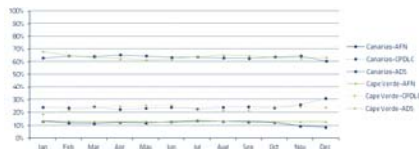
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Brazil, Cape Verde, Dakar and Canarias Data Comparison

Some data from CAA Brazil, ASA Cape Verde and ASECNA Dakar have been received. These data have been compared with those corresponding to ENAIRE and no major discrepancies have been detected



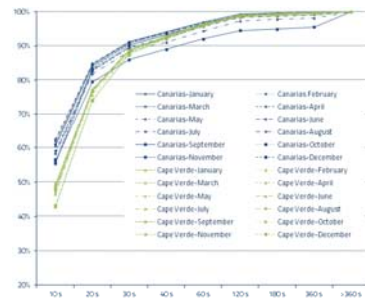
Brazil, Dakar and Canarias percentages of connected flights (2016)



Canarias and Cape Verde FANS Datalink Air-Ground Traffic Distribution (Uplink and Downlink)

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Canarias and Cape Verde Global Downlink Delivery Time

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Conclusions (1/2)

- Approximately 78% of the EUR/SAM Corridor flights* (Canarias area) connected to SACCAN in 2016
- Almost 90% of flights notifying FANS equipage in its flight plan connect to SACCAN.
- CPDLC information is interchanged with the vast majority of connected aircraft (about 92%)
- Major users of FANS services are TAP Portugal, Air France, Iberia and Air Europa. Air Europa appears in this top four for the first time.
- The initial ADS-C contracts established in the Canarias FIR are the most commonly requested contracts
- Position accuracy notified in ADS-C reports is not worse than 0.25 NM (FOM≥6) 99.97% of the times

* Flights Cape Verde-Canarias no included

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Conclusions (2/2)



- After the Free Text element, message elements related to the process of CPDLC communications transfer are among the most used by controllers. Message elements belonging to the response elements group are the most used by pilots
- On average 95% of the calculated delays are not greater than 60 s whilst 99% of calculated delays are usually well below 180 s
- Several issues (operational and technical and related to interoperability) have been detected. Coordination between stakeholders should be established in order to investigate them appropriately
- Data from CAA Brazil, ASA Cape Verde and ASECNA Dakar have been received and compared with those corresponding to ENAIRE. No major discrepancies have been detected

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REMINDER

Data for the analysis of FANS services in the EUR/SAM Corridor (1/3)



- As it was stated in Conclusion SAT/FIT 8/01, involved SAT States should provide SATMA the required data and notify to SATMA any problem detected along the Corridor/South Atlantic
- Data should be sent before the end of the following month in order to ensure its analysis and inclusion in the annual CFRA document. Therefore, data received after January next year cannot be considered in the analysis
- During 2016 some states have provided ENAIRE some limited data that have been analysed and included as an Annex in the 2016 CFRA Report
- ENAIRE analyses all received data and, when possible, compares them with those corresponding to ENAIRE. Nevertheless, to perform the corresponding analysis of FANS services in the EUR/SAM Corridor part within each state, the data to be provided is that stated in SAT/FIT 7 Report (see following slide)

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REMINDER
Data for the analysis of FANS services in the EUR/SAM Corridor (2/3)



▪ Data to be collected and provided to CFRA – Monthly base (extracts from SAT/FIT 7 Report)

- Traffic Data
 - Number of connected flights
 - Percentage referred to total number of flights in the EUR/SAM Corridor
 - Number of flights with CPDLC connection (monthly average)
 - Number of different aircraft (aircraft registration) connecting to ADS (monthly average)
- Downlink (air to ground) messages delays
- Percentage of connected flights from the most significant airlines
- Percentage utilization value per data link media used for air-to-ground communications (satellite link and VHF link)
- Cumulative percentage values per FOM

▪ DSP (SITA) ATS Performance Report for each month, when available, can be also provided to CFRA for their analysis and comparison

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REMINDER
Data for the analysis of FANS services in the EUR/SAM Corridor (3/3)



FANS/CFRA Notification Form

1. Reporting Date:	2. Reporting Unit:		
3. Operator Name:	4. Call Sign:	5. Aircraft Type:	6. FANS EQUIPE
7. Date of Occurrence:	8. Time UTC:	9. Occurrence Position	
15. Description and Action Followed:			

CLASIFICACION

1. Log-On received from aircraft not flying your airspace
2. A/C Log-On with incorrect flight identification
3. Log-On from Aircraft not declaring ADS-C capacity in FP
4. Unknown ADS-C messages are received.
5. A/Cs remain ADS-C connected after exiting airspace
6. A/Cs remain ADS-C connected after landing
7. Different reports in the same ADS-C message.
8. Identical reports of Waypoint Change received in an ADS-C message
9. CPDLC Message: "Not Current Data Authority"
10. Incorrect downlink CPDLC messages have been received:
11. Other (describe) : _____

Crew/Controller comments (if any)

When complete please forward the report(s) to: South Atlantic Monitoring Agency (SATMA-CFRA)
E-Mail: satma@aena.es

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