



ICAO

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WESTERN AND CENTRAL AFRICA OFFICE

Twenty-fourth Meeting on the improvement of Air Traffic Services over the South Atlantic (SAT/24)

Luanda, Angola, June 3 -7 2019

Agenda Item 3.5: PBCS Implementation and Monitoring

3.5.6 ADS-C/CPDLC SYSTEMS PERFORMANCE MONITORING IN ASECNA FIRS

(Presented by ASECNA)

SUMMARY

This paper provides the meeting with information regarding ADS system performance monitoring and maintenance in ASECNA centers ensuring service provision in the SAT region. It presents system treatment function as well as Air/Ground Data Link Infrastructures and address performance and monitoring aspects to provide the meeting with the technical capabilities of the system needed to finalize Term of Reference for RCP/RSP monitoring.

References:

SAT 23 Conclusion 23/06
SAT 23 Conclusion 23/14

1. Introduction

- 1.1 ADS/CPDLC operations in ASECNA FIRs are performed from the FDPS, which main function controls are based on flight plan data usage associated with Radar, ADS-B and/or ADS/CPDLC;
- 1.2 The system provides monitoring function including online support functions for the extraction and analysis of operational.

2 Discussion

2.1 ADS/CPDLC Treatment Function:

The Air/Ground Data Link treatment function ensure establishment and automatic process of Air/Ground Datalink communications between ATC center and FANS/1 or FANS/A avionic according to ARINC 622 standard.

These data links are used as basis for ADS and CPDLC as define in Doc 4444-RAC/501/12, RTCA/DO-212, RTCA/DO-219, ARINC 622.

At ATC System level, the system provides the ATCO with several visual and sonorous alerts and warning mandatory for a safe operational system. Theses alerts and alarm result from 4D Flight profile real time calculation processed by the FDP after integration of external information (messages coming from Radar, ADS, CPDLC, AFTN, etc...) (Emergency Message, STCA, DAW, MSAW, CLAM, RAM, ARCW).

The FDP trajectory calculation also includes integrated control such as ETO, MPR, FPCP and SAR

The basic logigram in Appendix A raises principal timers used for ADS-C tracks in ATM system:

2.2 Access to Air/Ground Data Link Infrastructure

The Air/Ground Datalink Infrastructure is provided by the CSP which is SITA. Access to the SITA AIRCOM network is done through 3 gateway sites located in Dakar, Abidjan and Fuchsstadt as illustrated in Appendix B.

2.3 Performance and Monitoring aspect

2.3.1 The performance and monitoring aspect are both managed at ATC system level and at Air/Ground Datalink connection.

2.3.2 At ATC level, the display analysis and replay tool (DART), and the Java Aided Data analysis facilities environment (JADE) allow to process post monitoring tools in terms of DM transit time, continuity and availability.

2.3.3 At A/G Datalink level, the CSP (SITA) as part of its contract with ASECNA undertakes to transmit monthly the measurement of traffic performance of ADS-C/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.

Micro failures in the ACARS link are reported when they occur, and if any, ASECNA and SITA coordinates in real time to restore the link availability.

2.3.4 To monitor the Data Message performances related to the ATSU part (links from AFISNET Gateway to the ATC facilities) the following monitoring tools are available:

- Satellite network latency monitoring from Dakar NMC (Network Monitoring Centre): see example in Appendix C. these latencies include a satellite hop from ATC centres to Dakar;
- Availability, continuity and Integrity monitoring: see example in Appendix D.

2.3.5 Surveillance Data Transit Time Performance

	Time at position	Operational Performance (Monitored)			ATSU Receives Surveillance Data	
		Surveillance data transit time				
99,9%		180				OD
95%		90				DT
		Aircraft System	CSP	ATSU System		
99,9%		5	170	5		99,9%
95%		3	84	3		95%

CSP (SITA) – March 2019

ADS-C Delivery Time Min:

- DKR 180 sec < 99,3% ;
- ABJ 180 sec < 98,90.

ATSU System (AFISNET + ATM System)

ATC centers	Mean Latency (AFISNET Satellite Link + local routing) (ms)	TOPSKY Treatment time
Abidjan	0	Instant treatment
Brazzaville	300	Instant treatment
Dakar	0	Instant treatment
N'Djamena	300	Instant treatment
Nouakchott	300	Instant treatment

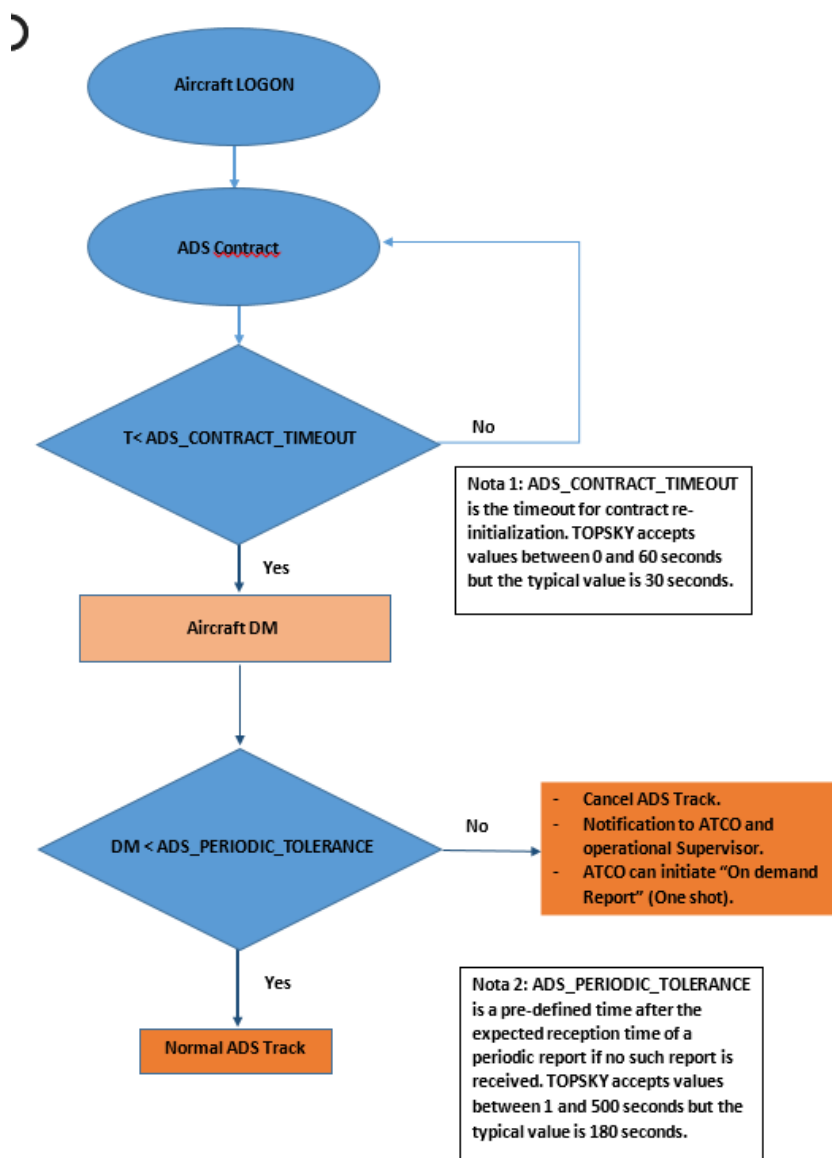
2.3.6 In addition to performance data reported by SITA, the above information regarding RCP/RSP behaviour percentages can be computed and exported in EXCEL files for post monitoring studies by RMA:

3. Action Required

The meeting is invited to:

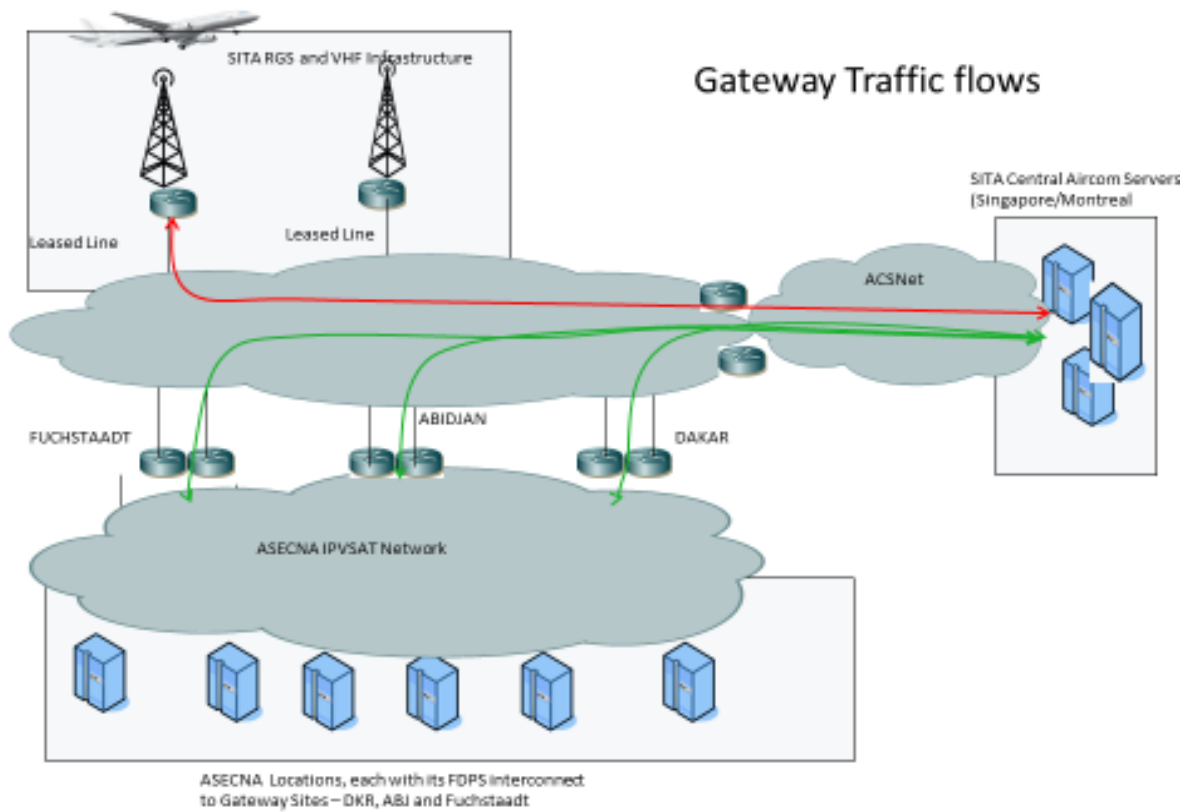
- a) Take note of the information provided in this working paper;
- b) Take into consideration the capacity of the system in term of performance monitoring and post monitoring capabilities;
- c) Finalize Term of References regarding RCP/RSP performance monitoring.

Appendix A



ADS-C Track Management related to DM reception time

Appendix B



SITA Gateways through ASECNA Satellite Network

Appendix C

Central Panel - Network 2 ID:002, NMC_STA_155903

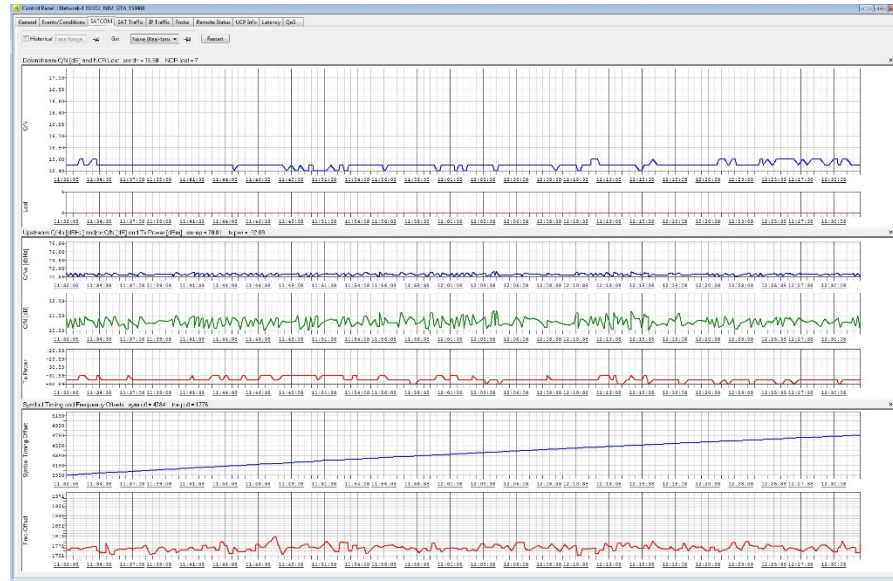
General | Events/Conditions | SAT/ICDRA | SAT Traffic | IP Traffic | Probe | Remote Status | UCP Info | Latency | Seqs

IP Historical | **Event Range** | Get | None (Real Time) | 44 | Restart

Time	Remote	Mount IP Address	Latency (ms)	ID	Type-SN	Network
24/05/2019 12:05:45	NMC_STA_155903	192.168.160.90	506.57	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:46	NMC_STA_155903	192.168.160.90	518.42	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:47	NMC_STA_155903	192.168.160.90	517.80	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:48	NMC_STA_155903	192.168.160.90	512.04	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:49	NMC_STA_155903	192.168.160.90	508.14	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:50	NMC_STA_155903	192.168.160.90	546.28	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:51	NMC_STA_155903	192.168.160.90	545.03	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:52	NMC_STA_155903	192.168.160.90	575.10	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:53	NMC_STA_155903	192.168.160.90	557.84	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:54	NMC_STA_155903	192.168.160.90	507.89	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:55	NMC_STA_155903	192.168.160.90	589.62	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:56	NMC_STA_155903	192.168.160.90	592.71	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:57	NMC_STA_155903	192.168.160.90	555.27	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:58	NMC_STA_155903	192.168.160.90	597.13	185	K5.155906	Network-1 ID:002
24/05/2019 12:05:59	NMC_STA_155903	192.168.160.90	556.70	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:00	NMC_STA_155903	192.168.160.90	535.78	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:01	NMC_STA_155903	192.168.160.90	601.71	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:02	NMC_STA_155903	192.168.160.90	562.19	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:03	NMC_STA_155903	192.168.160.90	601.05	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:04	NMC_STA_155903	192.168.160.90	599.24	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:05	NMC_STA_155903	192.168.160.90	622.47	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:06	NMC_STA_155903	192.168.160.90	596.82	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:07	NMC_STA_155903	192.168.160.90	558.22	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:08	NMC_STA_155903	192.168.160.90	549.24	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:09	NMC_STA_155903	192.168.160.90	599.02	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:10	NMC_STA_155903	192.168.160.90	510.20	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:11	NMC_STA_155903	192.168.160.90	551.80	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:12	NMC_STA_155903	192.168.160.90	600.29	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:13	NMC_STA_155903	192.168.160.90	547.04	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:14	NMC_STA_155903	192.168.160.90	594.42	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:15	NMC_STA_155903	192.168.160.90	597.71	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:16	NMC_STA_155903	192.168.160.90	571.71	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:17	NMC_STA_155903	192.168.160.90	559.26	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:18	NMC_STA_155903	192.168.160.90	560.99	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:19	NMC_STA_155903	192.168.160.90	577.26	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:20	NMC_STA_155903	192.168.160.90	611.72	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:21	NMC_STA_155903	192.168.160.90	501.34	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:22	NMC_STA_155903	192.168.160.90	559.52	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:23	NMC_STA_155903	192.168.160.90	535.32	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:24	NMC_STA_155903	192.168.160.90	535.96	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:25	NMC_STA_155903	192.168.160.90	535.70	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:26	NMC_STA_155903	192.168.160.90	576.20	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:27	NMC_STA_155903	192.168.160.90	560.01	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:28	NMC_STA_155903	192.168.160.90	572.02	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:29	NMC_STA_155903	192.168.160.90	607.22	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:30	NMC_STA_155903	192.168.160.90	611.39	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:31	NMC_STA_155903	192.168.160.90	606.81	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:32	NMC_STA_155903	192.168.160.90	596.20	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:33	NMC_STA_155903	192.168.160.90	536.87	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:34	NMC_STA_155903	192.168.160.90	532.70	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:35	NMC_STA_155903	192.168.160.90	591.30	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:36	NMC_STA_155903	192.168.160.90	559.73	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:37	NMC_STA_155903	192.168.160.90	530.52	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:38	NMC_STA_155903	192.168.160.90	560.11	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:39	NMC_STA_155903	192.168.160.90	545.49	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:40	NMC_STA_155903	192.168.160.90	557.73	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:41	NMC_STA_155903	192.168.160.90	570.48	185	K5.155906	Network-1 ID:002
24/05/2019 12:06:42	NMC_STA_155903	192.168.160.90	521.40	185	K5.155906	Network-1 ID:002

Dakar NMC Tool – Latency monitoring

Appendix D



Dakar NMC Tool – Availability, Continuity and Integrity

-END