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**Seventh Eastern Caribbean Network Technical Group (E/CAR/NTG/7) and
Fifth Eastern Caribbean Radar Data Sharing Ad hoc Group (E/CAR/RD/5)**
Basseterre, St. Kitts and Nevis, 17 – 18 October 2016

Agenda Item 4: Surveillance Sharing Activities
**4.3 Automatic Dependent Surveillance – Contract (ADS-C) and Automatic
Dependent Surveillance - Broadcast (ADS-B)/MLAT developments**

ADS-C AND ADS-B/MLAT DEVELOPMENTS

(Presented by SNA/AG, France)

EXECUTIVE SUMMARY	
This paper is presenting ADS-B and ADS-C activity, and more generally surveillance activities performed by SNA/AG.	
Action:	The suggested actions are presented in Section 3.
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency
<i>References:</i>	<ul style="list-style-type: none">• Fifth Eastern Caribbean Network Technical Group (E/CAR/NTG/5) and Third Eastern Caribbean Radar Data Sharing Ad hoc Group (E/CAR/RD/3) Meetings, Guadeloupe, French Antilles, France, 22 to 24 October 2014.

1. Introduction

1.1 The surveillance in French West Indies is based on the use of two monopulse secondary radars (Thales RSM970 MSSR) located in Guadeloupe and in Martinique and on a multi radar tracker (MRT) called DACOTA based in Martinique and serving radar tracks both to Martinique and Guadeloupe ATCO radar displays.

1.2 2 ADS-B stations will be tested in FWI from 2017.

1.3 ADS-C is not planned nor required in FWI.

2. Discussion

E/CAR “IRMA2000” RADAR DISPLAY CPU

2.1 No significant changes since last E/CAR/RD meeting in Miami.

2.2 Context: France made an offer to the Eastern Caribbean States to deliver, free of charge, IRMA2000 radar display software (and the associated computer-CPU) to assist E/CAR States with familiarization of surveillance tools. French radar data (Dacota MRT fed with Guadeloupe MSSR and Martinique MSSR) is sent from Martinique to Trinidad, and TTCAA can activate through E/CAR network a circuit to any State to provide radar data. This requires that the Cisco routers are equipped with a data licence. TTCAA advised that while the primary routers are equipped with the data licence, the secondary routers are not and that they were working with TSTT to have this done. States willing to have that radar display had to do a request to SNA/AG (French civil aviation) following a template provided by France. States having the system installed have to sign a letter of agreement with French civil aviation authorities. This agreement indicates that French civil aviation does not provide maintenance on these systems. They are delivered for familiarization, in order to facilitate the process of acquisition of surveillance systems in E/CAR.

2.3 The installation updates synthesis:

Item No.	Quantity of CPUs	State/Territory	Installation Date	Location	LoA Signed
1	1	Saint Vincent and the Grenadines	27 January 2015	TWR	LOA
2	2	Antigua and Barbuda	19 March 2015	TWR and Tech room	LOA
3	1	Grenada	17 April 2015	TWR	LOA
4	1	Montserrat	18 May 2015	Tech room	
5	1	Dominica	15 June 2015	TWR	LOA DASPA
6	1	Barbados	18/19 June 2015	IFR Room	LOA GAIA
7	1	Nevis	25 June 2015	TWR	LoA NASPA
8	1	Saint KITTS	25 June 2015	TWR	LoA SCASPA
9	1	Trinidad	20 Aug 2015	For trials	For trials
10	1	Anguilla	No news	Abandoned	

2.4 Basic training was provided, as a basic user manual. Basic maintenance actions were demonstrated. French civil aviation thanks States for the preparation (prerequisites) and for their welcome. Dialogs with ATCOs has shown very high interest, and sometimes disillusion (the system cannot be used for ATC, radar coverage sometimes not fitting airspace). In all cases, exchanges were very fruitful.

2.5 After two (2) demands for CPU repairing / replacement, no more activity since end of 2015.

Sending French Radar Data to Trinidad over E/CAR AFS Network

2.6 French radar data (Dacota MRT and the two (2) MSSR) are now connected in Martinique to E/CAR network. Trinidad now receives these radar data through two (2) channels:

- One via a France Telecom 64 kbps leased line that is presently being replaced by an Orange/C&W IP link; and
- One via E/CAR2 network (via 1 Mbps SCF connection)

2.7 This redundant link should enhance availability of these data to Trinidad, and in turn to IRMA2000 users.

2.8 The connection to the switch that allows sending French radar data to E/CAR has to be confirmed, implemented and documented.

Radar activities with Saint Lucia

2.9 Two old international leased lines that use to feed Saint Lucia radar display systems (on the two (2) airports) with French radar data are abandoned. Since June 2015, Saint Lucia radar displays are fed through E/CAR AFS network.

2.10 Since last meeting, basic latency measurements have been performed with success, and correlation Mode A / FiD tables are sent through E/CAR network, so that most of radar targets are labelled with Flight ID in Saint Lucia.

2.11 As far as RASA services are performed in Saint Lucia, there is no need for in-depth latency analysis.

2.12 Saint Lucia ATCOs have been trained by SNA/AG to use the radar information in line with RASA ECCAA requirements.

ADS-B and ADS-C activities

2.13 Five (5) ADS-B stations will be installed from 2017, with a roadmap from Tier3 to Tier1 operation, in radar environment. Reminder: TIER 3 is ADS-B available information use for Information and Alert services (equivalent to RASA for Radar), Tier2 is the use of ADS-B to facilitate the procedural control (procedural separations), Tier1 is ADS-B use for “radar control” with guidance and use of separation minima similar to radar. In 2017, MLAT use in French Guyana will be studied for the TMA, using existing remote radio antennas.

2.14 Two (2) ADS-B stations should be ordered and installed in Martinique and Guadeloupe for trials, in order to:

- Define a possible concept of operation (Tier2 as a radar backup)
- Define how ADS-B could help in SAR activities
- Determine how far the fleet is ADS-B equipped and get related figures

2.15 France has published ADS-B carrying requirement for EUR and AFR ICAO regions, and is working on an ADS-B carrying requirement text for French Guyana and FWI. SNA/AG suggest to define

regional ADS-B roadmap including carrying requirements, so that France would be integrated, as far as necessary, the regional ICAO policy.

2.16 ADS-C / CPDLC is in use in French Guyana since May 2011 with FANS1/A equipped airplanes. With these flights, CPDLC is the primary means for communication. HF is still in use with others (HF antennas have been renewed in 2010 for 3 M\$). Trials should be performed in 2017 to test and activate AIDC with Brazil and Dakar, then Piarco.

2.17 No ADS-C / CPDLC is planned for FWI.

RADAR activities in FWI

2.18 This year 2016, a lot of work is being done on annexes of both radars: replacement of the automatic fire detection and extinguishing system, replacement of energy devices and power generators, replacement of microwave radio relays, building upgrades.

2.19 From 2017, the radar output protocol will change for UDP/IP (Asterix cat 1 and 2). Dacota shall be capable of sending UDP/IP information too (Asterix cat 30 and or 62). These changes are a prerequisite to the installation of the new ATM system in FWI (see next chapter). These new formats should ease French radar integration into Piarco Selex systems, but will require test and prior coordination with TTCAA.

2.20 Plan for Mode S upgrade has been accepted, should start in 2020.

2.21 Radar programmed evaluation: FWI uses SASS-C for mono radar performance analysis, with a minimum of 2 full evaluations per year. The analysis is performed by Martinique or by Toulouse air navigation technical center. An evaluation is performed as soon as a change is done on radar with possible impact on radar performances. FWI qualifies every 3 years the Dacota radar tracker through a full appraisal process. Additional evaluation is performed on request when necessary. Specific measurements are performed when telecommunication devices are changed (i.e. latency checks).

2.22 Real time checks: both radars are monitored by local maintenance through a specific tool: radars are capable of detecting anomalies through their Built in Test Equipment, in that case information is sent through Asterix messages to the ATCO display. Dacota MRT is checking radar data received. In case of anomaly detected, depending on corruption detected, Dacota can discard the data and/or send a message to the ATCO display (i.e. in red "Loss of 5NM minima").

Replacement of FWI ATM Systems

2.23 SEAFLIGHT French program is dealing with ATM systems replacement in overseas territories (Surveillance, Flight data processing systems, displays). The first site to be equipped is Cayenne, French Guyana, with an ADACEL system (with ADS-C / CPDLC capabilities, e stripping).

2.24 The two (2) following sites are Guadeloupe then Martinique. Demonstrations are performed in October 2016, and selection of provider end 2016, among the 3 preselected providers: NAVCan, Adacel and INDRA.

2.25 The system delivered to FWI will include tactile displays for surveillance and flight data, traffic simulator and training system, a recording and replay system, a test platform. The system will be operated with electronic flight strips, and will allow automatic coordination between Martinique and Guadeloupe, and possibly with Selex systems from Trinidad and Barbados. In some extent, the system will bring a certain level of contingency between both islands.

2.26 The planning of the project is following:

- End 2016: Selection of the provider and contract notification for FWI
- 2017: system configuration by the provider
- End 2017: system installation on 1st site (Guadeloupe)
- 2nd half 2018: Full operation of the system in Guadeloupe
- 2nd half 2019: Full operation of the system in Martinique

2.27 Perimeter of the project: The Dakota MRT system would be kept, as French civil aviation gets high knowledge on DACOTA (MUST multiplot tracker). The COSNET safety net alert system would be kept too, as all safety nets are already tuned (MSAW, STCA). This should reduce risks on the project.

2.28 General Information Panel (displaying MET information, NAVAIDS status, operational documentation, charts, etc.) shall be replaced too.

2.29 CAGOU French AFTN Switch will be replaced by a COMSOFT system: AIDA and CADAS-ATS, compliant with AMHS.

3. Suggested actions

3.1 The Meeting is invited to:

- a) Take in consideration FWI surveillance activities; and
- b) Take in consideration the need for ADS-B carrying requirement and ADS-B roadmap in E/CAR region.