INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE FIFTH MEETING OF THE SAT FANS 1/A INTEROPERABILITY TEAM

(SAT FIT/5)

(Lisbon, Portugal, 17-18 May 2010)

ICAO Western and Central African (WACAF) Office

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PART I - HISTORY OF THE MEETING

1. Introduction

1.1 The Fifth Meeting of the SAT FANS 1/A Interoperability Team (FIT) was held at the Hotel Tivoli Oriente, Lisbon, Portugal, from 17th to 18th May 2010, at the kind invitation of Portugal. The meeting was supported by Nav Portugal.

1.2 Mr. Sadou Marafa, Regional Officer ATM/SAR from the ICAO Western and Central African Office, welcomed the participants at the opening of the Meeting, and highlighted the importance of the issues to be dealt with. He expressed his satisfaction to see SAT FIT meetings attended by an increasing number of delegates, which demonstrates the constant commitment of SAT members to work together for the improvement of air navigation services in the area. In concluding, he wished the participants a productive and successful meeting.

2. Officers and Secretariat

2.1 The meeting nominated Mr. Johnny Smith, (ATNS, South Africa), as its moderator.

2.2 Mr. Sadou MARAFA, ATM Regional Officer from the ICAO WACAF Office, was the Secretary of the meeting. He was assisted by Mr François Salambanga CNS Regional Officer from the ICAO WACAF Office.

3. Attendance

3.1 The meeting was attended by thirty-six (36) participants from eleven (11) ICAO contracting States namely, Angola, Argentina, Brazil, Cape Verde, Cote d'Ivoire, Ghana, Portugal, Senegal, South Africa, Spain and Uruguay, and 4 International/Interregional Organizations (ARINC, ASECNA, IATA, and IFALPA).

3.2 The list of participants and their contact addresses is at **Appendix A** to this report.

4. Working languages

4.1 The meeting was conducted in the English language and the relevant documentation was presented in this language.

5. Agenda of the meeting

5.1 The meeting adopted the following agenda:

Agenda Item 1: Adoption of the Agenda
Agenda Item 2: Review of SAT/FIT/4 Report
Agenda Item 3: Review of ADS/CPLC programmes and implementation activities in SAT FIRs
Agenda Item 4: System performance monitoring and maintenance
- a. Interoperability requirements
- b. Safety monitoring aspects
- c. Problem identification, reporting and resolution procedures

Agenda Item 5: Review of the terms of reference of the FANS 1/A Interoperability Team and Future work programme

Agenda Item 6: Any other business

6. Conclusions and Decisions of the meeting

SAT FIT5 LIST OF CONCLUSIONS

Number	Title
Conclusion SAT FIT 5/1	**ADS/CPDLC implementation in the SAT Area** That SAT/FIT members provide the Secretariat with ADS-C/CPDLC implementation and interoperability status in order to complete a table by the end of July 2010.
Conclusion SAT FIT 5/2	**Participation at SAT FIT meetings** That IFATCA and NAT FANS Team be invited to future SAT/FIT meetings
Conclusion SAT FIT 5/3	**ADS-CPDLC operations** That IATA and ACC units encourage Airlines to increase their level of participation in ADS-C/CPDLC operations in order to enhance safety and efficiency of operations within the SAT and specially the EUR/SAM corridor
Conclusion SAT FIT5/4	**FANS1/A CFRA monthly report:** That SAT members forward to SATMA the necessary FANS1/A CFRA report on a monthly basis in order to perform the monitoring process as required.
Conclusion SAT FIT 5/5	**CFRA** That: 1) The requirement for CFRA within the SAT be referred to APIRG for advise; 2) ICAO provides SAT members with guidance to support the cost recovery funding process in terms of global harmonization of the ATM system and improvement of operating efficiency.
Conclusion SAT FIT 5/6	**CPDLC message set** That: a) In order to minimize the use of free text messages ATS Units ensure that controllers use the preformatted uplink message elements when a specific report is required and; b) Aircraft operators should ensure that flight crew procedures and training includes information concerning the arming and transmission of CPDLC reports
Conclusion SAT FIT 5/7	**GOLD** That: 1. SAT/FIT members support the introduction of GOLD; 2. PIRGs approve the GOLD.
Decision SAT FIT 5/1	**Missing Flight Plans** That SAT/15 takes actions to ensure that the issue regarding the missing Flight Plans within the SAT is addressed appropriately
Decision SAT FIT 5/2	**CPDLC Harmonization/Standardization Action plan** That the Rapporteur forwards to SAT members a draft action plan to be completed by the end of July 2010.

II - REPORT ON DISCUSSIONS

2.1 Agenda Item 1: Adoption of the Agenda

2.1.1 The meeting elected Mr. Johnny Smith, Manager ATS Johannesburg ATNS and member of the South African delegation as Chairman and Rapporteur of the meeting. Subsequently the provisional agenda was discussed and adopted by the meeting as shown above.

2.2 Agenda Item 2: Review of SAT/FIT/4 Report

2.2.1 The meeting reviewed the Conclusions and Decisions adopted by the SAT/FIT/4 Meeting which was held in Sal, Cape Verde, from 8 to 9 June 2009 and discussed the status of implementation of each of them.

2.2.2 With regards to the implementation of ADS-C/CPDLC in the SAT area (Conclusion SAT FIT4/1) the status is as shown in the following table:

STATE/ACC	Implementation status/Target date	Remark
Dakar/Senegal	implemented	Full operational
Canarias/Spain	implemented	Full operational
Brazil	implemented	Full operational
Abidjan	implemented	Pre-operational
South Africa	implemented	Full operational
Argentina	September 2010	Three to four months from the meeting
Angola	December 2010	
Accra/Ghana	July 2010	
Cape Verde	December 2010	
Uruguay	At the planning level	

2.2.3 Therefore, the following general conclusions relating to ADS-C/CPDLC implementation in the SAT region were formulated:

Conclusion SAT/FI/5-01: ADS/CPDLC implementation in the SAT Area

That SAT/FIT Members provide the Secretariat with ADS-C/CPDLC implementation and interoperability status in order to complete a table by the end of July 2010.

Conclusion SAT/FI/5-02: Participation at SAT FIT meetings

That IFATCA and NAT FANS Team be invited to future SAT/FIT meetings.

2.2.4 The meeting noted that ADS-C/CPDLC is fully operational in EUR SAM Corridor. However, various reports show that many airspace users do not take advantage of the existence of this facility, either for lack of equipment or simply by carelessness. IATA indicated that most of their member airlines' flights in that area are equipped ADS-C/CPDLC and that, most of the time, they are not well informed of possibilities offered by ANSPs.

2.2.5 The meeting therefore agreed to the following conclusion:

Conclusion SAT/FI/5-03:

That IATA urges Airlines to participate in order to enhance safety and efficiency of operations within the SAT and specially the EUR/SAM corridor

2.2.6 As a result, the meeting reformulated or complemented all the conclusions and decisions related to the SAT/FIT/4 Meeting which were ongoing or still valid (See **Appendix B** to this report).

2.3 Agenda Item 3: Review of ADS/CPLC programmes and implementation activities in SAT FIRs

Central FANS Reporting Agency (CFRA)

2.3.3 SATMA presented a report on start-up problems of CFRA activities. The said report is in **Appendix C** to this report. SATMA emphasized the importance of receiving required information from all States in order to start the development of CFRA functions.

2.3.4 The meeting noted that a first attempt to start with CFRA functions can be done by using the reports sent to each State by the communications service providers. By using this information, SATMA would present periodic reports including the performance of the FANS 1/A functionality within the entire EUR/SAM Corridor. These analyses will be restricted to the information included by SITA in its monthly reports; therefore, only technical performance will be analyzed.

2.3.5 The meeting was of the view that these reports do not provide enough information to monitor the FANS services. Due to this fact, more complete FANS analyses are expected to be done in the future. The development of this kind of studies requires that more detailed and complete information is sent by the States.

2.3.6 In this regard, the following conclusion was adopted by the meeting:

Conclusion SAT/FI/5-04: FANS1/A functionality monthly report

That SAT members forward to SATMA the necessary FANS1/A functionality report on a monthly basis in order for AENA to perform the monitoring process as required.

2.3.7 With reference to conclusion SATFIT4/2 line 4, related to the hosting and operation of the Central FANS Reporting Agency (CFRA) the meeting was presented by SATMA with a Cost Analysis Study laying out the annual costs related to tasks referred to the CFRA in the EUR/SAM Corridor and calling for the establishment of a cost recovery mechanism. The Cost Analysis document presented by SATMA is shown in **Appendix D** to this report.

2.3.8 The meeting was also informed that, as per Conclusion SATFIT4/2 line 3, the Secretariat requested two service providers to make financial proposals for a technical support of the CFRA to be presented to this SATFIT5 meeting; unfortunately no response was received from them.

2.3.9 It was recalled that SATMA accepted to discharge the CFRA function for one year; and that therefore, a final solution should be adopted by 31 December 2010 with regard to the funding of the CFRA.

2.3.10 The meeting renewed its view with regards to the need for a CFRA in order to conduct and monitor the implementation of FANS 1A facilities/operations in the SAT area. However, after discussing the issue at length, the meeting could not reach an agreement on a cost recovery mechanism.

2.3.11 As a result, the meeting formulated the following conclusion:

Conclusion SAT/FI/5-05: CFRA

That

1) The requirement of CFRA within the SAT be referred to APIRG for advise;
2) ICAO provides SAT members with guidance to support the cost recovery funding process in term of global harmonization of the ATM system and improvement of operating efficiency.

The correct use of CPDLC reports

2.3.12 The meeting was seized with a concern related to the correct use of CPDLC reports between Pilots and Controllers.

2.3.13 It was noted that, on many occasions, free text message “reports" were used in the operational CPDLC exchanges between flight crews and controllers. Apart from the loss of automation associated with these free text messages, these types of messages are prone to errors, as well as being displayed in a non-standard format.

2.3.14 The meeting recognized that in order to maximize the benefits that may be achieved by the use of CPDLC, it is important for ATS Units and flight crews to correctly use the CPDLC message set.

2.3.15 Hence the conclusion:

Conclusion SAT/FI/5-06: CPDLC message set

That

a) ATS Units ensure that controllers use the correct uplink message elements when a specific report is required ; and

b) Aircraft operators should ensure that flight crew procedures and training includes information concerning the arming and transmission of CPDLC reports

GLOBAL OPERATIONAL DATA LINK DOCUMENT (GOLD)

2.3 16 The Team Leader of the SAT FIT (South Africa) presented to the meeting with the status on the Global Operational Data Link Document (GOLD) and invited the SAT FIT to begin planning and implementation of its use.

2.3.17 The purpose of the GOLD is to facilitate global harmonization of existing data link operations (FOM with the North Atlantic Data Link Guidance Material) and resolve regional and/or State differences impacting seamless operations.The objective is to include required communication performance (RCP) and surveillance specifications, based on RTCA DO-306/EUROCAE ED-122, and guidelines on post-implementation monitoring and corrective action to address issues with satellite data communication services that were coordinated in the North Atlantic and Asia-Pacific Regions. (Ref ISPACG/22 FIT/15 WP/07 and Report of ISPACG/22, paragraph 3.9.3).

2.3.18 It is intended primarily for those who are involved in the planning and implementation of data link services, and day-to-day operations, and will be key to harmonizing oceanic and continental (domestic) data link operations worldwide.

2.3.19 GOLD will effectively replace the Guidance Material for ATS Data Link Services in North Atlantic Airspace (NAT Data Link GM) and the FANS-1/A Operations Manual (FOM) for the Asia-Pacific, South American and African-Indian Ocean Regions. It also includes provisions for the aeronautical telecommunication network (ATN) implementation in the European Region.

2.3.20 In view of the above, the meeting noted that the GOLD can be seen as the update of the current FOM, taking into account the evolution of ATM requirements. Yet, there is a need to assess and identify the operational or technical impact of transitioning from the FOM to the GOLD on data link operations in the South Atlantic sub-region. However, the meeting was of the view that this should be done at PIRGs level for the sake of harmonization and efficiency.

2.3.21 The following conclusion was therefore adopted:

Conclusion SAT/FI/5-07: Global Operational Data Link Document (GOLD)

That:

1) **SAT/FIT members support the introduction of GOLD Document;**
2) **PIRGs approve the GOLD Document**

WRONG FLIGHT PLANS; MISSING FLIGHT PLANS

2.3.22 The issue of wrong or missing flight plans was raised once again as one of the main factors that could jeopardize the coordination of operations between ACCs.

2.3.23 The meeting recalled that, due to the importance of the availability of flight plans in the ATM system, it is essential that flight plans be filled according to the ICAO format and delivered to concerned ACC. However, due to various aspects to be taken into account in addressing the issue, the meeting deemed that it should be referred to the SAT 15 meeting for appropriate consideration and formulated the following decision:

Decision SAT FIT 5/1: Missing Flight Plans

That SAT/15 takes actions to ensure that the issue regarding the missing Flight Plans within the SAT is addressed appropriately.

2.4 Agenda Item 4: System performance monitoring and maintenance

2.4.1 The meeting recalled the imperative need for harmonization in the applicable ADS-C/CPDLC procedures and parameters, used by the ACCs, to ensure safe operations of ADS-C/CPDLC in the SAT area.

2.4.2 In this regard, SATFIT4 had adopted conclusion SATFIT4/6 which reads:

Conclusion SAT FIT 4/6: Standardization of ADS- CPDLC functionalities within the SAT

That:

1. the FIT members as a working group develop a roadmap and make the necessary proposals to address :

- ***an AIP Supplement Model to be used by SAT States in future;***
- ***a common update rate for periodic contracts;***
- ***the parameters applied to trigger events contracts;***
- ***FANS 1/A non recognized messages;***
- ***Possible changes of LOA/LOPs;***
- ***The altitude change range regarding RVSM airspace and non RVSM airspace***

2. The Secretariat will initiate the process by July 2009 and all discussions will be by electronic correspondence.

2.4.3 The meeting considered that conclusion as still valid and action must be taken to implement it as soon as possible.

2.4.4 To this effect, the meeting decided to establish an action plan that will determine responsible parties and a timeframe for each action.

2.4.5 Therefore, the meeting formulated the following decision:

Decision SAT FIT 5/2: CPDLC Harmonization/Standardization Action plan

That the Rapporteur forwards to SAT members a draft action plan to be completed by the end of July 2010.

2.5 Agenda Item 5: Review of the terms of reference of the FANS 1/A Interoperability Team and Future work programme

2.5.1 The meeting reviewed and updated the Terms of reference and future work programme of the FANS 1/A Interoperability Team (FIT) as shown at **Appendix E** to this report.

2.6 Agenda Item 6: Any other business

2.6.1 No particular issue was considered under this agenda item.

2.6.2 Organization of the next SAT FIT meeting will be coordinated with FIT group members. It will be held back to back with the next SAT16 meeting to be convened in the second quarter of 2011. FIT members will be timely informed of the final agreed date and venue for the next FIT meeting.

INTERNATIONAL CIVIL AVIATION ORGANIZATION
Western and Central African Office

Fifth Meeting of the FANS I/A Interoperability Team (SAT/FIT/5)
(Lisbon, Portugal, 17-18 May)

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APPENDIX B

Status of Conclusions related to SAT/FIT/4 Meeting

Number	Title	Implementation Status	Remarks
Conclusion SAT FIT 4/1	**ADS/CPDLC in the SAT Area** That: a) SAT members implement the various Conclusions related to the need for implementation/operational application of ADS/CPDLC in the SAT area by not later than the end of 2010; and b) Canarias FIR, Dakar Oceanic FIR and Atlántico FIR (EUR/SAM Corridor), take appropriate measures aimed at full operational implementation by August 2009, in compliance with previous SAT conclusions.	**On going** **Implemented**	**Implementation target dates given by States are shown in the report on Agenda item 2.**
Conclusion SAT FIT 4/2	**Hosting of the Central FANS Reporting Agency (CFRA)** That 1. The CFRA be in place by 2010 2. The CFRA Cost recovery is supported by the FIT in principle. 3. Technical service providers be invited by the Secretariat to present their proposals to the FIT by SAT FIT5 4. SATMA provides a business case, including financial implications and funding options: a) for review by the FIT in order to ensure full transparency of the process, and b) to provide SAT States with the outcome of the business case for consideration in making their final decisions. *Note: SATMA (Spain) offered to discharge CFRA function pending the finalization of the CFRA.*	**Still valid**	**Reconsidered by SAT FIT : superseded by Conclusion SATFIT5/5**
Conclusion SAT FIT 4/3	**Participation at SAT FIT meetings** That: a) In case the regulator is different from the service provider, SAT States should ensure participation of regulators in the SAT/FIT meetings in order to have full commitment to the implementation activities; and b) Major airline representatives should also participate in the SAT/FIT meetings.	**Still valid**	**Complemented by ConclusionSATFIT5/2**

Number	Title	Implementation Status	Remarks
Conclusion SAT FIT4/4	**Update of ADS/CPDLC activities by States:** That States should update their plan of action/activities at Appendix D to the SAT FIT/2 report and return the same to the Rapporteur (johnnys@atns.coza) as an on going activity for presentation to SAT Meetings.	**Still valid**	**Complemented by Decision SATFIT5/2**
Conclusion SAT FIT 4/5	**Update of FOM** That a new controlled version of the FOM be posted to the corresponding ICAO Website. *Note: Latest version of FOM is version 6.* *Any further amendments to be forwarded to the Rapporteur.*	**completed**	
Conclusion SAT FIT 4/6	**Standardization of ADS- CPDLC functionalities within the SAT** That 1) the FIT members as a working group develop a roadmap and make the necessary proposals to address : • an AIP Supplement Model to be used by SAT States in future; • a common update rate for periodic contracts; • the parameters applied to trigger events contracts; •FANS 1/A non recognized messages; • Possible changes of LOA/LOPs; and • The altitude change range regarding RVSM airspace and non RVSM airspace. 2) The Secretariat initiates the process by July 2009 and all discussions be conducted by electronic correspondence	**Still valid**	**Complemented by Decision SATFIT5/2**
Conclusion SAT FIT 4/7	**Use of ADS-C/CPDLC in south Atlantic** That IATA and ICAO urge all airlines with suitably equipped aircraft to make use of ADS-C/CPDLC technologies to enhance safety and efficiency of operations within the South Atlantic.	**Still valid**	**Superseded by Conclusion SAT FIT 5/3**

Number	Title	Implementation Status	Remarks
Conclusion SAT FIT 4/8	**ADS-C/CPDLC Systems Interoperability in SAT Area** That Member States ensure interoperability of their systems and cooperate to implement data and applications exchange to improve operational coordination and air navigation safety.	**On going**	
Conclusion SAT FIT 4/9	**Amendment to the SAT FANS 1/A Interoperability Team Work programme** That SAT FIT work programme is amended as shown in Appendix B to SAT FIT 4 report.	**completed**	

APPENDIX C

SATMA Report: Operational Report on SACCAN FANS 1/A Functionality

1. INTRODUCTION

This annex presents a summary of the results of the "SACCAN FANS 1/A functionality analysis" reports, which are monthly performed by AENA to monitor the use of the FANS services.

2. DISCUSSION

The following sections introduce the main results obtained from the monitoring of FANS 1/A aircraft operating in the oceanic Canary airspace.

To do this report traffic information from the oceanic area of the Canaries UIR has been used, which has been recorded by Palestra (Aena´s flight plan database). As far as the FANS connections are concerned, information is obtained from the recordings done in the SACCAN system.

With the objective to show tendencies, in this report information has been used from September 2009 to January 2010.

This report is based on the flight plans and FANS connections to SACCAN in the oceanic Canary airspace, as it is shown in the following figure:

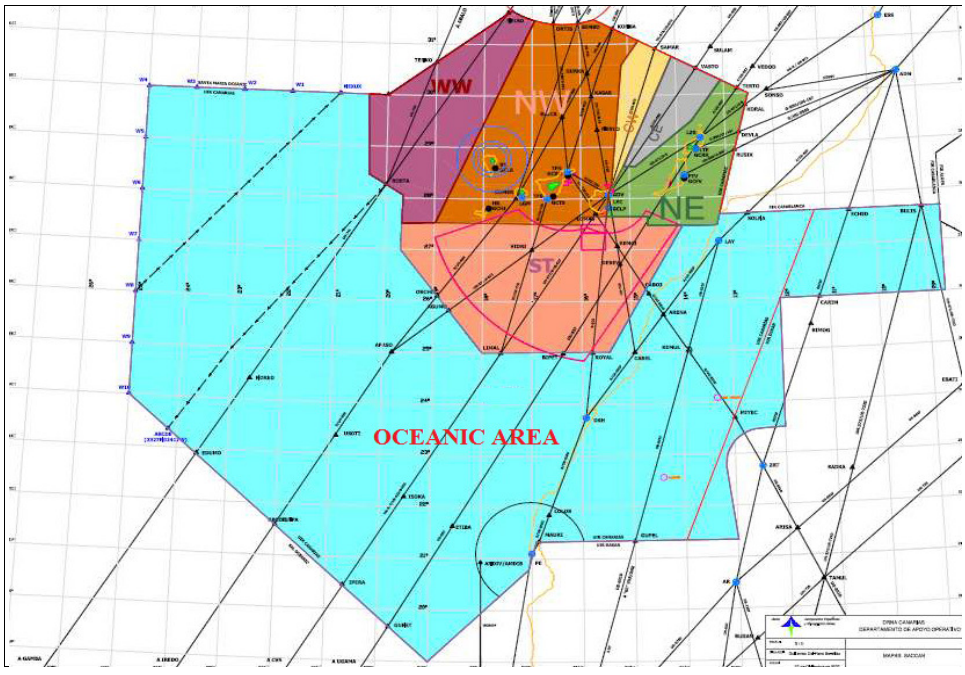

FIGURE 1
Oceanic Canary airspace

2.1 Evolution of the FANS 1/A connections

First of all, the following tables introduce the evolution of the FANS 1/A connections from September 2009 to January 2010 on SACCAN in relation to the number of aircraft flying in the oceanic area and those ones that, in its flight plan, reported ADS and data link capabilities (called in TABLE 1 "FANS 1/A equipped flights").

General information	Jan. 2010	Dec. 2009	Nov. 2009	Oct. 2009	Sep. 2009
Nº connected flights	1233	1210	1165	1049	947
% with respect to total flights (Oceanic area)	32.67%	33.16%	32.70%	28.40%	27.59%
% with respect to FANS 1/A equipped flights (Oceanic area)	73.39%	81.59%	77.31%	66.60%	65.36%
Nº of flights with CPDLC exchange	1127	1065	1001	901	839

TABLE 1
General traffic information in the oceanic Canary airspace

In the second table shown below, a comparison between the principal airlines connected to SACCAN and using FANS 1/A technology has been depicted.

Airline information (Percentage of total connected flights)						
Airline	**Jan. 2010**	**Dec. 2009**	**Nov. 2009**	**Oct. 2009**	**Sep. 2009**	**Type of airplane[1]**
TAM Brazil	22.71%	24.05%	26.35%	24.79%	26.40%	59.83% A330 26.59% B777 13.58% A340
Iberia	19.63%	20.41%	20.17%	20.21%	16.90%	100% A340
TAP Portugal	17.68%	14.96%	14.08%	9.34%	7.18%	100% A330
Air France	17.60%	17.11%	18.03%	21.26%	24.29%	48.90% B777 27.15% A330 21.56% B747 2.39% A340
Lufthansa	6.57%	6.36%	6.35%	7.34%	7.92%	71,44% B747 28.56% A340
Air Europa	5.19%	5.87%	5.24%	4.96%	5.70%	100% A340

TABLE 2
Principal airlines

The following sections summarize those periods of time in which flights connected, in January 2010, to SACCAN. Most of them are carried out at night, from 22:00 pm to 08:00 am next morning, as it is presented in the third and fourth tables below.

[1] Estimated mean in the five studied months.

Day	Contacts between 08:00 a.m. and 22:00 p.m.		Contacts between 22:00 p.m. and 08:00 a.m.	
	Total	Percentage	Total	Percentage
1	9	25,71%	26	74,29%
2	7	20,59%	27	79,41%
3	8	21,05%	30	78,95%
4	12	28,57%	30	71,43%
5	9	32,14%	19	67,86%
6	14	32,56%	29	67,44%
7	17	43,59%	22	56,41%
8	13	31,71%	28	68,29%
9	15	34,88%	28	65,12%
10	17	36,96%	29	63,04%
11	10	33,33%	20	66,67%
12	14	36,84%	24	63,16%
13	10	32,26%	21	67,74%
14	14	38,89%	22	61,11%
15	12	27,91%	31	72,09%
16	12	30,77%	27	69,23%
17	11	27,50%	29	72,50%
18	16	36,36%	28	63,64%
19	12	30,77%	27	69,23%
20	19	48,72%	20	51,28%
21	11	26,83%	30	73,17%
22	10	23,26%	33	76,74%
23	13	29,55%	31	70,45%
24	11	29,73%	26	70,27%
25	10	29,41%	24	70,59%
26	12	30,00%	28	70,00%
27	13	25,49%	38	74,51%
28	12	30,77%	27	69,23%
29	15	27,78%	39	72,22%
30	12	29,27%	29	70,73%
31	12	29,27%	29	70,73%

TABLE 3
Timetable of connections between aircrafts and SACCAN (January 2010)

Regarding the information presented above, the following figure introduces the distribution of connections per hour produced between aircrafts and SACCAN by focusing on the five days with the highest figures of connections in January 2010.

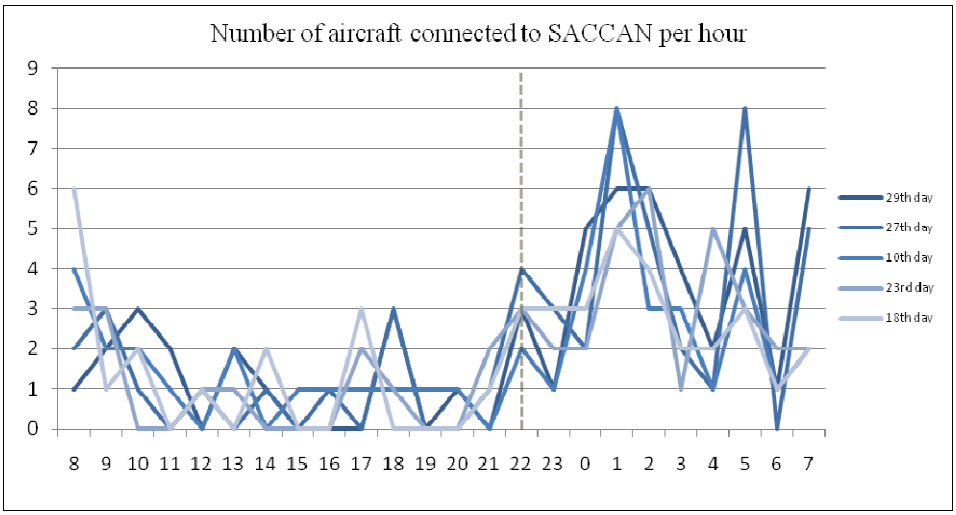

FIGURE 2
Number of connections between aircraft and SACCAN per hour

2.2 Datalink performance analysis.

On the other hand, it is also important to represent the delay in the reception of the message sent by the ADS and CPDLC communications.

To this respect, the following section introduces the downlink message delivery delay at 95% and 99%. These percentages represent the time in which the calculated delay is lower or equal than the value presented.

	Figure of delays ≥ 95% (seconds)	**Figure of delays ≥ 99% (seconds)**
AFN Log On		
VHF	38,503 s.	138,864 s.
Satellite	71,280 s.	112,644 s.
Global	65,447 s.	117,968 s.
ADS Reports		
VHF	27,144 s.	86,944 s.
Satellite	56,555 s.	127,138 s.
Global	45,993 s.	116,326 s.
CPDLC AT		
VHF	21,782 s.	53,201 s.
Satellite	33,682 s.	130,105 s.
Global	32,906 s.	125,740 s.
AFN Log On, ADS Reports and CPDLC AT		
VHF	27,556 s.	89,378 s.
Satellite	55,736 s.	126,132 s.
Global	46,105 s.	116,492 s.

TABLE 4
Delays at 95% and 99% (January 2010)

Additionally, the next three figures relate the table above to its graphical representation, by making a comparison between the ways in which the information is transmitted, namely VHF or satellite.

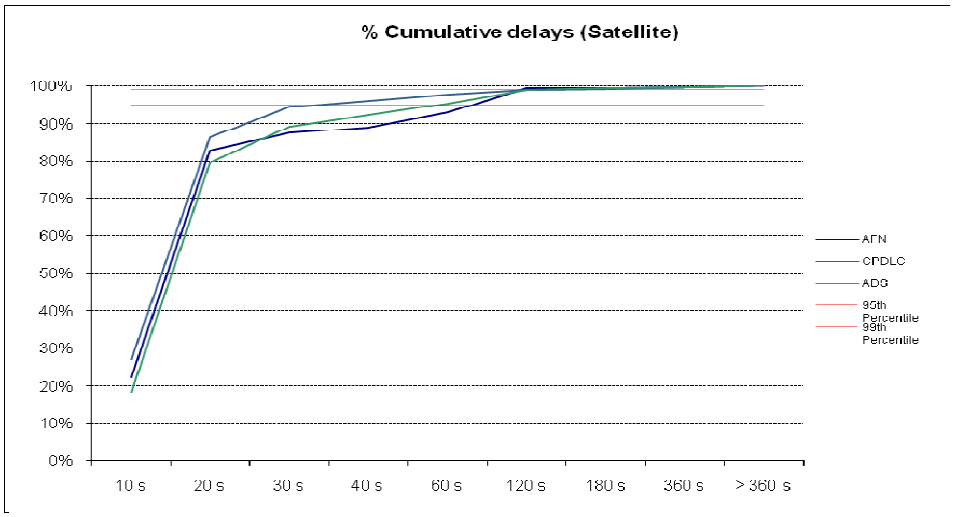

FIGURE 3
Satellite downlink delay – Cumulative diagram (January 2010)

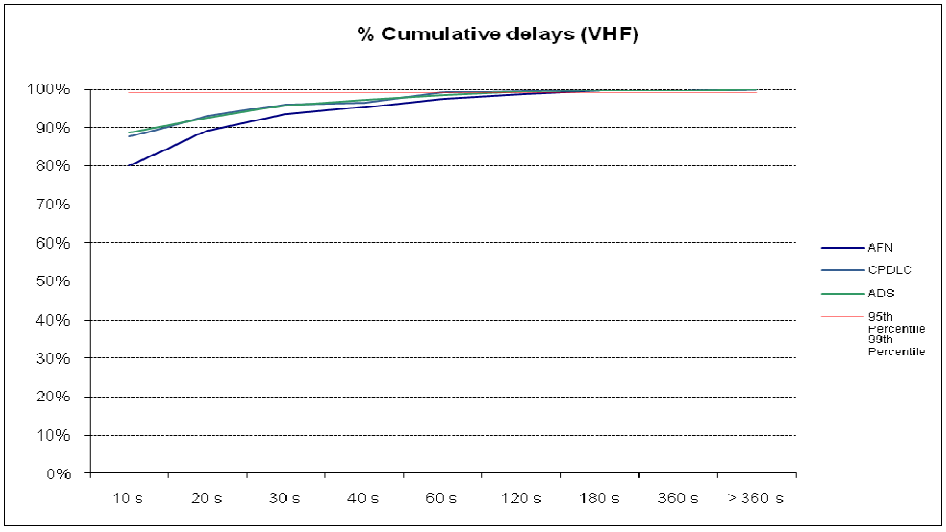

FIGURE 4
VHF downlink delay – Cumulative diagram (January 2010)

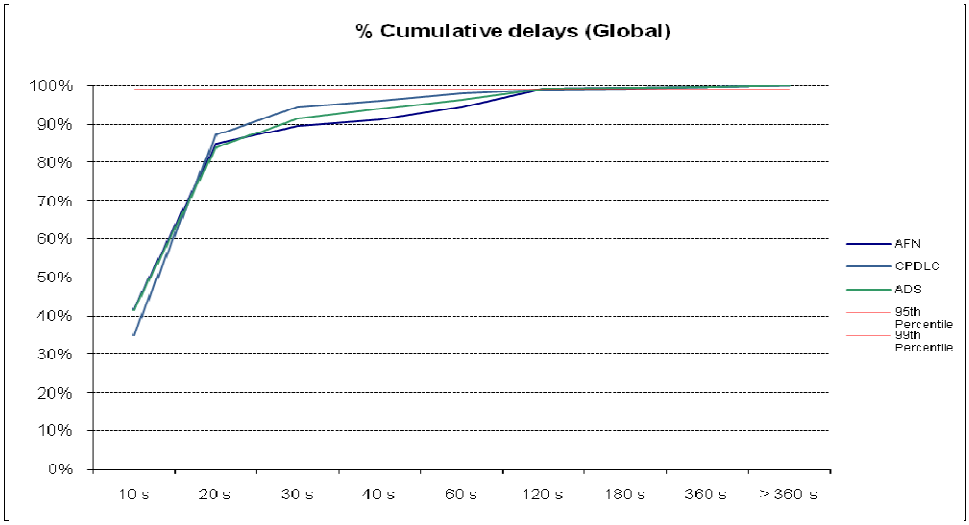

FIGURE 5
Global downlink delay – Cumulative diagram (January 2010)

Regarding to the delays, it is also important to introduce the round trip time. In this study this time is measured by using ADS contracts (from the time these contracts are sent until an answer is provided by the aircraft. Therefore, it also includes time spent by the avionics).

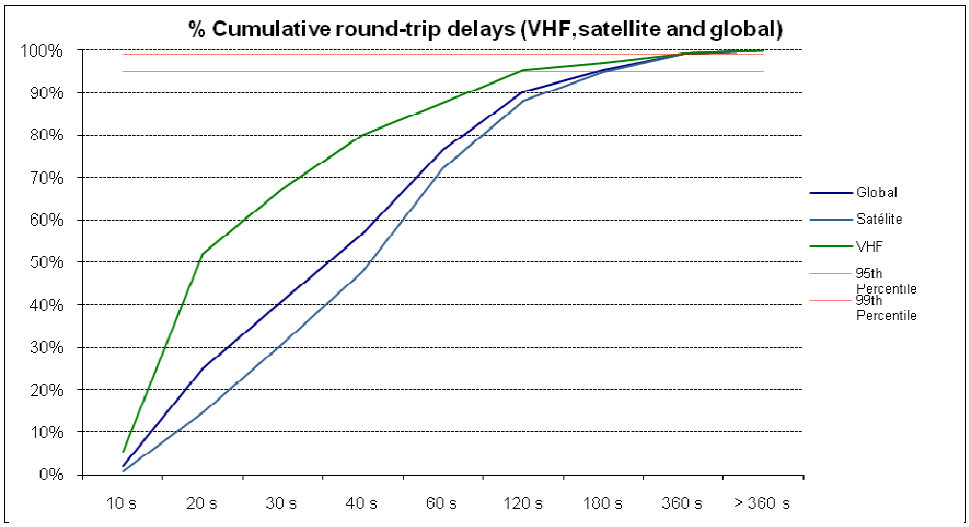

FIGURE 6
Round trip delay – Cumulative diagram (January 2010)

2.3 ADS-C Contracts

ADS-C provides surveillance capability in oceanic and en-route airspace. In non-radar airspace, the effective use of ADS-C in the provision of air traffic services enhances flight safety.

Three types of ADS-C contracts can be established with an aircraft (periodic, event and demand). Each of these contracts operates independently from each other and they are initiated by the ground system and do not require pilot actions.

The following table represents the ADS-C contracts established from September 2009 to January 2010 between aircrafts and SACCAN.

It must be taken into account that SACCAN is configured to automatically establish one periodic and one event contracts (including waypoint change and lateral deviation events). In the following table, these contracts are considered a part from the rest of established contracts.

ADS-C Contracts	Jan. 2010	Dec. 2009	Nov. 2009	Oct. 2009	Sep. 2009
Initials contracts	1332	1311	1347	1193	998
Periodic contracts (No initials)	123	92	114	95	116
Event contracts (No initials)	105	104	113	106	104
Demand contracts	97	77	81	76	82

TABLE 5
Number and type of ADS-C Contracts

Continuing with ADS characteristics, another important issue to remark is the FOM values of ADS message sent by the airplanes. FOM, namely Figure of Merit, defines the accuracy measurement of the navigation information.

The following table introduces the monthly trend of the different FOMs, most part of these values are equal or higher than six, which correspond to an error less than 0.25 NM with a probability of 95%.

FOM	Jan. 2010	Dec. 2009	Nov. 2009	Oct. 2009	Sep. 2009
FOM = 7 (Error < 0.05 NM)	2.31%	1.91%	0.79%	0.75%	1.28%
FOM ≥ 6 (Error < 0.25 NM)	99.13%	99.88%	99.93%	99.95%	99.90%
FOM ≥ 5 (Error < 1 NM)	99.15%	99.88%	99.94%	99.98%	99.91%
FOM ≥ 4 (Error < 4 NM)	99.20%	99.88%	99.94%	99.98%	99.91%
FOM ≥ 3 (Error < 8 NM)	99.34%	99.88%	99.94%	99.98%	99.91%
FOM ≥ 2 (Error < 15 NM)	99.34%	99.88%	99.94%	99.98%	99.91%
FOM ≥ 1 (Error < 30 NM)	99.38%	100%	99.99%	99.98%	99.91%
FOM ≥ 0	100%	100%	100%	100%	100%

TABLE 6
Cumulative percentages of FOM values sent in ADS messages

2.4 Controller-Pilot Datalink Communications

The CPDLC application provides air-ground data communication for the ATC service. This includes a set of clearance/information/request message elements which correspond to voice phraseology employed by Air Traffic Control procedures.

The controller is provided with the capability to issue level assignments, crossing constraints, lateral deviations, route changes and clearances, speed assignments, radio frequency assignments, and various requests for information. A “free text” capability is also provided to exchange information not conforming to defined formats.

To introduce CPDLC functionality, the following tables present the number and type of uplink message elements sent by the air traffic controller to the aircraft.

UL message elements	Nº of times used	Percentage
[freetext] (normal)	660	54,55%
SQUAWK [beaconcode]	124	10,25%
REPORT LEVEL [altitude]	92	7,60%
CONTACT [icaounitname] [frequency]	87	7,19%
CLIMB TO AND MAINTAIN [altitude]	69	5,70%
PROCEED DIRECT TO [position]	63	5,21%
MAINTAIN [altitude]	26	2,15%
ERROR [errorInformation]	22	1,82%
MONITOR [icaounitname] [frequency]	19	1,57%
ROGER	13	1,07%
RADAR CONTACT [position]	11	0,91%
END SERVICE	5	0,41%
DESCEND TO AND MAINTAIN [altitude]	4	0,33%
[freetext] (distress)	4	0,33%
CONFIRM ALTITUDE	3	0,25%
REPORT PASSING [position]	2	0,17%
CONFIRM SPEED	2	0,17%
REQUEST POSITION REPORT	2	0,17%
AT [position] CONTACT [icaounitname] [frequency]	1	0,08%
RADAR SERVICE TERMINATED	1	0,08%

TABLE 7
UL message elements transmitted (January 2010)

Type	Nº of times used	Percentage
Additional messages	664	54,88%
Contact / Monitor / Surveillance requests	231	19,09%
Report / Confirmation requests	101	8,35%
Vertical clearances	99	8,18%
Route modifications	63	5,21%
System management messages	27	2,23%
Responses / Acknowledgements	13	1,07%
Air traffic advisories	12	0,99%
Crossing constraints	0	0,00%
Lateral offsets	0	0,00%
Speed changes	0	0,00%
Negotiation requests	0	0,00%

TABLE 8
Types of UL message elements (January 2010)

On the other hand, the pilot is provided with the capability to respond to messages, to request clearances and information, to report information, and to declare/rescind an emergency. The following two tables introduce the used of CPDLC downlink service in January 2010.

DL message elements	Nº of times used	Percentage
ROGER	525	31,31%
WILCO	360	21,47%
POSITION REPORT [positionreport]	237	14,13%
[freetext]	213	12,70%
LEVEL [altitude]	81	4,83%
DEVIATING [distanceoffset] [direction] OF ROUTE	74	4,41%
REQUEST [altitude]	58	3,46%
REQUEST CLIMB TO [altitude]	36	2,15%
DUE TO AIRCRAFT PERFORMANCE	20	1,19%
STANDBY	16	0,95%
REQUEST CRUISE CLIMB TO [altitude]	10	0,60%
REQUEST DIRECT TO [position]	8	0,48%
ERROR [errorInformation]	6	0,36%
REQUEST VOICE CONTACT	5	0,30%
REQUEST DESCENT TO [altitude]	4	0,24%
PRESENT ALTITUDE [altitude]	4	0,24%
WHEN CAN WE EXPECT HIGHER ALTITUDE	3	0,18%
NOT CURRENT DATA AUTHORITY	3	0,18%
AT [position] REQUEST CLIMB TO [altitude]	2	0,12%
AT PILOTS DISCRETION	2	0,12%
UNABLE	1	0,06%
AT [position] REQUEST DESCENT TO [altitude]	1	0,06%
AT [time] REQUEST CLIMB TO [altitude]	1	0,06%
REQUEST [speed]	1	0,06%
CLIMBING TO [altitude]	1	0,06%
PASSING [position]	1	0,06%
PRESENT SPEED [speed]	1	0,06%
WHEN CAN WE EXPECT [speed]	1	0,06%
WHEN CAN WE EXPECT LOWER ALTITUDE	1	0,06%
DUE TO WEATHER	1	0,06%

TABLE 9
DL message elements transmitted (January 2010)

Type	Nº of times used	Percentage
Responses	902	53,79%
Reports	325	19,38%
Additional messages	236	14,07%
Vertical requests	112	6,68%
Lateral offset requests / reports	74	4,41%
System management messages	9	0,54%
Route modification requests	8	0,48%
Voice contact requests	5	0,30%
Negotiation requests	5	0,30%
Speed requests	1	0,06%
Emergency messages	0	0,00%

TABLE 10
Type of DL message elements (January 2010)

APENDIX D

Cost Analysis for the Implementation of the CFRA for the EUR / SAM Corridor

1. BACKGROUND

1.1. Implementation of ADS / CPDLC plans by SAT States

The SAT *Conclusion 13/TF/1/09* (Cape Town, South Africa, 21 - 23 February 2007) agreed by states at the SAT/13-TF/1 meeting states:

Implementation of ADS / CPDLC plans by SAT States:

> *a) That SAT be apprise Members of the Various Conclusions related to the Need of an Implementation / Operational application of ADS / CPDLC in the SAT area by the end 2010 or before.*
>
> *b) Note; Canarias FIR, SAL Oceanic FIR, Dakar Oceanic FIR FIR and Atlantic (EUR / SAM Corridor), will take the Appropriate Measures Aiming at Full Operational Implementation by December 2008, in compliance with SAT previous conclusions.*

This conclusion, pursued by several states over the past few years, put the threshold for operational implementation of ADS / CPDLC in the EUR / SAM corridor in December 2008.

1.2. Creation of Central FANS Reporting Agency (CFRA)

In the SAT 13/TF/1/14, (Cape Town, South Africa, 21 - 23 February 2007) the following conclusions were reached:

> *Conclusion SAT 13/TF/1/14: Creation of Central FANS Reporting Agency (CFRA).That a Central FANS Reporting Agency (CFRA) be created. The purposes and funding of the CFRA will require further studies.*
>
> *Conclusion SAT 13/TF/1/15: Development of terms of reference Central FANS Reporting Agency (CFRA) in the SAT REGION. That ATNS develop terms of reference of the SAT CFRA taking cognizance of the Fans Operation Manual (FOM) and present to the next FIT meeting.*

*In SAT/FIT 4th meeting, held in Sal, Cape Verde, from 8 to 9 June 2009 the Conclusion SAT FIT 4/2 "**Hosting of the Central FANS Reporting Agency (CFRA)" stated:*

1. *The CFRA be in place by 2010*
2. *The CFRA Cost recovery is supported by the FIT in principle.*
3. *Technical service providers be invited by Secretariat to present their proposals to the FIT by SAT FIT5*
4. ***SATMA provide a business case**, including financial implications and funding options:*
   a) for review by the FIT in order to ensure full transparency of the process
   b) to assist SAT States in making a final and informed decision.

To this regard, Brazil was not committed to this conclusion as the Brazilian delegation needs approval from Brazilian authorities regarding the issue of funding.

It is also important to highlight that SATMA (Spain) offered to discharge CFRA function for one year, pending final conclusion about financial implications.

2. DURATION OF THE PROJECT

Indefinite duration under costs recovery mechanism on the basis of yearly liquidations meanwhile there would not be another agreement in place.

3. DESCRIPTION OF WORK

3.1. Objectives and Scope of work

The main objective of this project is to perform a quantitative and qualitative assessment of the EUR/SAM corridor as follows:

a) Establish and maintain a systems incident database. Track resolutions, review and analyze data obtained.

b) Monitor and report on system incidents and resolutions of incidents and system problems.

c) Institute procedures to obtain monthly status reports from FIT members.

d) Compile de-identified review reports from monthly FIT status reports for circulation to FIT members and other stakeholders on a regular basis.

e) Identify and report on chronic system errors and trends, utilizing monthly FIT status reports.

f) Produce annual reports on FANS1/A activity within the area of interest to the CFRA for review by the FIT and appropriate PIRGS, relating to trends and problems identified, together with progress on problem resolutions and trend mitigation.

g) Monitor and report on ADS/CPDLC compliance with common procedures agreed to.

h) Promote interaction between Service Providers and other Stake Holders, including FIT interoperability Teams in adjacent airspaces and Airline Operators.

i) Harmonize ADS/CPDLC procedures within the CFRA area of interest and also with adjacent airspaces.

3.2. Requirements

To this regard, there is a Working Paper (Central FANS 1/A Reporting Agency) detailing all the necessary requirements.

4. PROJECT RESOURCES

4.1. Personnel Requirements

The establishment of the CFRA for the EUR / SAM Corridor would imply a long-term international engagement between all the States involved and ICAO which means the management and coordination of all the tasks allocated for the Agency.

To fulfill the project, it will be necessary dedicated operational staff with experience and appropriate qualified technical personnel, as well as administrative staff and the corresponding budget for possible tools.

To this regard, the analysis of costs estimated, in order to carry out a precise coordination and monitoring of the EUR / SAM Corridor, contemplates the best possible scenario. It has been considered the optimal involvement from the different necessary resources, as the best mechanism to fulfill all the expectations for the tasks of the Agency.

4.2. Tasks and Effort for full duration of the project

The following table summarizes the percentage of the different efforts assigned to each task.

ID	Tasks	Weight
01	Establish and maintain a systems incident database. Track resolutions, review and analyze data obtained	8%
02	Monitor and report on system incidents and resolutions of incidents and system problems	8%
03	Institute procedures to obtain monthly status reports from FIT members	13%
04	Compile de-identified review reports from monthly FIT status reports for circulation to FIT members and other stakeholders on a regular basis	14%
05	Identify and report on chronic system errors and trends, utilizing monthly FIT status reports	5%
06	Produce annual reports on FANS1/A activity within the area of interest to the CFRA for review by the FIT and appropriate PIRGS, relating to trends and problems identified, together with progress on problem resolutions and trend mitigation.	20%
07	Monitor and report on ADS/CPDLC compliance with common procedures agreed to	9%
08	Promote interaction between Service Providers and other Stake Holders, including FIT interoperability Teams in adjacent airspaces and Airline Operators	8%
09	Harmonize ADS/CPDLC procedures within the CFRA area of interest and also with adjacent airspaces	15%
	TOTAL	100%

4.3. Tasks cost Breakdown

Cost distribution - whole duration of the project	
01	13.331 €
02	13.331 €
03	21.663 €
04	23.329 €
05	8.332 €
06	33.327 €
07	14.997 €
08	13.331 €
09	24.995 €
TOTAL	**166.636 €**

4.4. Total Cost Breakdown

Direct Cost	P. Operational	68.933 €	166.636 €
	P. Technical	97.703 €	

4.5. Funding Mechanism

This analysis of costs is initially done on the scenario to coordinate and monitor the EUR/SAM Corridor.
It is proposed the funding option should be based on a cost recovery mechanism whereby all parties involved contribute. This should be formalized through the corresponding agreement (Letter of Intent, Memorandum of Understanding, etc.,) to be signed by the all the parties involved and committed to.

APPENDIX E

TERMS OF REFERENCE, WORK PROGRAMME AND COMPOSITION OF THE SAT FANS 1/A INTEROPERABILITY TEAM (SAT/FIT)

1. The SAT FANS 1/A Interoperability Team (SAT/FIT) has been established to oversee FANS 1/A system performance monitoring to ensure that the system continues to meet safety and interoperability requirements and that operations and procedures are working as specified.

2. The FIT main objectives are to:

a) Monitor and harmonize ADS/CPDLC trials being carried out by SAT States and adjacent States;

b) Review identified problem reports and determines appropriate resolution;

c) Develop interim operational procedures to mitigate the effects of problems until such time as they are resolved;

d) Monitor the progress of problem resolution;

e) Prepare summaries of problems encountered and their operational implications;

f) Assess system performance based on information in Central FANS Reporting Agency (CFRA) periodic reports;

g) Co-ordinate system testing; and

h) Ensure harmonization of ADS/CPDLC procedures (**operations and maintenance)**

……

WORK PROGRAMME OF THE SAT FANS 1/A INTEROPERABILITY TEAM

WORK PROGRAMME

TASK No.	SUBJECT	TARGET DATE
1.	Oversee FANS 1/A system performance monitoring to ensure that the system continues to meet safety and interoperability requirements and that operations and procedures are working as specified.	Continuous
2.	**Carry out studies on the establishment of a sustainable central reporting agency (CRA) and related institutional issues**	**Completed**
3.	Harmonize ADS/CPDLC programmes developed by SAT States/FIRs.	Continuous
4.	**Assist member States with cost-benefit aspects related to their implementation of ADS/CPDLC programmes.**	**Continuous**
5.	Maintain ADS/CPDLC operational guidance material updated.	Continuous
6.	Conduct studies related to the implementation of the Global ATM Operational Concept and other enabling concepts within the SAT area.	Continuous

Note: The SAT FIT should submit its meeting reports and proposals to the SAT Working Group.

COMPOSITION

- *The SAT FANS-1/A Interoperability Team (FIT) of multi-disciplinary nature shall comprise of experts from States responsible of FIRs in AFI and SAM routing areas AR1/AH2 and AR2/AH8 as defined in the Global Air Navigation Plan (ICAO Doc 9750), and experts from adjacent FIRs and international organizations.*
- ***Team Leader:*** *South Africa*
- ***WORKING ARRANGEMENTS****: THE SAT FIT SHOULD COMPLETE ITS WORK AND SUBMIT ITS PROPOSALS TO THE SAT ATM WORKING GROUP. THE SAT FIT SHOULD WORK THROUGH ELECTRONIC CORRESPONDENCE PRIOR TO MEETINGS.*
