Twenty First Meeting of the Africa-Indian Ocean Planning and Implementation Regional Group (APIRG/21)
(Nairobi, Kenya, 9 – 11 October 2017)

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation

Performance Framework for Regional Air Navigation Planning and Implementation

GOLD/PBCS/Data Link Monitoring

(Presented by ASECNA)

SUMMARY
This working paper presents the state of implementation and monitoring of ADS-C and CPDLC in ASECNA FIRs and shows also the advantages as well as the operational issues encountered in the exploitation of these means.

Strategic Objectives	This Working Paper is related to Strategic Objectives: A, B & E
References	Conclusion 20/09 APIRG/20: Implementation of ICAO PBCS manual (DOC 9869) and GOLD Manual (DOC 10037)

1.   INTRODUCTION

1.1   APIRG 20 meeting held in Yamoussoukro, Cote d'Ivoire, 30 November – 2 December 2015, invite states, Air Navigation Service Providers (ANSPs) and users to take necessary action to apply the technical and operational guidance provided in the Second Edition of Doc 9869 (Performance Based Communication and Surveillance (PBCS) Manual) and the Global Operational Datalink (GOLD) Manual (Doc 10037) once published; States and ANSPs that have already implemented CPLDC/ADS-C have to review their systems performance using PBCS Manual and take immediate action where remedial measures are necessary.

1.2.   In accordance with this recommendation and in order to improve the air navigation services, ASECNA took the decision to implement ADS-C and CPDLC in several centers.

2. IMPLEMENTATION

2.1.   Since 2002, ASECNA started to implement ADS-C and CPDLC systems in several centers, including Dakar, Abidjan, Antananarivo, Brazzaville, Niamey and Ndjamena.

2.2.   A complete simulator system is implemented at EAMAC in Niamey, to support the training of Air Traffic Controllers.

2.3.   Systems deployed include the following functionalities:

- Flight Data Processing System (FDPS),
- Automatic Flight Data Processing (AFDP),
- Flight Plan Air Situation Display (FPASD)

2.4.   A Flight Data Operator (FDO) position dedicated for the corrections of wrong filed flight plans as well as a simulator system for the on-job training are also implemented.

2.5.   **The table below recapitulates the implementation of the ADS-C and CPDLC :**

FIRs	Implementation Date	Status	Operation Date
Antananarivo	2002	Full Operational	19/02/2004
Ndjamena	2007	Full Operational	05/04/2012
Dakar	2005	Full Operational	24/09/2009
Niamey	2007	Full Operational	01/07/2010
Abidjan	2009	Full Operational	01/07/2010
Brazzaville	2009	Full Operational	05/04/2012
EAMAC	2006	Training system	-

3.   ADS-C/CPDLC MONITORING PERFORMANCE

3.1.   The provision of the data link service to aircraft is provided through an ATS AIRCOM service provided by SITA which undertakes to transmit monthly the measurement of traffic performance of ADS-C and CPDLC connections. These statistics show:
- FANS traffic statistics with the global datalink traffic and the traffic by media and airlines;
- FANS performance with the service availability, RGS and GES availability, the uplink success rate and the uplink reject rate.

3.2.   Micro failures in the ACARS link are reported from time to time. Consequently, ASECNA and SITA coordinates quickly to restore the link availability.
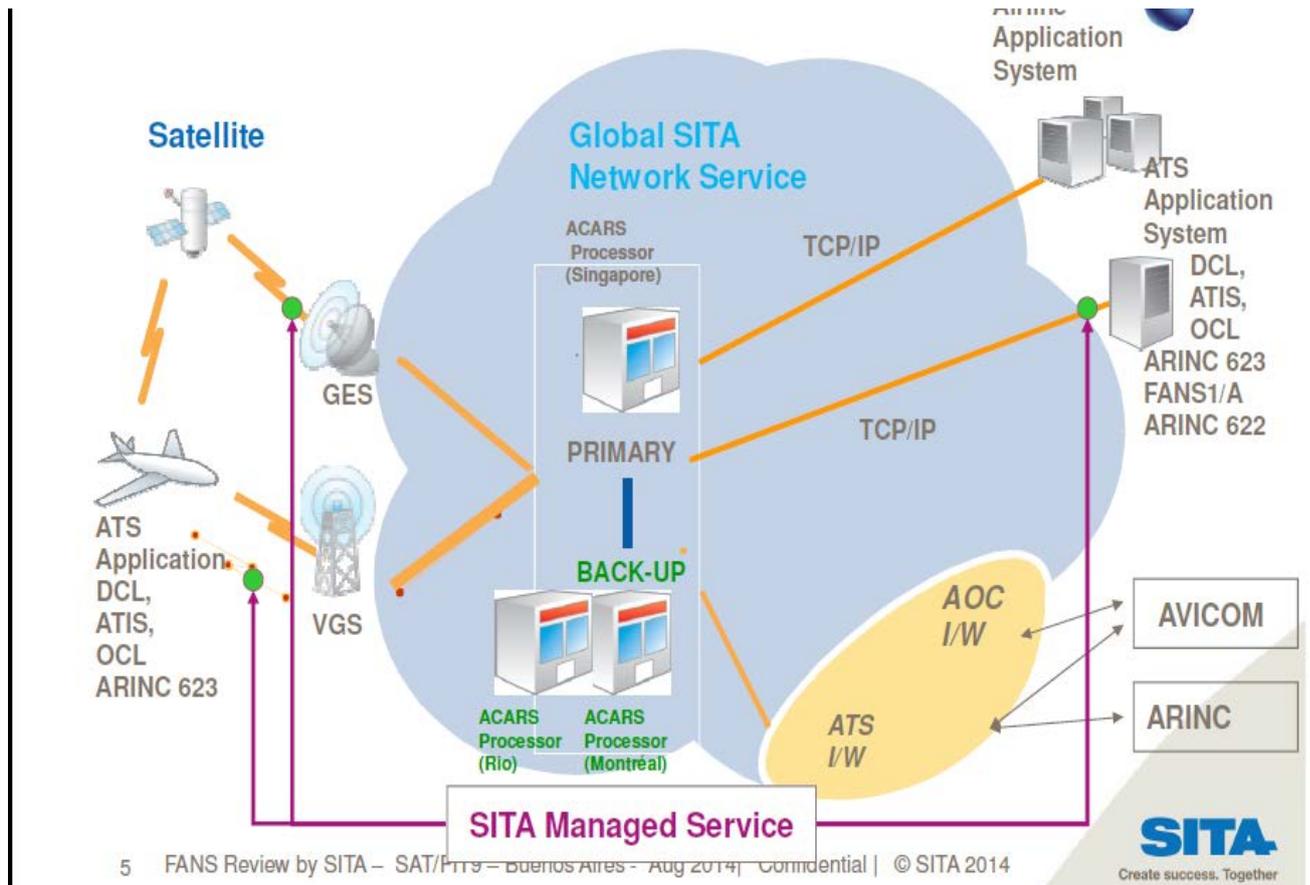
3.3.   The results compiled in July 2017 are presented in the table below:

Centers	ASA Aircom Service Availability		USR Uplink success rate= 1		UDT Uplink messages Delivery Time		Obs.
	VHF Service via DHP	Satellite Service via DHP	VHF Service	Satellite Service	FANS (< 120s)	FANS (< 360s)	
Abidjan	97.37%	100.0%	100.0%	100.0%	98.58%	99.84%	Good USR and UDT performance. Good VHF availability (affected mainly by NDJ breakdowns)
Brazzaville	74.49%	100.0%	100.0%	99.97%	98.78%	99.85%	Good USR and UDT performance. VHF availability was affected by the suspension of the BGF station - the service was available via satellite
Dakar	95.56%	100.0%	100.0%	99.98%	99.33%	99.96%	Very good performance (VHF availability affected by BKO station failures)
Ndjamena	76.71%	100.0%	100.0%	99.97%	98.31%	99.88%	Good performance (VHF availability affected by suspension of BGF station and NDJ breakdowns) - service was

|							
							available via satellite
Niamey	NA	100.0%	NA	99.98%	99.16%	99.98%	Good performance
Nouakchott	NA	100.0%	100.0 %	100.0%	99.42%	100.0%	Good performance
Madagascar	97.86%	100.0%	100.0 %	100.0%	98.89%	99.97%	Good performance (VHF availability was affected by faults in DAR and BUQ stations)

3.4   FANS Reliability performance

| FANS Services	AFN (Log-on)			CPDLC			ADS			TOTAL		
Success / Reject Rate	**Jul-17**	**Last 3 Months**	**Last 12 Months**	**Jul-17**	**Last 3 Months**	**Last 12 Months**	**Jul-17**	**Last 3 Months**	**Last 12 Months**	**Jul-17**	**Last 3 Months**	**Last 12 Months**
Messages Delivered	99.26%	99.08%	99.33%	99.45%	99.32%	99.52%	99.66%	99.55%	99.60%	99.54%	99.42%	99.54%
No Ack + NAK	0.01%	0.16%	0.06%	0.04%	0.10%	0.04%	0.01%	0.07%	0.03%	0.02%	0.09%	0.04%
No Ack	0.01%	0.16%	0.06%	0.04%	0.10%	0.04%	0.01%	0.07%	0.03%	0.02%	0.09%	0.04%
NAK	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
No Station To	0.00%	0.02%	0.03%	0.01%	0.02%	0.02%	0.01%	0.01%	0.02%	0.01%	0.01%	0.02%
Not Logged On	0.47%	0.46%	0.33%	0.37%	0.38%	0.24%	0.17%	0.21%	0.19%	0.28%	0.30%	0.22%
Message Too Old	0.02%	0.03%	0.02%	0.00%	0.01%	0.01%	0.00%	0.02%	0.01%	0.01%	0.02%	0.01%
Other SITA Rejects	0.04%	0.10%	0.07%	0.01%	0.07%	0.04%	0.00%	0.04%	0.03%	0.01%	0.06%	0.04%
Internetworking Rejects	0.19%	0.15%	0.17%	0.12%	0.11%	0.13%	0.14%	0.11%	0.12%	0.14%	0.11%	0.13%

TOTAL TRAFFIC
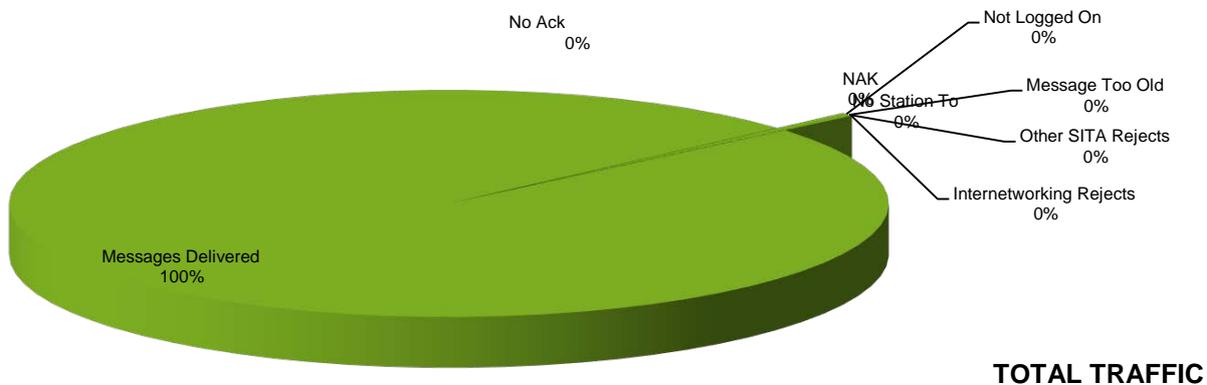
3.5 AIRCOM FANS service availability

Service Availability	# of outages	Shortest Duration	Average Duration	Longest Duration	Total Duration	Availability	3-month average	12-month average
VHF FANS AIRCOM Processor Availability	0	0	0	0	0	100.00%	100.00%	100.00%
Satellite FANS AIRCOM Processor Availability	0	0	0	0	0	100.00%	100.00%	100.00%
VHF Access Network Availability						99.56%	97.77%	92.62%
Satellite Access Network Availability						100.00%	99.95%	99.97%
VHF FANS Service Availability						99.56%	97.77%	92.62%
Satellite FANS Service Availability						100.00%	99.95%	99.97%
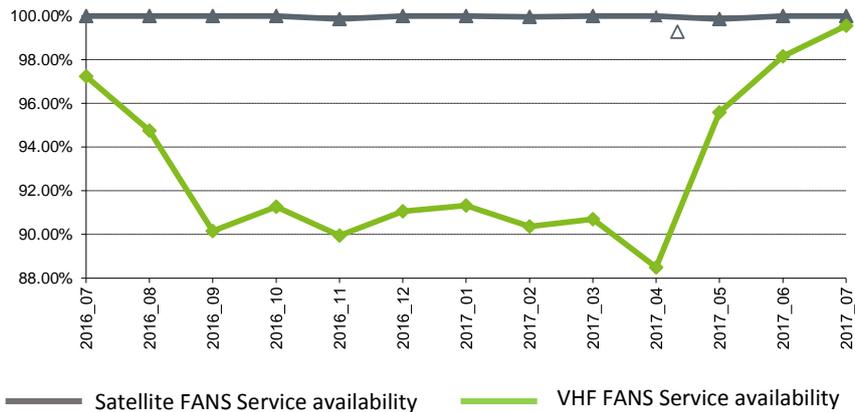
3.6 FANS service performance (VHF+SAT)

Uplink Message Delivery Time	10 s	20 s	30 s	40 s	50 s	60 s	100 s	120 s	180 s	360 s	>360 s
ATS Provider	66.13%	86.46%	92.14%	94.39%	95.92%	96.74%	99.04%	99.33%	99.77%	99.96%	100.00%
AFN (Log-on)	72.62%	91.16%	95.13%	96.07%	97.14%	97.57%	99.53%	99.70%	99.84%	99.96%	100.00%
CPDLC	72.20%	88.98%	93.25%	94.77%	95.75%	96.26%	99.12%	99.44%	99.82%	99.94%	100.00%
ADS	60.98%	83.92%	90.85%	93.81%	95.79%	96.88%	98.89%	99.17%	99.73%	99.98%	100.00%

FANS Uplink Delivery Time
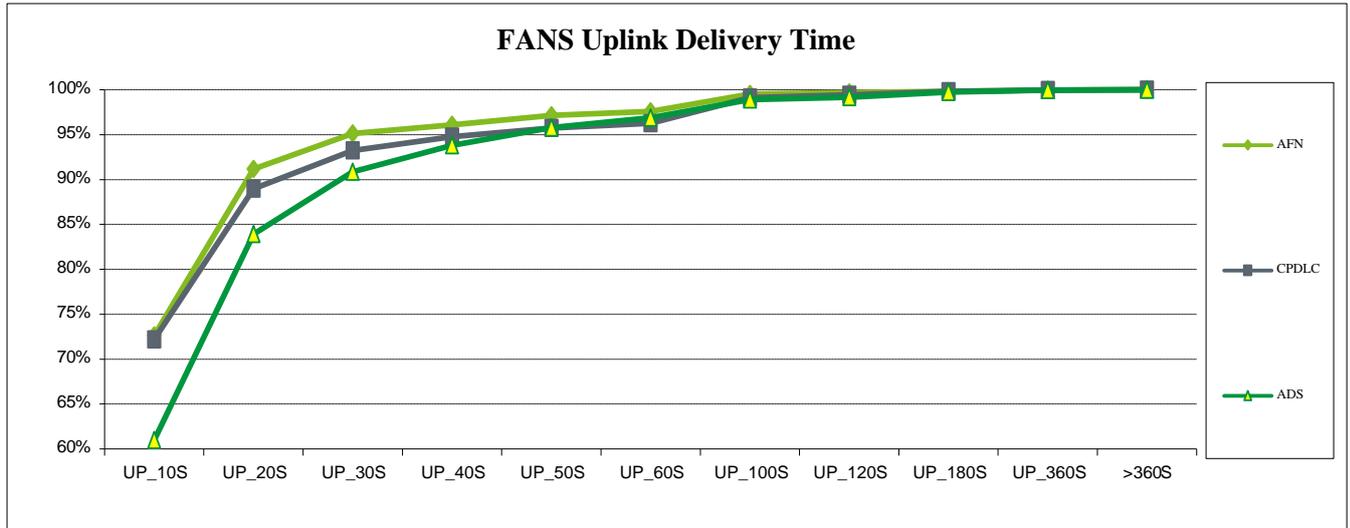
Downlink Message Delivery Time	10 s	20 s	30 s	40 s	50 s	60 s	100 s	120 s	180 s	360 s	>360 s
ATS Provider	40.61%	75.25%	87.45%	92.10%	94.45%	95.93%	98.24%	98.64%	99.10%	99.75%	100.00%
AFN (Log-on)	35.11%	69.03%	85.54%	93.31%	95.79%	96.65%	98.33%	98.80%	99.17%	99.82%	100.00%
CPDLC	47.31%	81.53%	90.11%	93.59%	95.55%	96.82%	98.55%	98.86%	99.19%	99.76%	100.00%
ADS	38.53%	73.50%	86.58%	91.19%	93.70%	95.39%	98.08%	98.50%	99.04%	99.74%	100.00%

FANS Downlink Delivery Time
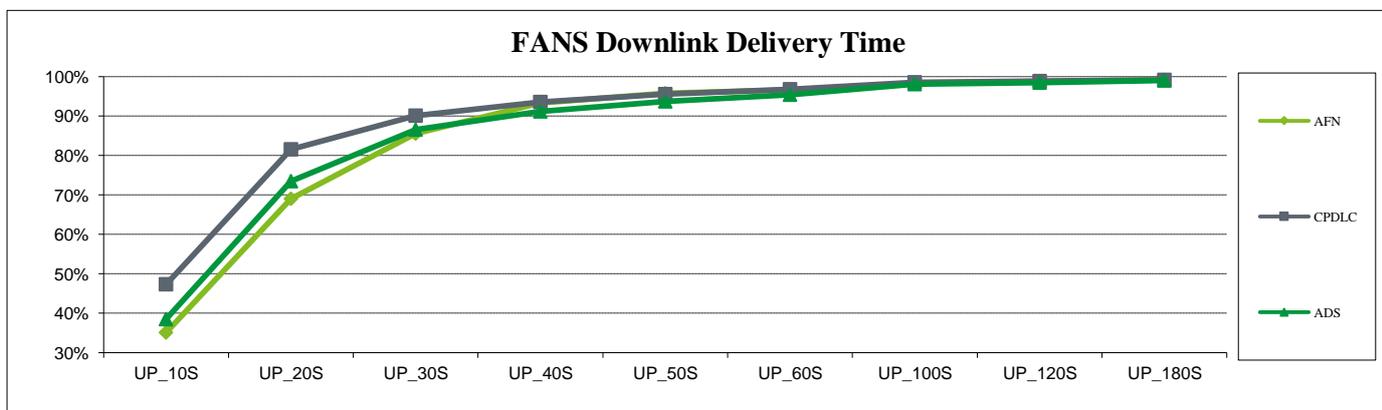
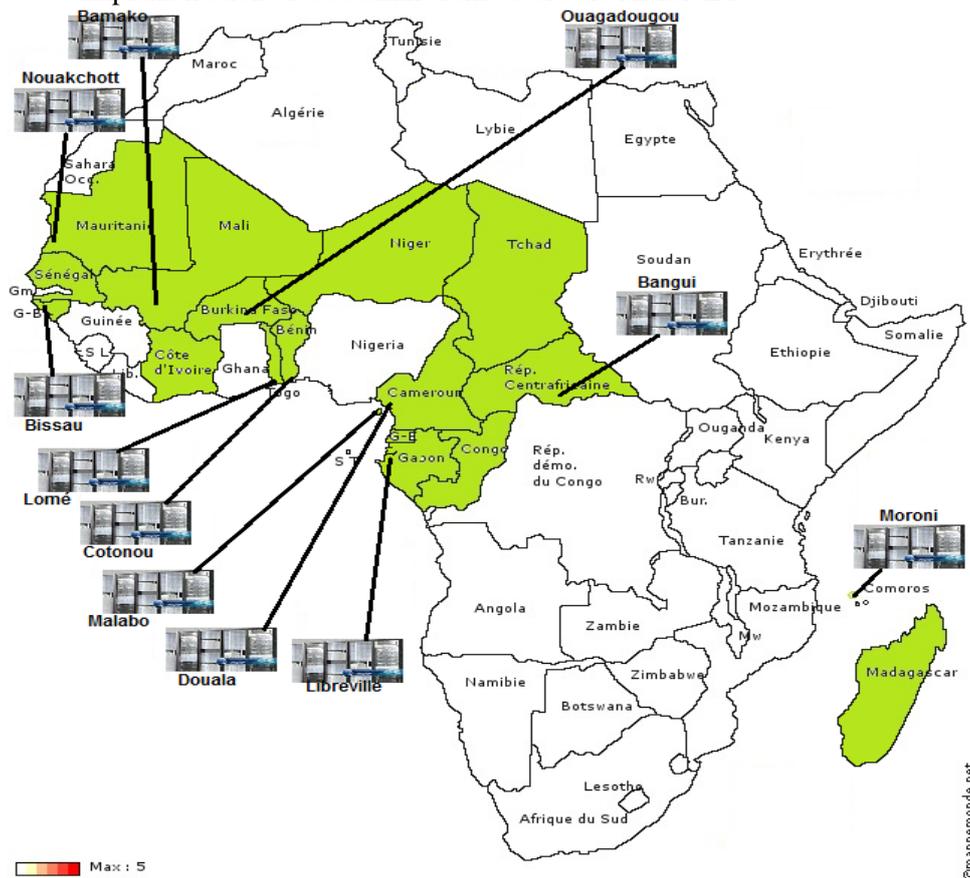| Area Control Center	State of implementation of CPDLC	Ground traffic in messages (Uplink and Downlink)	Percentage of message delivered (reliability)	Percentage of messages rejected		FANS service availability 12 month average		Percentage of Traffic by media
				Procedural error	by Co-DSP	Service	Availability	
Antananarivo	Operational since 2001	9.247	99,92%	0,05%	0,03%	via VHF	97,03%	13,47%
						via satellite	99,99%	79,16%
						via co-DSP	100%	7,37%
Ndjamena	Operational since 2009	8.444	99,76%	0,16%	0,08%	via VHF	82,57%	3,53%
						via satellite	100%	72,93%
						via co-DSP	100%	23,54%
Niamey	Operational since 2009	19.713	99,84%	0,07%	0,09%	via VHF	100%	1,91%
						via satellite	100%	82,78%
						via co-DSP	100%	15,30%
Dakar	Operational since 2008	35.776	99,84%	0,04%	0,12%	via VHF	96,93%	10,04%
						via satellite	100%	65,61%
						via co-DSP	100%	24,35%
Abidjan	Operational since 2009	4.327 6811	99,66%	0.20%	0.10%	via VHF	89,87%	10,93%
						via satellite	100%	60,07%
						via co-DSP	100%	29,00%
Brazzaville	Operational since april 2012	7.000	99,95%	0,05%	0,02%	via VHF	91,44%	3,94%
						via satellite	100%	93,19%
						via co-DSP	100%	2,87%

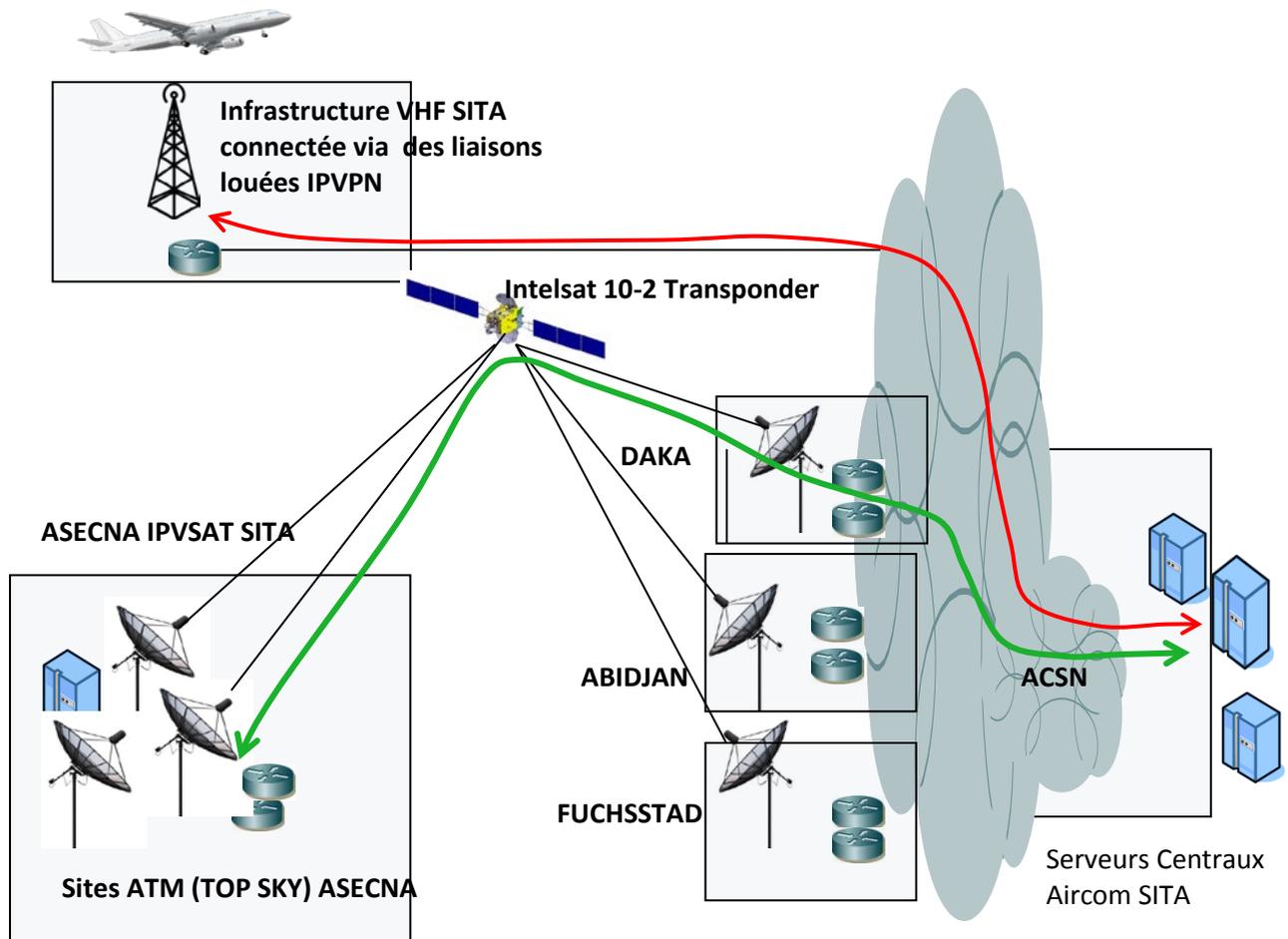**4.   ADVANTAGES AND ENCOUNTERED PROBLEMS NETWORKS**

- The percentage of aircrafts equipped by ADS-C and CPDLC is increasing slowly However, it is still low to take complete advantage of the systems. Also, it is obvious that the increase of ADS- CPDLC equipped aircraft will improve the air navigation safety;
- The use of CPDLC at the boundaries of FIRs is useful and supplies AMS on HF/VHF
- The whole ADS procedures of the GOLD are not used yet, as the call by the aircraft for a contract (AFN log-on) before FIR entry. Some airlines didn't use the ADS-C/CPDLC systems even when the aircraft has the capability. It may decrease the rate of bad coordination;
- The flight plan missing issue and the bad filling of flight plans, impact on the operation of the system; such problems must be discussed properly.

5.   ONGOING IMPROVEMENT PROJECTS TO ENHANCE THE SAFETY

5.1.   To meet regional and international requirements, ASECNA is pursuing its policy of improving its means of communication with the following orientations:
- Strategic orientation Plan (POS) adopted in 2011;
- Extension of Radar and ADS-C surveillance and CPDLC services to the following centers: Bamako, Bangui, Bissau, Cotonou, Douala, Libreville, Lome, Malabo, Moroni, Nouakchott, Ouagadougou;
- Implementation of a datalink architecture via AFISNET

Infrastructure VHF SITA connectée via des liaisons louées IPVPN

Intelsat 10-2 Transponder

DAKA

ASECNA IPVSAT SITA

ABIDJAN

ACSN

FUCHSSTAD

Sites ATM (TOP SKY) ASECNA

Serveurs Centraux
Aircom SITA

6.   ACTION BY THE MEETING

- The meeting is invited to:
- Take note of the information communicated above;
- Make recommendation to airliners to take the appropriate measures to equip aircrafts with ADS-C and CPDLC. This will enhance the level of safety in AFI Region;
- Encourage Airlines to report the events to improve the monitoring of the systems.

END