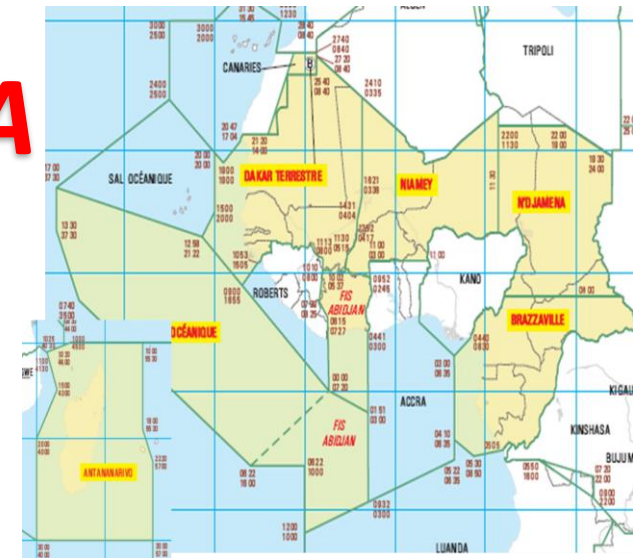


GOLD/PBCS/Data Link Monitoring Activities Workshop Dakar, Senegal, Sept 11-15, 2017

Status of ADS-C /CPDLC implementation in ASECNA Airspace



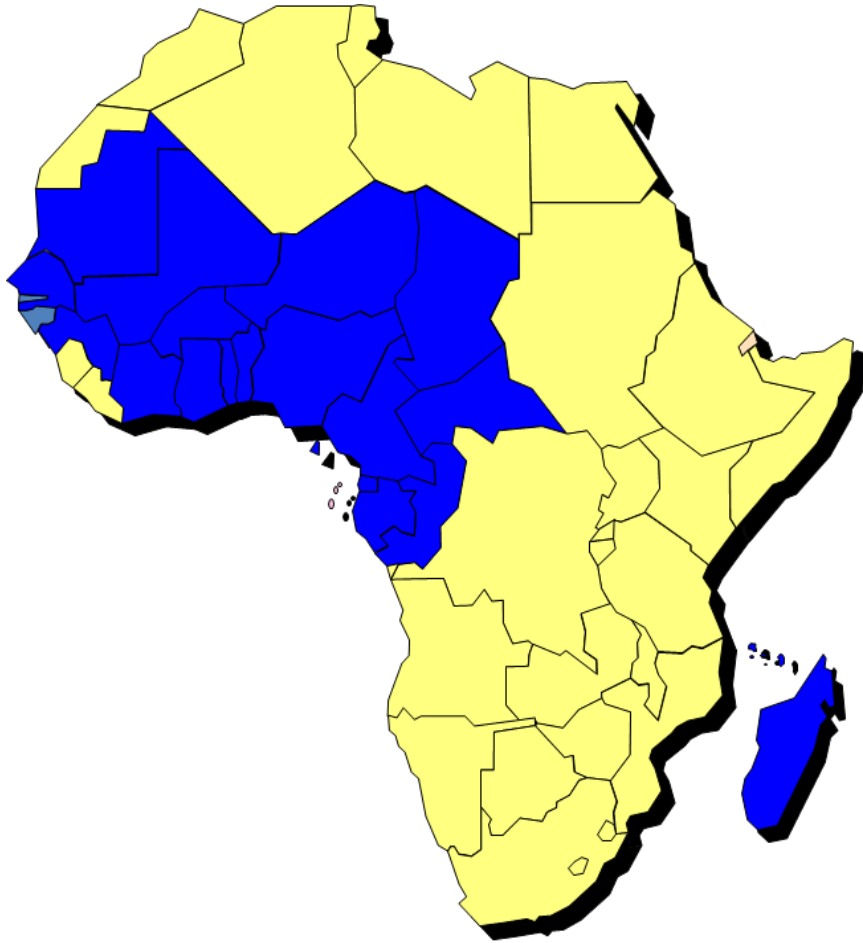
CONTENT

- ❖ Introduction
- ❖ ASECNA at a glance
- ❖ Status of the ADS-C and CPDLC Implementation
- ❖ ADS-C and CPDLC Monitoring Performance
- ❖ Advantages and encountered problems networks
- ❖ On going improvement projects to enhance the safety
- ❖ Conclusion

Introduction

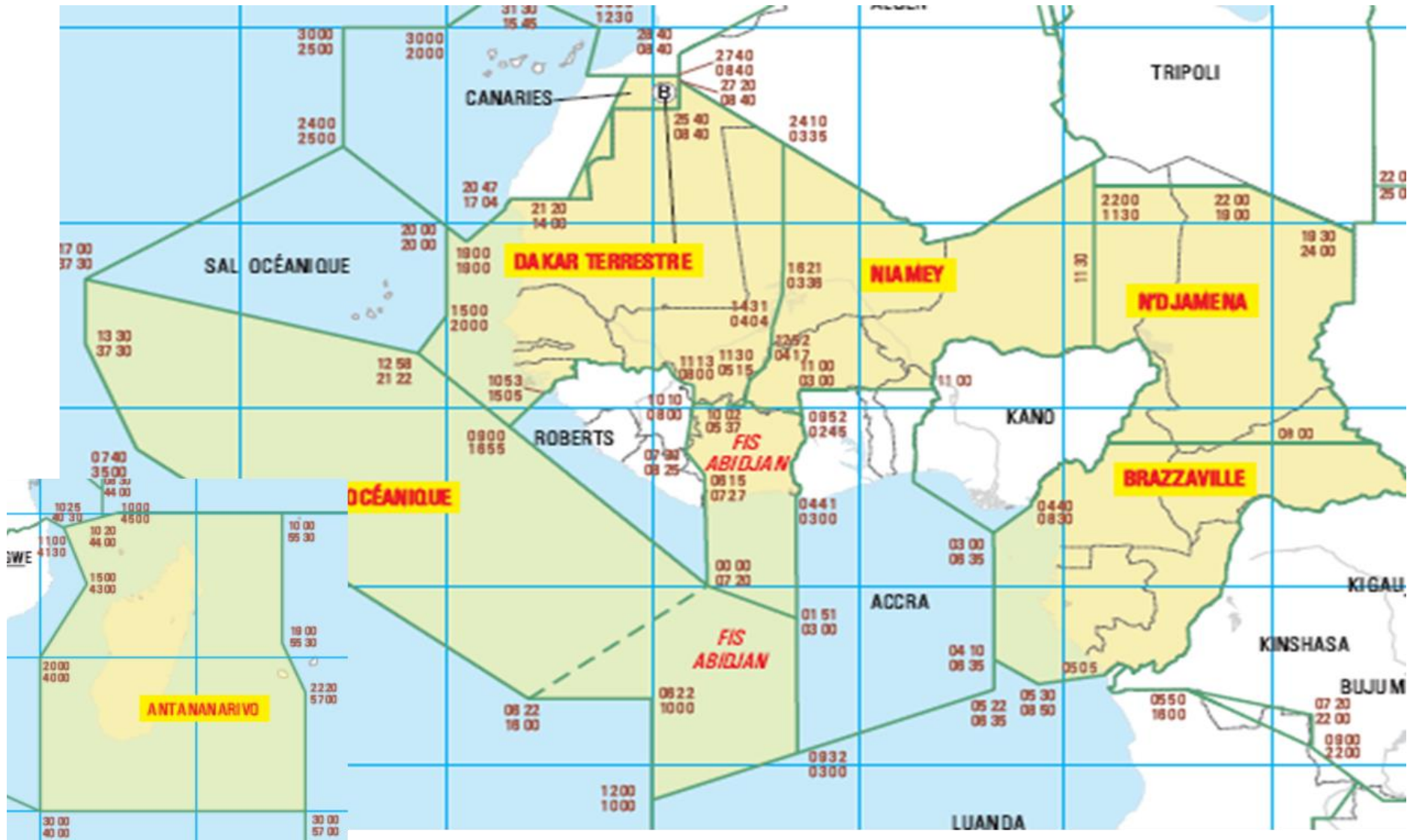
- ❑ In order to improve the air navigation services, ASECNA took the decision to implement ADS-C and CPDLC in several centers.
- ❑ APIRG 17 meeting, held in Ouagadougou, 2-6 August 2010 tasked States to implement CPDLC and ADS-C procedures for the en-route operations in their oceanic and remote continental airspaces.
- ❑ 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.

ASECNA at a glance



- ❖ Air Navigation Service Provider
- ❖ Created in 1959
- ❖ 17 African Countries & France
- ❖ More than 16 Millions km² (+1,5 Europe)
- ❖ Six Flight Information Regions
- ❖ A satellite VSAT Network (more than 100 nodes)

Airspaces managed by ASECNA



Status of the ADS-C and CPDLC Implementation

- ❑ Since 2002, ASECNA started to implement ADS-C and CPDLC systems in several centers, including Abidjan, Antananarivo, Brazzaville, Niamey and Ndjamen.
- ❑ A complete simulator system is implemented at EAMAC in Niamey, to support the training of-Air traffic Controllers.
- ❑ Systems deployed include the following functionalities :
 - ✓ Flight Data Processing System (FDPS),
 - ✓ Automatic Flight Data Processing (AFDP),
 - ✓ Flight Plan Air Situation Display (FPASD)
 - ✓ Flight Data Processing System (FDPS).

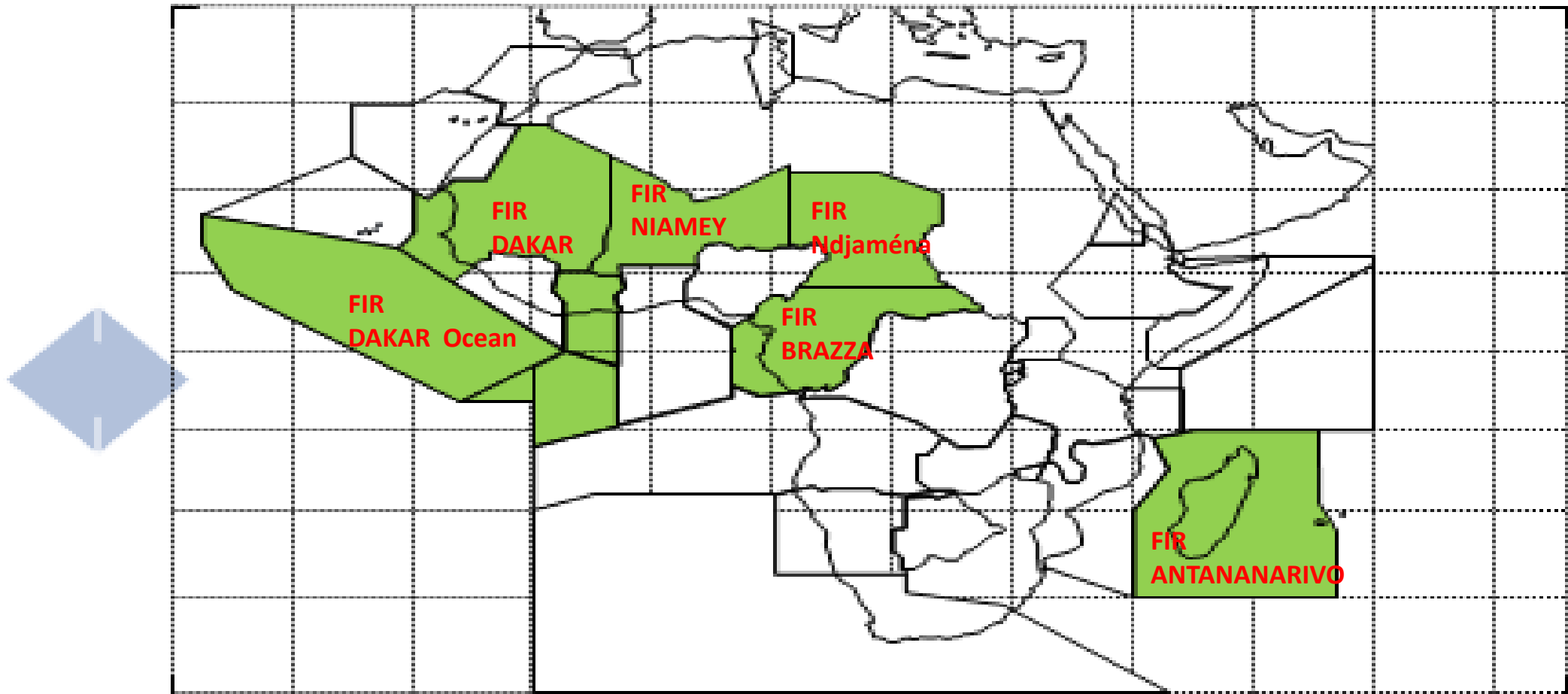
A Flight Data Operator (FDO) position dedicated for the corrections of wrong filed flight plans as well as a simulator system for the on-job training are also implemented.

Status of the ADS-C and CPDLC Implementation

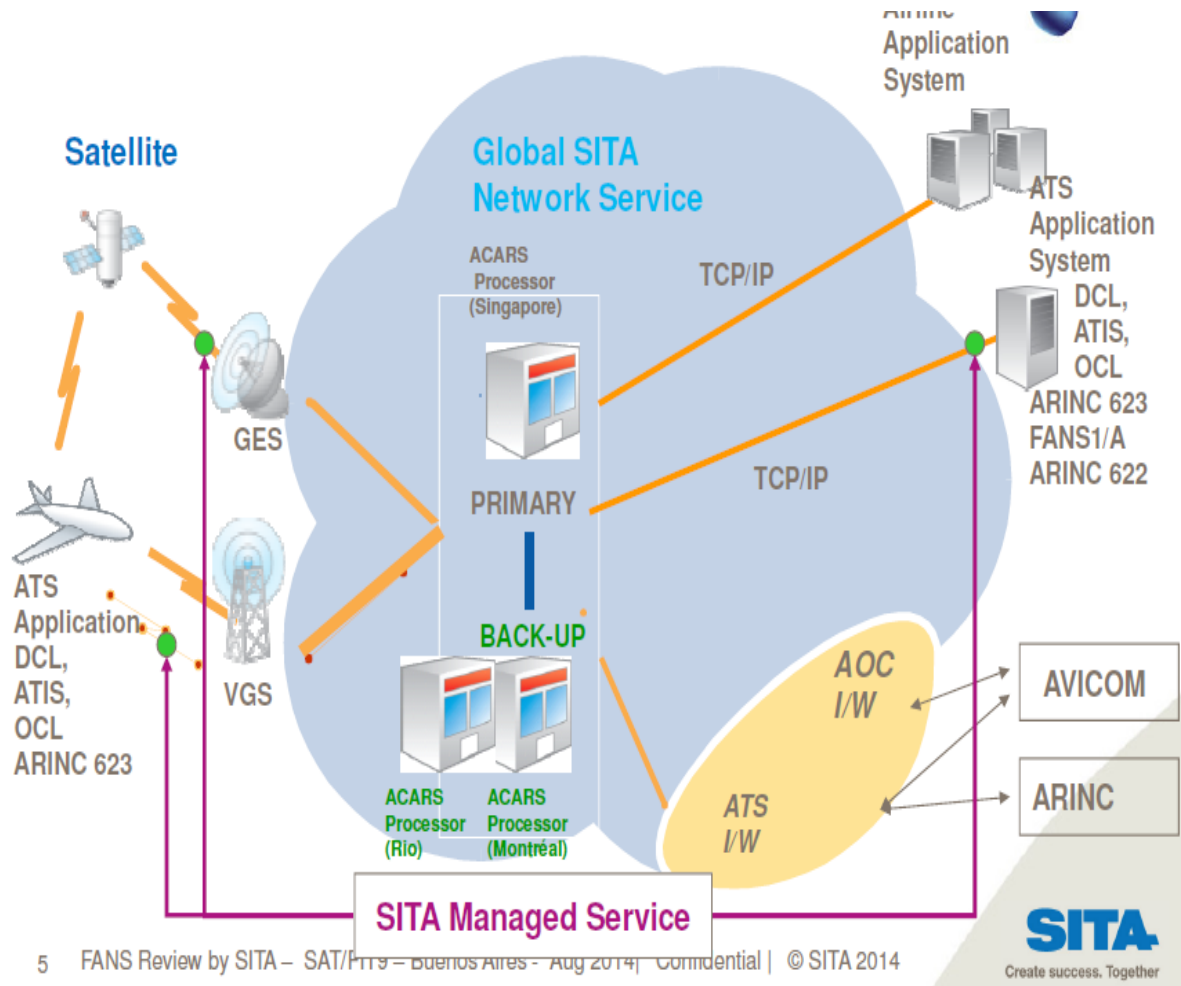
The table below recapitulates the implementation of the ADS-C and CPDLC:

FIRs/Center	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	-

Status of ADS-C/CPDLC implementation



ADS-C and CPDLC Monitoring Performance



❑ SITA communicates monthly to ASECNA the 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.

However, micro failures in the ACARS link are reported from time to time. Consequently, ASECNA and SITA coordinates quickly to restore the link availability.

ADS-C and CPDLC Monitoring Performance (Statistiques SITA)

- ❖ ADS-C/CPDLC service provider : SITA
- ❖ Contract
- ❖ Service Level Agreement

Service Availability Targets

Pre-FANS and FANS

Service provided through VHF (VHF-ASA):

FANS : 95%

Service provided through satellite (SAT-ASA):

FANS : 99.5%

Service Element	Target Uplink Success Rate Targets		
	At 60 s (ATS-UDT60)	At 120 Seconds (ATS-UDT120)	At 360 Seconds (ATS-UDT360)
FANS	n/a	97%	99%

ADS-C and CPDLC Monitoring Performance(July 2017-SITA)

ABIDJAN

ASA - Aircom Service Availability refer to § 1.2

- VHF Service via DHP 97.37%
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service 100.0%
- Satellite Service 100.0%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 98.58%
- FANS (< 360s) 99.84%

DAKAR-

ASA - Aircom Service Availability refer to § 1.2

- VHF Service via DHP 95.56%
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service 100.0%
- Satellite Service 99.98%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 99.33%
- FANS (< 360s) 99.96%

NIAMEY

ASA - Aircom Service Availability refer to § 1.2

- VHF Service via DHP pas de station proche
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service pas de station proche
- Satellite Service 99.98%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 99.16%
- FANS (< 360s) 99.98%

BRAZZAVILLE

-- Aircom Service Availability refer to § 1.2

- VHF Service via DHP 74.49%
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service 100.0%
- Satellite Service 99.974%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 98.78%
- FANS (< 360s) 99.85%

NDJAMENA

ASA - Aircom Service Availability refer to § 1.2

- VHF Service via DHP 76.71%
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service 100.0%
- Satellite Service 99.97%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 98.31%
- FANS (< 360s) 99.88%

MADAGASCAR

ASA - Aircom Service Availability refer to § 1.2

- VHF Service via DHP 97.86%
- Satellite Service via DHP 100.0%

USR - Uplink success rate= 1- "No Ack+NAK" refer to § 3.4

- VHF Service 100.0%
- Satellite Service 100.0%

UDT Uplink messages delivery time refer to § 1.4

- FANS (< 120s) 98.89%
- FANS (< 360s) 99.97%

ADS-C and CPDLC Monitoring Performance (Statistiques SITA)

DAKAR CENTER (July 2017)

■ CPDLC/ADS/AFN

Customer	Ground Traffic (Uplink + Downlink)	Percentage Total	Air-Ground Traffic (Uplink + Downlink)	Percentage Total
ATS Provider	229,719	100%	187,541	100%
FANS Services				
AFN (Log-on)	22,056	9.60%	16,845	8.98%
CPDLC	63,437	27.62%	50,815	27.10%
ADS	144,226	62.78%	119,881	63.92%

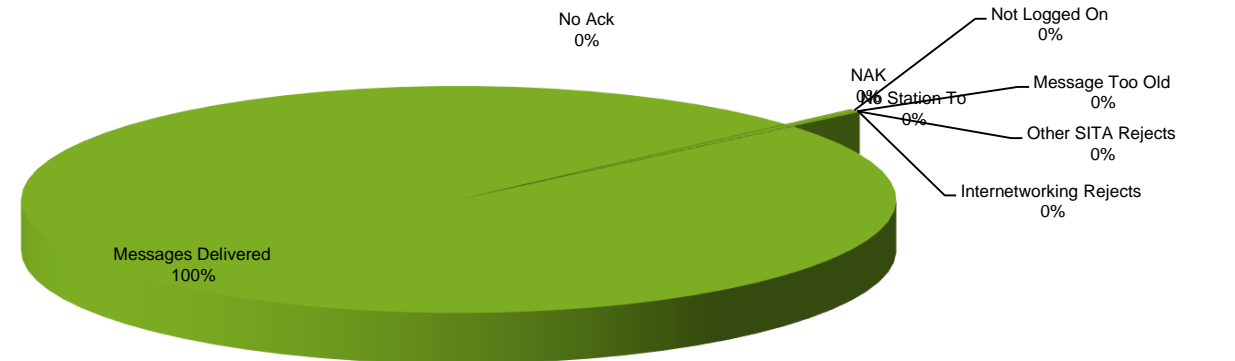
■ Messages by airline

ATS Provider	FANS BY AIRLINES		
	Jul-17	12-month average	Percentage Total
TAP	29,360	23,825	12.78%
TAM	22,054	19,576	9.60%
DLH	21,198	19,795	9.23%
AFR	21,001	19,761	9.14%
IBE	19,843	16,591	8.64%
AZA	17,327	17,751	7.54%
AEA	12,679	11,150	5.52%
KLM	10,944	8,959	4.76%
ARG	9,917	7,179	4.32%
OTHERS	65,396	62,091	28.47%
Total Airlines	229,719	200,508	100.00%

ADS-C and CPDLC Monitoring Performance (Statistiques SITA)

1.3 FANS RELIABILITY PERFORMANCE

FANS Services	AFN (Log-on)			CPDLC			ADS			TOTAL		
	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%

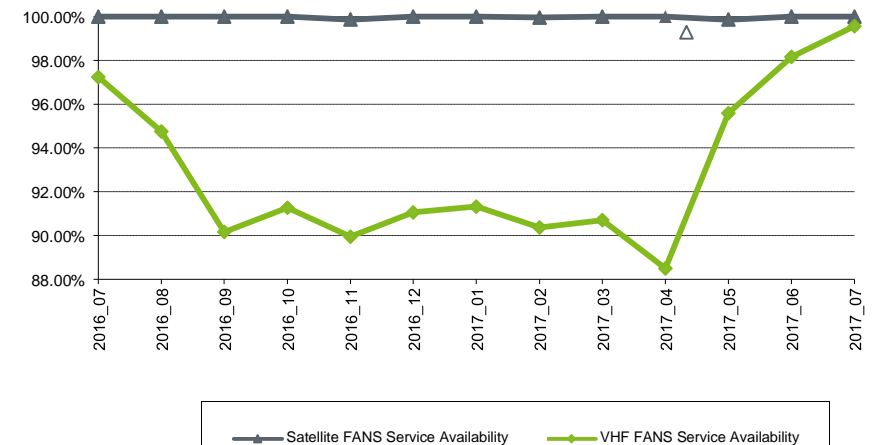
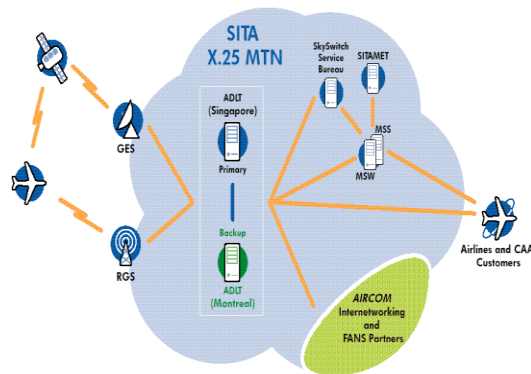


TOTAL TRAFFIC

ADS-C and CPDLC Monitoring Performance (Statistiques SITA) DAKAR CENTER (July 2017)

3.1 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%

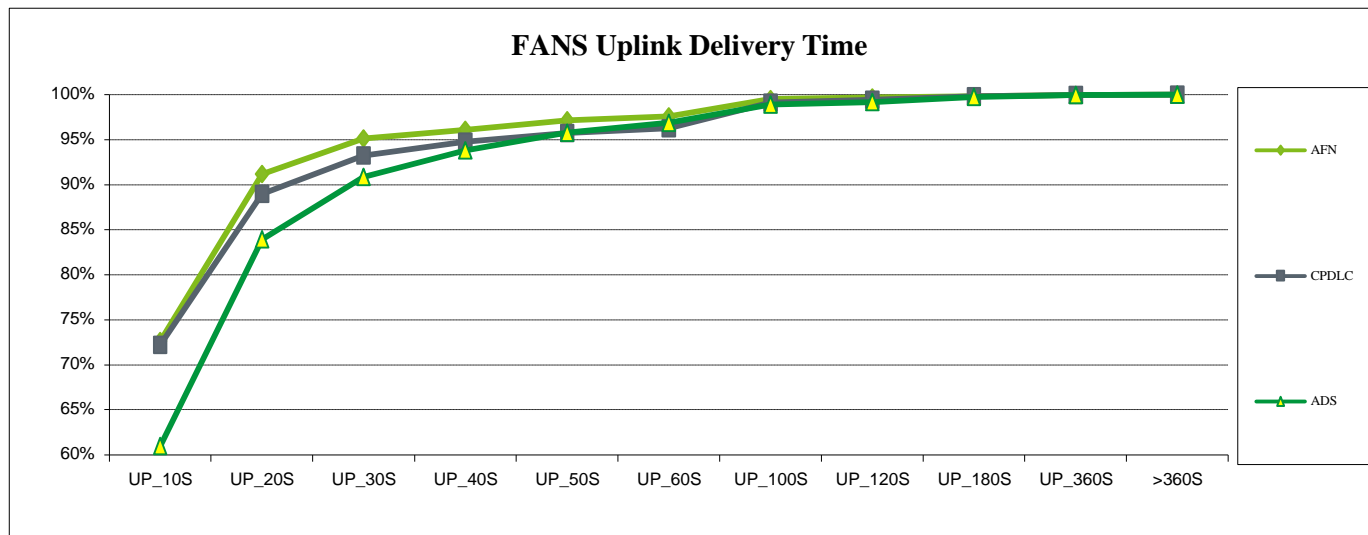


ADS-C and CPDLC Monitoring Performance (Statistiques SITA)

DAKAR CENTER (July 2017)

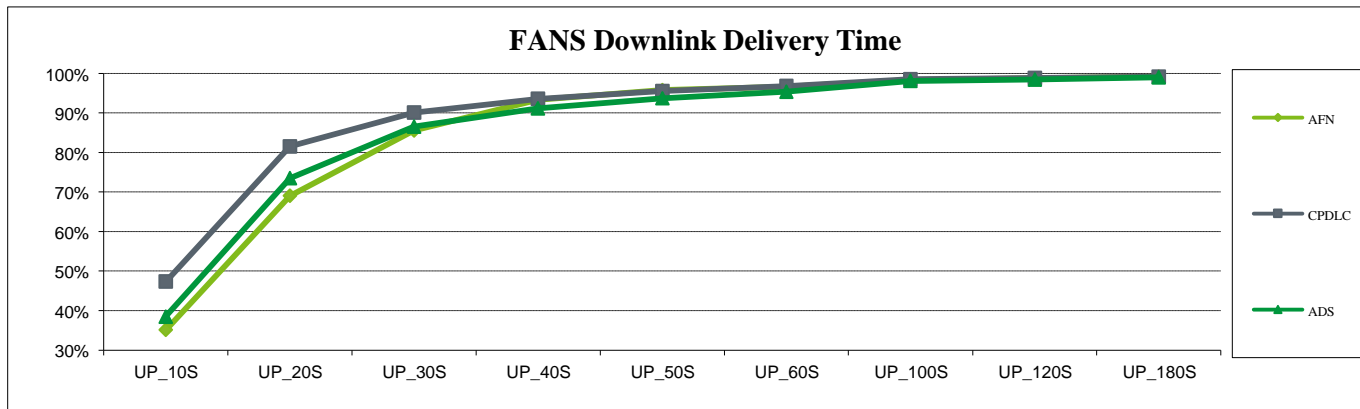
1.4 FANS SERVICE PERFORMANCE (VHF+SAT)

Uplink Delivery Time	Message	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%



ADS-C and CPDLC Monitoring Performance (Statistiques SITA) DAKAR CENTER (July 2017)

Downlink Delivery Time Message	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%



ADS-C and CPDLC Monitoring Performance (Statistiques SITA)

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%
Njamena	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%

Advantages and encountered problems networks

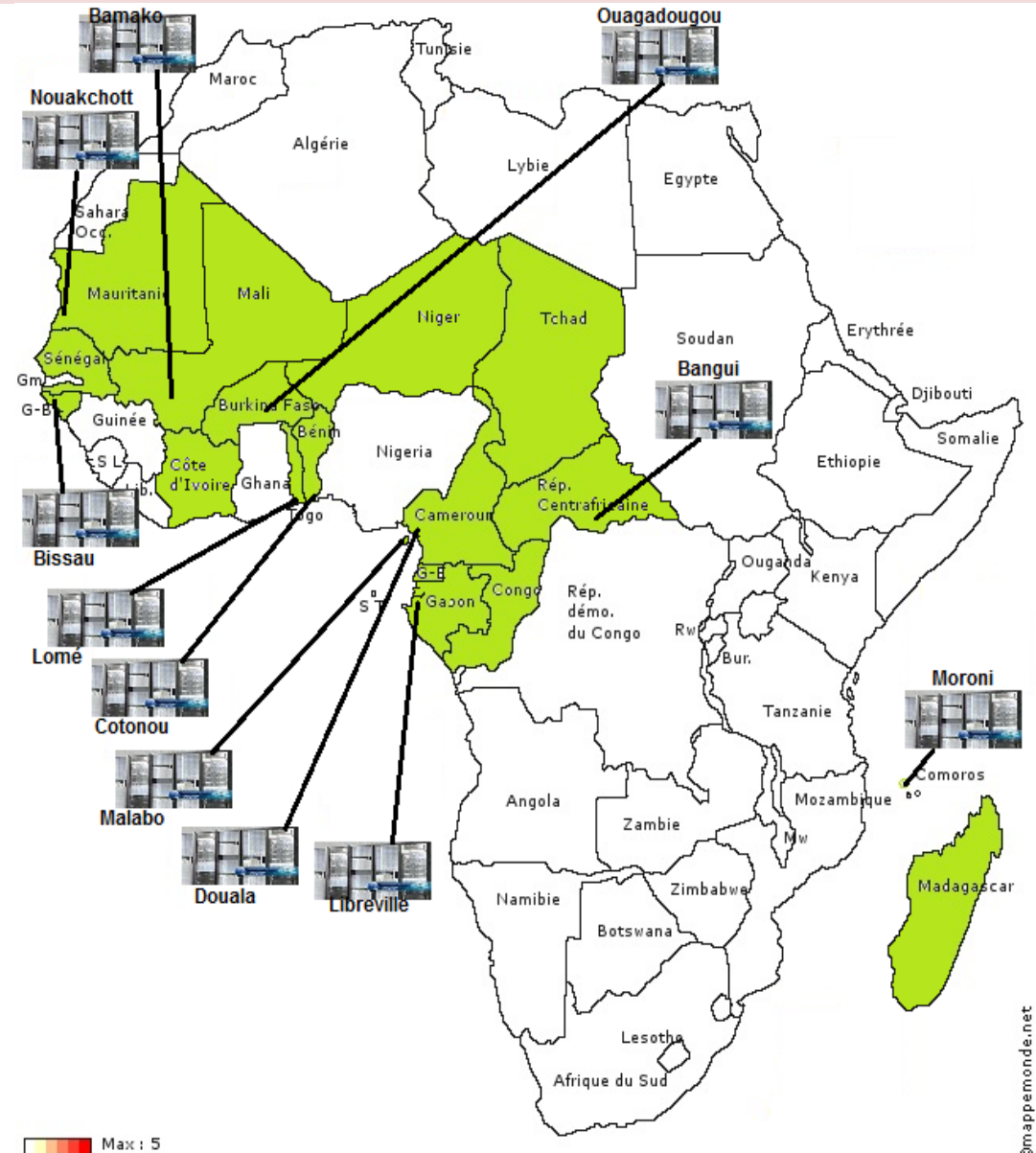
- ❑ The percentage of aircrafts equipped by ADS-C and CPDLC is increasing slowly. However, it is still low to take complete advantage of the systems. Also, it is obvious that the increase of ADS- CPDLC equipped aircraft will improve the air navigation safety;
- ❑ The use of CPDLC at the boundaries of 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.

On going improvement projects to enhance the safety

Strategic orientation Plan (POS) adopted in 2011;

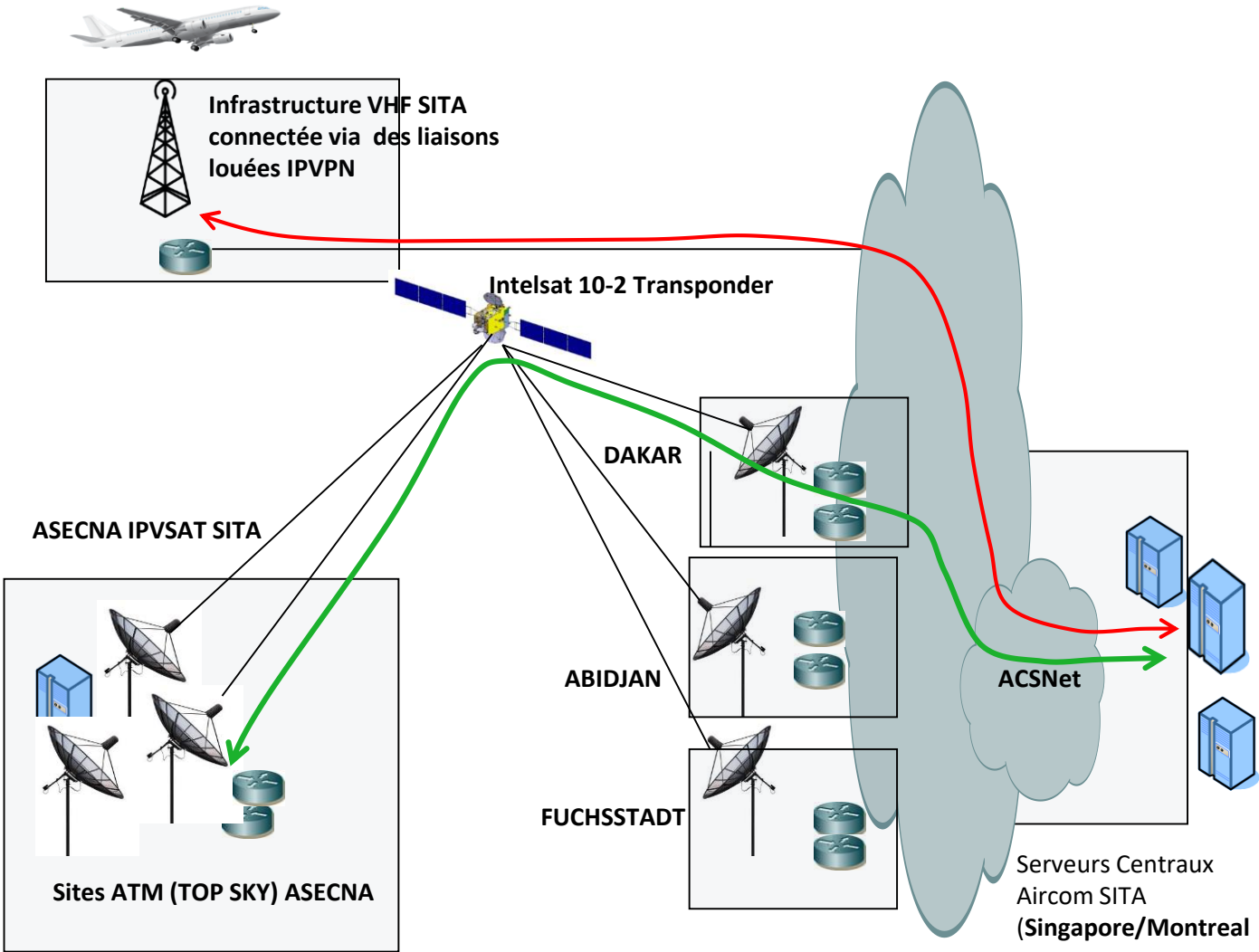
Extension of Radar and ADS-C surveillance and CPDLC services to the following centers : Bamako, Bangui, Bissau, Cotonou, Douala, Libreville, Lome, Malabo, Moroni, Nouakchott, Ouagadougou;

Implementation of a datalink architecture via AFISNET



On going improvement projects to enhance the safety

Implementation of a datalink architecture via AFISNET



Assistance and/or Experience sharing

- ❖ Implementation of a Fans Central Reporting Agency for ASECNA and AFI region
- ❖ Exchange of experience in ADSC/CPDLC operation
- ❖ Training

Conclusion

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.

THANK YOU