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Agenda Item 3: Air Navigation Matters
3.4 E/CAR CNS Committee Report

SPECIFIC AIR NAVIGATION ACTIVITIES AND DEVELOPMENTS - COMMUNICATIONS, NAVIGATION AND SURVEILLANCE

(Presented by Rapporteur of the CNS Committee ECWG)

SUMMARY

This Working Paper advises the 20th E/CAR/DCA of activities planned for the Eastern Caribbean toward improving CNS in the sub-region

References

- Report of the Fifth Meeting of the ATM/CNS Subgroup (ATM/CNS/SG/5)
- Summary of Discussions and Conclusion 30th Eastern Caribbean Working Group Meeting, Saint Lucia, 2006
- Draft Report Third MEVA/REDDIG II Coordination Meeting
- ALLPIRG/5 Conclusion 5/16

1. Introduction

1.1 The CNS Committee of the 30th E/CAR WG Meeting took place in Castries, Saint Lucia, 7-11 August 2006 with participants from 13 States/Territories; Anguilla, Antigua and Barbuda, Barbados, Grenada, France, Montserrat, Saint Lucia, Saint Kitts/Nevis, Trinidad and Tobago and the United States of America.

1.2 The Committee analyzed the following Items, which were listed under **Agenda Item 4.5 (Specific Air Navigation Activities and Developments – CNS):**

- Proposed solutions to resolve the AFTN problems,
- Immediate and near term proposed solutions to problems on the AFS network,
- Automatic Message Handling System programs and interconnection activities between the FAA and the E/CAR AFS digital network,
- Fault reporting and resolution procedures, link failures and proposed solutions,

- Follow up on the developments of the E/CAR CNS systems, namely RADAR sharing/remoting and studies on the regional implementation of ADS-C and ADS-B systems, and
- Status of existing E/CAR digital network contract.

2. Excerpts of discussion of the CNS Committee on the listed Items

2.1 Proposed solutions to resolve the AFTN problems.

2.1.1 The Committee considered the status of the AFTN workstations at Eastern Caribbean States and a solution was proposed to resolve the deficiency in the reliability of the hardware and software of the AFTN workstations.

2.1.2 Trinidad and Tobago replaced its old AFTN in October 2004 with a Thales AFTN/AMHS gateway. To ensure compatibility and commonality of equipment, which would show cost savings in spares and training, the TTCAA proposed to replace the Eastern Caribbean AFTN workstations currently operating on DSA software with the Thales Intelligent AFTN Terminals (IAT). The replacement would comprise PC, Printer and UPS. A test IAT workstation was set up in Dominica on May 12, 2006 and the AIS personnel there received training from the TTCAA on the operational use of the IAT.

2.1.3 In discussion with the AIS Committee and following up on WP/19 of E/CAR/WG/30 presented by France, the matter of ATS message templates was examined. The IAT does not currently have the ICAO type format of templates for ATS messages that the AIS personnel are familiar with. The templates currently consist of fields within parenthesis in an AFTN type format. The lack of familiar templates and validity checks created numerous invalid flight plans being received by other States. This resulted in fewer invalid messages being sent. The Committee agreed that the ICAO type templates with validity checks should be provided. At a meeting held in Dominica with France and attended by Trinidad and Tobago in September 2006 this matter was discussed and Dominica's AIS operators were urged to exercise caution in formatting ATS messages and to follow the ICAO approved procedure.

2.1.4 After several communications, a meeting was held with Thales on 21-22 November 2006 to resolve the templates and validity checks. The following solutions were proposed:

- *Solution 1* - Install the Flight Plan Management System in the Trinidad and Tobago AFTN/AMHS switch and equip the Eastern Caribbean States with workstations loaded with the ANAIS software. The ANAIS software already contains the required templates and the FPL package will ensure validity checks. This would have been the ideal solution but it requires a safe and reliable TCP/IP infrastructure. The E/CAR AFS network in its present configuration does not support TCP/IP.

- *Solution 2* – Internet self-briefing, which can be done from any PC via WAN infrastructure over Internet connection. This solution required extensive upgrade of the current AIS infrastructure with significant cost impacts.

- *Solution 3* - Install the Flight Plan Management System in the Trinidad and Tobago AFTN/AMHS switch and equip the Eastern Caribbean States with workstations loaded with the IAT software upgraded with the required ATS message templates. This is the most cost economical solution that fulfills the user requirements of templates and validity checks.

2.1.5 The tentative schedule is to replace the Eastern Caribbean AFTN workstations with the IAT workstations by February 2007. States will receive training on the operation of the new AFTN terminal by the Trinidad and Tobago Civil Aviation Authority. The replacement will be carried out in three phases:

- In the first phase the workstations, printers and UPSs will be replaced with the Thales IAT software and new computers similar to that tested in Dominica as reported at the 30 ECWG,

- The second phase will be to install a Flight Plan Management (FPL) Module in Trinidad and Tobago AFTN/AMHS switch. This FPL module will allow States to send all flight plans to Trinidad and Tobago for validation and subsequent automatic onward transmission if the message is validated. If the message is invalid it will go into an invalid queue at the Trinidad and Tobago AIS office for manual correction and then sent on. The operation of the ATS messages will be similar to that of the NOTAM package. The result will be that no recipient State will receive an invalid flight plan from a sender State. This second phase is anticipated to be March 2007, and

- The third phase will be introduction on the IAT terminals of the ICAO format templates for all ATS messages as it relates to flight planning. These templates will allow user-friendly insertion of flight plan information in the format that is familiar to the ATS users. This phase is anticipated to be May 2007.

2.1.6 ***Transition from AFTN to AMHS/ATN*** - At the Second Meeting of the ATN Task Force (ATN/TF/2) of the CNS Committee of the ATM/CNS/SG (Lima, Peru, 11-12, November 2006) with participants from Argentina, Haiti, Jamaica, United States of America, COCESNA and SITA information was presented on actions carried out on tasks relating to the development of the regional strategy for the implementation of ATN.

2.1.7 At ATN/TF/2 meeting, Argentina informed that its AMHS system has been installed at all its national airports with a total of 164 stations. The FAA also advised of its implementation of AMHS in Salt Lake City.

2.1.8 In October 2004 Trinidad and Tobago implemented an AFTN with AMHS gateway composed of a Message Transfer Agent (MTA), Message Store (MS) and a Directory Server (DS). The AMHS gateway is compatible with the ATN and can be connected to an existing ATN network via a suitable router. Trinidad and Tobago proposes to develop and coordinate a test plan for test trials in conjunction with Argentina and the FAA. Test trials with Argentina would be achieved through the REDDIG VSAT Piarco node and with the FAA Atlanta via the public internet or a dedicated Ethernet connection through San Juan.

2.1.9 The proposed plan for the Eastern Caribbean region is to maintain the AFTN on the Eastern Caribbean States/Territories with Trinidad and Tobago as the AMHS/ATN gateway to the global aviation community. This reduces cost to the States/Territories and still allows the E/CAR States/Territories to benefit from the ATN technology.

2.1.10 The CNS Committee recommends that Trinidad and Tobago become a member of the ATM/CNS/SG CNS Committee's ATN Task Force.

2.2 Immediate and near term proposed solutions to problems on the AFS network.

2.2.1 Information Paper 07 of 30th E/CAR/WG Meeting advised of problems on the E/CAR digital network regarding voice and data AFS circuits. The quarterly reports compiled and distributed by the TTCAA detail the faults and resolution and also provides statistics of the failures. The Committee agreed that the E/CAR sub-region needs an end-to-end solution from a single provider/point of contact. This ties responsibility for resolution of failures to a single point of contact, which results in increasing efficiency, reliability and availability of the network. Three options were proposed:

a) To replace the existing E/CAR Digital network with a full VSAT solution. To this end the TTCAA has signed a contract to be completed by December 31, 2006 to conduct the following:

- A VSAT survey of the existing VHF high sites with reference to the VHF frequencies coverage areas,
- A study of alternative and/or additional sites to provide the most optimum coverage for the existing and new VHF frequencies,
- Provide a digital coverage map of each frequency at the recommended high site,
- Propose the most economical and effective means of transporting the VHF information from the high site to the VSAT antenna at the operator site, and
- A survey of the existing Control Towers and AIS operator sites on the Eastern Caribbean islands and French Territories to determine the best location for the VSAT antenna to serve VHF, point-to-point voice, AFTN circuits and RADAR data.

b) To have a combination VSAT and ground lines network.

c) To have a full ground line network similar to what currently exists but with pertinent changes. This solution proposes retaining the TSTT backbone and tributary links from Cable & Wireless (C&W) but replaces all the end user and interface equipment. In this arrangement each State would be responsible for their first line maintenance with follow up support provided by the TTCAA. Each State would receive the appropriate training and compliment of spares required to support first line maintenance for both software and hardware as it relates to the AFTN. There would be no TSTT sub-contractor as currently exists with Sigma. In this regard TTCAA would perform the network management aspect.

2.2.2 Each State was previously requested to provide to the TTCAA via email their user requirements to formulate a Request for Proposal (RFP) for the options presented above. After all the responses are received the TTCAA proposes to host a Special Meeting of the E/CAR CNS Committee tentatively set for January 2007 to review the requirements as a team and justify each request and then to discuss the options proposed. The subsequent draft RFP would be circulated via e-mail for finalization before an RFP for the network is issued. To carry out an intelligent comparison on the options the draft RFP must be clearly written and must solicit solutions from the three options. The finalized RFP with recommendation/s on the selected option solution from the options presented would be forwarded to the DCAs for action.

2.2.3 ***The availability of a network suitable of transporting the AMHS/ATN*** - Conclusion CNS/5/4 of ATM/CNS/SG/5 states the adoption of IP version 6 as the protocol for AMHS interface. It is to be noted that the existing E/CAR AFS network does not support IP version 6. Therefore, in order to benefit from the AMHS/ATN technology the E/CAR Region needs to have a safe, reliable and modern network to support these new protocols.

2.2.4 ALLPIRG/5 Conclusion 5/16 discourages the proliferation of VSAT networks and urges States to work towards integrated regional/interregional digital communication networks with a single centralized operational control and preferably based on Internet Protocol (IP).

2.2.5 Based on ICAO's vision for VSAT networks the E/CAR sub-region has the following options if it chooses a VSAT solution for the sub-region:

- E/CAR to become part of REDDIG. Trinidad and Tobago has a REDDIG node which became operational in October 2006,
- E/CAR to become part of MEVA II. MEVA II be expanded to serve the E/CAR sub-region, and
- Set up an independent VSAT network designed and delivered with full interconnectivity to MEVA II and REDDIG.

2.2.6 The CNS Committee recommends that this matter of network type be taken to the Special CNS Committee Meeting tentatively set for January 2007 in Trinidad and Tobago for discussion.

2.3 Automatic Message Handling System programs and interconnection activities between the FAA and the E/CAR AFS digital network.

2.3.1 The CNS Committee agreed that the existing E/CAR AFS network did not fulfill the requirements to transport AMHS/ATN protocol IP version 6 and the replacement/upgrade of the network would resolve this deficiency.

2.3.2 The Trinidad and Tobago Civil Aviation Authority and United States Federal Aviation Administration have begun a project to reconfigure the Aeronautical Fixed Telecommunications Network (AFTN) between the two countries. The first phase of the process will remove the X.25 protocol Packet Assembler Disassembler (PAD) that is interfaced to the Thales AFTN Switch. Once this PAD is removed the switch in Trinidad and Tobago will communicate with the FAA NADIN Network through the legacy telecommunications connectivity. The second phase of the process will consist of a change from X.25 protocol to Transmission Control Protocol/Internet Protocol (TCP/IP) and will terminate at the new US FAA NADIN MSN which is also multi-protocol capable. This phase is in the engineering and planning stage, and the telecommunications path has not been determined at this time. The first phase with the planned removal of the TSTT AMHS pad in Piarco will remove a single point of failure and the AFTN will connect directly to the FAA via X.25 port on the AFTN switch in the immediate future. This activity is tentatively set for the last quarter of 2006.

2.4. Fault reporting and resolution procedures, link failures and proposed solutions.

2.4.1 Fault reporting and resolution procedures agreed at the E/CAR/WG/29 have been implemented:

- Fault Report Form are generated by States and sent to Trinidad and Tobago AIS fax number as the primary contact,

- The AIS supervisor then conveys this information to the T&E on-call technician, who then responds by reporting the problem to TSTT and notifying the initiator of acknowledgement of the report,

- A reasonable estimate for acknowledgement of a report by the TTCAA was given as three (3) hours,
- Quarterly statistics have been compiled and circulated via email by the TTCAA to States based on the reports received. Statistics from July 2005 to September 2006 have been forwarded to States, and

- A list of contacts with reference to fault reporting procedures including operational and technical contacts where applicable was circulated to States based on information received from States. States are reminded to keep this list current.

2.5 Follow up on the developments of the E/CAR CNS systems, namely RADAR sharing/remoting and studies on the regional implementation of ADS-C and ADS-B systems.

2.5.1 ***Automatic Dependent Surveillance – Broadcast (ADS-B)*** - ADS-B technology has been identified as one of the surveillance solution that can meet the needs of pilots and air traffic controllers by providing essential information. ADS-B transmits relevant flight information from the aircraft thereby improving situational awareness of the pilot and the air traffic controller.

2.5.2 GREPECAS Conclusion 13/87 for *ADS-B trials Program in the CAR/SAM Regions*, urged Aeronautical Administrations to collaborate with airspace users to establish and implement ADS-B trial programs in order to improve the knowledge on ADS-B and evaluate benefits for air traffic management in the CAR/SAM Regions.

2.5.3 Trinidad and Tobago having participated in the ATM/CNS/SG/5 held in Lima, Peru on 2006 November 13-17, offers the following information:

- The Federal Aviation Administration (FAA) via IP/04 provided information on the FAA Program Plan for the deployment of ADS-B technology across the U.S. National Airspace System,

- SITA presented a Service model that was jointly developed by the Australian Air Navigation Service Provider and presented the results of the Indonesian ADS-B trail,

- Cuba and Argentina also stated that they were conducting test trials of ADS-B, and

- A task force was set up comprising Brazil, Colombia, Cuba, France, Trinidad and Tobago, USA and COCESNA to develop an implementation plan for the near and medium term ADS applications in the CAR/SAM Regions including target dates.

2.5.4 The Eastern Caribbean Region has started information gathering towards the implementation of ADS-B in the airspace West of 56º in the Piarco FIR and has requested from the FAA, SITA, Cuba and Argentina their procedures and results of their test trial data to date. SITA was invited to meet with Trinidad and Tobago to share their experience in ADS. This information in conjunction with the information gathered from the ATM/CNS/SG ADS-B Task Force will assist the E/CAR Region in formulating a plan of action.

2.5.5 The CNS Committee invites all interested States to participate in the visit of SITA, and will be notified as soon as the date is finalized.

2.5.6 ***ADS-C*** – The CNS Committee agrees that the preferred, maybe the only option, to service the needs of the Oceanic Airspace East of 56º in the Piarco FIR may be the implementation of ADS-C. The CNS Committee recommends that a plan of action to implement this service be developed for consideration.

2.5.7 ***RADAR Remoting*** **-** Trinidad and Tobago is in the process of evaluating tenders for the provision of an ATM system inclusive of RADAR remoting. This exercise is anticipated to conclude in first quarter 2007 at which time a contract will be awarded. Trinidad and Tobago has also submitted Draft Letters of Agreements to Barbados and France for the support of the RADAR remoting project. The LOA with Barbados is nearing conclusion with signed copies having been sent to the Barbados Administration.

2.6 Status of existing E/CAR digital network contract.

2.6.1 At a meeting held on 23 November 2006 between the network service provider, TSTT and the TTCAA the following items were discussed:

- The Settlement and Release Agreement signed between TSTT and TTCAA on 22 May 2006 amounted to full and final settlement of all claims relating to the IACL Contract up to December 31, 2005. This settlement transferred ownership of all equipment (A3/A7, AFTN, AFTN interface, Voice) to TTCAA,

- TTCAA is responsible for the upgrade/replacement of the AFTN workstations on the Eastern Caribbean States,

- A maintenance agreement will be drafted and agreed upon between the TTCAA and TSTT for the maintenance of the A3/A7, AFTN interface and voice equipment,

- A maintenance agreement will be drafted and agreed upon between the Cable & Wireless and TSTT for the maintenance of the A3/A7 and voice equipment,

- A maintenance agreement will be drafted and agreed upon between Sigma Communications and TSTT for the maintenance of the AFTN interface equipment,

- All agreements between TSTT and subcontractors will be made available to the TTCAA for comments prior to final acceptance and signature,

- TTCAA will continue to pay for the backup telephone lines,

- The maintenance agreements will include financial penalties for down time of circuits. Details are to be mutually agreed upon,

- TTCAA will pay for all link charges and equipment upgrades from January 2006, and

- The new negotiated agreement should be for a period no longer than 24 months in light of new network developments being investigated by the CNS Committee.

3 Other business

3.1 The Air Navigation Plan identifies several key CNS matters that need to be addressed within the E/CAR sub-region with proposed timeframes, in addition to the items presented above, namely:

- GNSS,

- The scheduled deactivation of NDBs,

- The provision of support structure for CNS/ATM,

- Resolution of outstanding deficiencies,

- Development and integration of the ATM Automated System, and

- Consideration on the support of communications for the migration to the BUFR-coded OPMET format

3.1.1 Global Navigation Satellite System (GNSS)

3.1.1.1 The Second Meeting of the GNSS Task Force of the ATM/CNS/SG (Lima, Peru, 11-12 November 2006) with participants from Brazil, Chile, Cuba, United States of America and COCESNA reviewed the tests and trial results for GNSS implementation and discussed the coordination of technical-operational studies alternatives for the Regional SBAS implementation.

3.1.1.2 GNSS implementation must take into account the concept at global level and not to focus on every one of its elements separately. Based on the analysis of the trials it was agreed that SBAS solution with APV 1 Performance for the CAR/SAM region is technically feasible.

3.1.1.3 Conclusion CNS/5/7 of the ATM/CNS/SG/5, invites all States to subscribe to the Project: RLA/03/902 – SACCSA, in order to get full advantage from this GNSS project. The CNS Committee recommends that Trinidad and Tobago subscribe to this project.

3.1.2 The scheduled deactivation of NDBs

3.1.2.1 Conclusion CNS/5/11 of ATM/CNS/SG/5 on the progressive deactivation of NDB stations urged States to analyze the service provided by each NDB station, its function, procedural existence with other aids such as VOR/DME, GNSS-RNAV as well as the aircraft capacity/development that operate in serviced airspace and inform the ICAO Regional Offices (NACC in case of the E/CAR) regarding their prospective plan before 30 November 2007. It is recommendation that the CNS Committee of the E/CAR/WG coordinate the action plan for this activity in the E/CAR.

3.1.3 The provision of support structure for CNS/ATM

3.1.3.1 One of the problems encountered at Eastern Caribbean States/Territories is the unreliability of the commercial power being supplied to airports. Fluctuations and disruptions in power adversely impacts on the operational reliability of the air navigation services provided by ATS at the various States/Territories as it relates to AFTN and voice communication.

3.1.3.2 While a UPS may be provided to support the end user equipment, if commercial power is interrupted for over two hours, the UPS, depending on the capacity, may become depleted at which time the equipment is no longer powered and becomes unserviceable.

3.1.3.3 Trinidad and Tobago as the provider of the AFS network urge States to ensure the supply of a reliable and conditioned commercial power source to the AFS network equipment.

3.1.4 Resolution of outstanding deficiencies

3.1.4.1 The CNS Committee informs on the resolution of the following deficiencies with the implementation of a REDDIG VSAT node in Trinidad and Tobago. The Piarco node became operational in October 2006, providing connectivity:

- CNS 3 C – AFTN circuits- Caracas/Port of Spain,
- CNS 2 C – AFTN circuits- Georgetown/Port of Spain,
- CNS 4 C – ATS Speech circuit – Piarco ACC/Georgetown ACC,
- CNS 5 C – ATS Speech circuit – Piarco ACC/Maiquetia ACC, and
- CNS 52 C – ATS speech circuit – Piarco ACC/Paramaribo ACC.

3.1.4.2 Trinidad and Tobago procured through ICAO Procurement Section in Montreal one redundant HF AMS system with SELCAL to meet the responsibilities of the Piarco FIR for HF Communications, from Thales Systems Canada (TSC) on September 30, 2002. The complete system was to have been delivered and commissioned in eighteen (18) months with a then projected date in the first quarter of 2004.

3.1.4.3 Deficiencies relating to the tendered technical specifications were identified and the equipment was not accepted until the deficiencies were rectified. In October 2005, a Supplementary SAT was conducted and the TTCAA signed the SAT certificate and accepted the equipment. The TTCAA was advised to record the performance of the HF AMS and forward these records to ICAO for analysis.

3.1.4.4 Some shortcomings with reception of aircraft at various flight levels within the Piarco FIR were noted to ICAO. After discussions the supplier agreed to replace the receive antenna with a more powerful and sensitive antenna. The antenna is in Trinidad and Tobago and installation is anticipated to be completed by January 31, 2007. Until the HF AMS matter is fully resolved to satisfaction, there will continue to exist with New York Aeronautical Radio Inc. Communications Centre (ARINC), an arrangement for the supplementary relay and delivery of ATC clearances.

3.1.5 Development and integration of the ATM Automated System

3.1.5.1 The Rapporteur of the ATM Task Force presented at the ATM/CNS/SG/5 the report of the first ATM automation Task Force Meeting held in Mexico City, 29-31 August 2006 and attended by 6 participants representing 4 States/Territories/International Organisations of the CAR and SAM Regions.

3.1.5.2 Draft Conclusions 1/1 – Establishment of agreements for AIDC implementation between ATS units – That States/Territories/International Organizations, taking into account the technical feasibility studies and operational benefits; carry out coordination to establish bilateral or multilateral agreements for AIDC implementation between adjacent ATS units.

3.1.5.3 Draft Conclusion 1/2 – Establishment of an action plan to improve ATM situational awareness.

3.1.5.4 This matter for the benefit of the Region is recommended to be handled by both the CNS and ATM Committees and develop a plan of action to address these needs.

3.1.6 Consideration on the support of communications to the migration to the BUFR-coded OPMET format

3.1.6.1 The plan for the migration from the traditional alphanumeric format to a coded format based on bit-oriented tables (BUFR – *Binary Universal Form for the Representation of Meteorological data*) for the transmission of OPMET meteorological information was approved at the 14th Congress of the World Met Organization (WMO) held in Geneva, Switzerland on 5-23 May 2003.

3.1.6.2 The transition from alphanumeric to bit-oriented codes in order to improve the efficiency of the aeronautical meteorology service is contemplated in two phases:

- Parallel use of alphanumeric codes and codes based on bit-oriented tables in OPMET messages starting in 2007, and

- The exclusive use of codes based on bit-oriented tables by 2015.

3.1.6.3 It is to be noted that the AFTN system as it is will not support BUFR code. Available information show that Japan, Thailand, USA have basic AMHS that does not support BUFR code. The AMHS of Argentina and Spain supports BUFR code. It is also to be noted that the Interface Control Document (ICD) between AMHS and MET systems are still being drafted.

3.1.6.4 The CNS Committee recommends that Trinidad and Tobago obtain information from the supplier of their AFTN/AMHS to determine if it can handle BUFR code and including what would be necessary to accomplish this if it is not so equipped. The Committee recommends that a plan of action be developed in conjunction with the MET office for transition to BUFR code.

4. Suggested action

4.1 The Meeting is invited to:

- Note the information presented in this Working Paper; and
- Analyze, suggest and recommend any other action/s that the meeting may consider convenient in order to contribute to the improved implementation of the E/CAR CNS initiatives as appropriate.

- END -