E/CAR/NTG/9 & E/CAR/RD/7 —
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Ninth Eastern Caribbean Network Technical Group (E/CAR/NTG/9) and
Seventh Eastern Caribbean Radar Data Sharing Ad hoc Group (E/CAR/RD/7) Meetings
On-line, 14 and 15 July 2020

Agenda Item 4:   **Surveillance Sharing Activities**
　　　　　　　　　　　　4.3   E/CAR Surveillance data coverage status (Radar Data Display and E/CAR needs)

E/CAR SURVEILLANCE DATA COVERAGE STATUS
(RADAR DATA DISPLAY AND E/CAR NEEDS)

(Presented by E/CAR/NTG Rapporteur)

EXECUTIVE SUMMARY	
This paper presents an update on E/CAR Surveillance sharing project.	
Action:	Suggested actions are presented in Section 3.
Strategic Objectives:	• Air Navigation Capacity and Efficiency
References:	• Sixth Eastern Caribbean Network Technical Group (E/CAR/NTG/6) and Fifth Eastern Caribbean Radar Data Sharing Ad hoc Group (E/CAR/RD5) Meetings.

1.   Introduction

1.1   The RD group identified that some States' requirements for the next three (3) years is to have situational awareness with the implementation of full radar service in five (5) to ten (10) years in the future. Functionalities, for example, billing, flight data processing system (for flight strips, flight management), will be requested in RFP as optional for that particular State. In order to move forward with the activities of the RD group for Phase II, the RFP will focus on situational awareness.

1.2   Previous Meetings discussed the procurement process for Phase II as an ICAO TCB procurement. A task force comprising ECCAA, France, Trinidad and Tobago and the United States was set up to draft the technical specifications. Eventually this task force would evaluate the tender responses and select a successful vendor.

2. **Discussion**

2.1   Based on information received from States, the technical specifications were reviewed and amended (**Appendix**). The following States have shared their involvement in ongoing airport development projects:

- Antigua
- Dominica
- Grenada,
- St. Lucia

2.2   The following States have advised their continued interest in Phase II of the project:

- Montserrat
- St. Kitts and Nevis
- St. Vincent

2.3   The following updates have been provided by States:

Antigua

2.3.1   As the region progresses towards the implementation of ADS-B within the Piarco FIR, Antigua continues to work towards meeting the targets of the ICAO Regional Performance Based Air Navigation Implementation Plan (RPBANIP). To this end, Request for Information (RFI) to acquire ADS-B with SSR capabilities, was disseminated.

2.3.2   In August 2019, the ECCAA received a request from the Ministry of Public Utilities, Civil Aviation, Transportation, and Energy to review a proposal for GECI Espanola S.A for the provision of an ATM System and Surveillance sensor to be used by V.C. Bird Air Traffic Services. A team from ECCAA CNS Unit and V.C. Bird Air Traffic Services evaluated the GECI proposal and a report was submitted to the Ministry for consideration. In December 2019, the Ministry advised that proposals from other suppliers may be under consideration for the ATM System.

St. Lucia

2.3.3   Saint Lucia is about to embark on a World Bank Project for its Airport under the banner "Caribbean Regional Air Transport Connectivity Project" (CATCOP). CATCOP is a World Bank funded project which is aimed at promoting resiliency of airport infrastructure to combat the potential effects of climate change and modernization of air navigational services and equipment to meet the technical and efficiency capacities that the future of aviation demands. It is a project involving three (3) states: Dominica, Haiti and Saint Lucia. Each country's project scope is distinct and separate but there are many commonalities.

2.3.4   The CATCOP project is separate and distinct from the ongoing USD $175 million Hewanorra International Airport (HIA) Re-development Project. The World Bank Project will complement the HIA Re-development Project and not overlap it in any way. ECCAA is an integral part of the initial discussions and will be part of oversight going forward. These projects include International Development Association (IDA) financing of US$13 million for Dominica, US$17 million for Grenada, US$84 million for Haiti, and US$45 million for Saint Lucia. The Aide De Memoire for Saint Lucia outlines the following as part of coverage for the USD$45 million Project:

   Structural:
   - Resurfacing of Runway HIA
   - Establishment of RESAS
   - Establishment of shoulders
   - Runway Drainage repair and rehabilitation HIA and GFLCA

   Navigational:
   - Installation of ILS
   - ADS-B - possible 2 or 3 antennas installed
   - Aeronautical Charts

   Personnel:
   - Capacity Building
   - ATS and other Personnel Training

2.3.5   Work is in progress with the Government of Saint Lucia's Project Coordination Unit (PCU) on the Stakeholder Engagement Plan (SEP), the Environmental and Social Assessment (ESA), and the Environmental and Social Impact Assessment (ESIA). These were completed in September 2019. The World Bank Team visited Saint Lucia from September 16 to 18, 2019 to review the drafts. All paperwork was finalised by November 2019.

2.3.6   St. Lucia has been working with the bank since May 2019. The timeline on deliverables of Radar, Charts and ADS-B is projected by second quarter 2021. The ILS is TBD at this time.

2.3.7   It is anticipated that the ADS-B component will be a collective project by Grenada, Saint Lucia and Dominica, with the same Technical Guidance and Specialists, because of the commonalities and potential cost savings. The CATCOP project was officially approved by the Board of the World Bank on May 28, 2020. Currently SLASPA is awaiting Parliamentary approval by Saint Lucia of the Project. Once this occurs, the Project Implementation Unit will be sourced and employed and work will commence in earnest.

   Dominica

2.3.8   For Dominica, there are three (3) components to the CATCOP project:
   - Component 1: Build resilience at the existing airports through safety and disaster mitigation measures
   - Component 2: Technical Assistance and Project Implementation Support for the new International Project

- Component 3: Contingency Emergency Response Component

2.3.9   The main activities are:
- Gap analysis in air transport resilience.
- Technical assistance and capacity-building in air transport resilience
- Support for the drafting of Terms of Reference for the vulnerability assessment of targeted airport infrastructure in Haiti, Dominica, and Saint Lucia.
- Data collection, testing, and support to drafting Terms of Reference for the feasibility study of resilient pavement in selected airport infrastructure in Haiti, Dominica, and Saint Lucia.

2.3.10   The project's estimated timelines are 01/2020-01/2022.

Grenada

2.3.11   The following is a brief outline of the projects that Grenada Airports Authority (GAA) is involved in under an airport development project with the World Bank and China Harbour Engineering Company (CHEC) with an expected completion date of June 2021:

Airport development

- Runway rehabilitation.
- Terminal upgrade.
- Construction of additional Turning Bay.
- Cargo terminal facility with Apron.
- Upgrade Runway End Safety Area (RESA) at both 10/28.

CNS Projects

- The implementation of a Thales ATC Automation System (ATCAS), inclusive of electronic flight strips and strip printing.
- Recording/Replay for Surveillance
- Situational awareness to integrate the surveillance from the Piarco Multi Radar Tracker (MRT).
- Billing system to generate and send reports to IATA.
- Configuration: 2 positions in the Tower (Tower + Flight Strip Printer and Approach), 1 for the Billing system at AIS, 1 Supervisor position.
- Installation of ADS-B technology within the Maurice Bishop TMA.
- Implementation of ILS Runway 10.
- Installation of PAPI system for Runway 28.
- Installation of ATIS system.

Montserrat, St. Kitts and Nevis, St. Vincent

2.3.12   CATCOP is considering the participation of two (2) additional countries (Saint Vincent and Grenada). St. Vincent has confirmed their interest in Phase II, but only to the level of situational awareness at this time.

2.3.13   St. Kitts and Nevis shared that they may enter into an airport development project in the next years. In the near term, they are interested in implementing situational awareness. The intent is to obtain specific price information then submit to their government for procurement.

2.3.14   Montserrat has confirmed their interest in Phase II, but only to the level of situational awareness at this time.

3.   **Suggested actions**

3.1   The meeting is invited to:

   a) review the information supplied and advise on any suggestions to assist States in reaching their surveillance goals; and
   b) agree to any other actions as deemed appropriate.

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APPENDIX

1. Introduction

1.1 Surveillance data sharing provides many operational benefits to aircraft operations, air traffic management and safety improvements. Surveillance data sharing brings to the air traffic environment benefits such as increased surveillance coverage, which directly impacts on airspace utilization and efficiency by permitting a reduction in aircraft separation and improve safety of operations. It provides redundancy within areas where nearby Surveillance systems overlap, cost benefits to airline operators due to improved service and optimum flight performance. It also reduces traffic congestion or efficiently manages traffic in busy ATC environments and homogeneity in ATC operations between neighbouring states.

1.2 The Surveillance data sharing tasks are assigned to the ad-hoc group E/CAR[1]/RD of the E/CAR CNS Committee.

1.3 Trinidad and Tobago is the collation point for surveillance data from Martinique, Guadeloupe and Barbados and any other available Surveillance feeds. The Piarco ATM System will process the data via multi sensor fusion and disseminate the data over the E/CAR AFS network.

1.5 The Piarco ATM[2] system is able to provide outputs via LAN with IP addresses. The data will be provided as System Track (ASTERIX Category 62 standard) data format. The surveillance data output will be centered on the same system centre of the Piarco ATM system.

2. Scope and Objective of This Document

2.1 The scope and objective of this document is to provide the minimum technical/operational features (Design, Supply, Delivery, Installation, Testing and Commissioning) and characteristics of the Surveillance display to be implemented as end-user equipment. The local site requirements shall be defined based on each site specific environment.

2.2 The Surveillance displays will serve as the system for a RASA[3] operation, with the capacity for surveillance control (radar control). The surveillance display is a part of the whole

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[1] E/CAR – Eastern Caribbean
[2] ATM – Air Traffic Management
[3] RASA-Radar Assisted Situational Awareness

system that shall allow RASA and Radar Control, including ATCO[4] training, validated procedures, safety cases, validation of the system, etc).

State / Territory	No. of Data Displays	Site
Montserrat	1	Airport Control Tower
St. Vincent	1	Airport Control Tower
St. Kitts	1	Airport Control Tower
Nevis	1	Airport Control Tower

2.3   The display will present the Surveillance system information exported by Trinidad and Tobago where correlated (flight Plan information) and non-correlated Surveillance tracks will be available.

2.4   The interface to the AFS[5] Network at each User State shall be via UDP/IP on an IP port of the AFS Cisco router. Router configurations, if any, shall be under the responsibility of the TTCAA[6].

3. General Requirements

3.1   This system shall have an open architecture design and high performance characteristics. Key requirements are its adaptability and scalability to suit the specific Air Traffic Management environment. The system shall provide a cost effective and low-risk solution for the ATM automation needs.

3.2   All designs, materials, manufacturing techniques and workmanship shall be in accordance with the highest accepted international standards for this type of equipment.

3.3   The eventual winning tenderer (hereafter referred to as the Supplier) shall be responsible for the installation and commissioning of all the equipment and elements covered

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[4] ATCO-Air Traffic Control Officer
[5] AFS – Aeronautical Fixed Services
[6] TTCAA- Trinidad and Tobago Civil Aviation Authority

by this specification, including all accessories, cables, cabinets, supports and other necessary installation materials/elements. The Supplier shall also provide the manpower, technical administration, materials, equipment and special tools needed to complete the work.

3.4   The System hardware shall be based on COTS[7] hardware components, available on the market place, and already used for similar critical systems.

4. Project Services

4.1   **Project services**

4.1.1   Project services shall include but not be limited to the following:

- Project and Quality Management;
- Factory Acceptance;
- Delivery of equipment;
- Site installation, Interoperability and Acceptance Tests;
- Training; and
- Warranty Services.

4.2   **Risk Management**

4.2.1   The Supplier will establish as part of the Project Management Plan a risk management process to manage risks throughout the program and addressing risk identification, risk assessment, risk avoidance and/or mitigation and risk control. Risk assessment shall be monitored during Progress Meetings.

4.3   **Progress Reviews and Reports**

4.3.1   Progress reviews will be held once every month. If needed, Customer participation will be requested via phone or videoconference methods. A Progress Report will be issued after each Progress Review. It will keep track of major project events and of the decisions agreed between the Project Managers.

4.4   **Custom Clearance and Packaging**

4.4.1   The equipment shall be delivered according to DAP conditions (Incoterms 2011 - Delivered at Place) to the end user.

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[7] COTS – Commercial off the shelf

4.4.2 Packaging

4.4.2.1 The goods to be delivered shall be new, manufacturer's original and compliant with the specifications and indicated tolerances herein.

4.4.2.2 The Supplier shall bear responsibility that the delivered goods shall be packed and sealed and clearly marked with sufficient details for their identification. The packaging shall provide guaranteed protection of the equipment against unfavourable weather conditions and other factors that might affect the quality of the equipment even for prolonged storage periods. Regardless of the form of shipment, all indispensable facilities for the proper handling of the packages shall be provided.

4.4.2.3 The packaging to be used for the transport of the equipment and/or materials from the factory to the port of entry into the user states shall follow standard factory practices for long-distance carriage.

4.4.2.4 Prior to packing, the goods shall be subjected to the necessary factory acceptance tests to verify the quality and compliance with the technical requirements.

4.4.2.5 The spare parts shall be supplied in their original packing, duly protected against humidity with dehydrating or silica elements. Each set of spare parts shall be labelled with the part number and denomination of the item, with an indication of the quantity in each package.

4.5 System Installation

4.5.1 The Supplier shall describe briefly the site layout he foresees in his proposal, taking into account the necessary room for access of the hardware maintenance team. Environment conditions required and power consumption of the whole system shall be stated.

4.5.2 The Supplier shall state clearly which part of the installation he will be responsible for, and which responsibility is expected to be taken by the User State regarding installation matters.

4.5.3 The Supplier shall clearly state the preparation activities that need to be performed by User State prior to installation.

4.6 Work Statement

4.6.1 Notwithstanding the information supplied in this document, the Supplier shall conduct a site visit, at his own expense, to determine the appropriate locations of all systems involved and shall provide the User States with a site survey report and adequate illustrations and drawings. Not conducting a site visit does not diminish the responsibility of the Supplier from fulfilling all the conditions of this document.

4.7   **Maintenance Procedures and Standards**

4.7.1   The Supplier shall submit with his proposal his regular procedures and methodologies for maintenance of the equipment. The procedures shall be in accordance with established standards and shall include administrative procedures and method of spare parts management.

4.8   **Redundancy, Fault Tolerance and Recovery**

4.8.1   One of the major requirements of the System is to guarantee continuous processing. High availability equipment is required.

4.8.2   The Supplier shall explain how the hardware fault-tolerant feature is assured and state how redundancy, fault tolerance and recovery will be achieved to protect against service degradation.

4.8.3   Fault tolerant shall be understood as a group of similar entities equipped with automatic mechanisms that support each other in case of failure and/or when any element of the group is out of service, with the purpose of providing continuity in the operation of services provided.   The operation of these mutual support mechanisms should not produce any interruption in the operation or in the services provided.

4.8.4   Redundant shall be understood as the implementation of the fault tolerance measures employing identical entities.

4.8.5   Independent entities (i.e. equipment, ports, circuits etc.) shall be understood as entities that are physically independent of each other and that do not use a common element.

4.8.6   Redundant equipment shall be understood to be a physical entity supplied in a common chassis that has redundancy in its common parts and that permits change of common parts without disruption in service.

4.8.7   Simple equipment shall be understood as a physical entity supplied in a common chassis that do not have redundancy in its common parts.

4.8.8   For components of the Systems that are not hardware fault-tolerant, the impact on operation of the failure of such components shall be described including the procedures to restore the components to operation.

4.8.9   For hardware fault-tolerant units (typically the servers) and unit of active/standby configuration, the requirements stated above shall apply to only the functions supported by the units concerned.

4.8.10   The Supplier shall propose a design with no single point of failure (SPOF) and systems shall have high availability architecture (excluding software).

4.8.11   The configuration of the system shall permit planned periodical tests of the backup equipment or in the duplicated part of the redundant equipment for the purpose of verifying its operability. These tests shall not adversely affect the service of the System.

4.9   **System Reliability, Availability and Maintainability**

4.9.1   System Reliability

4.9.1.1   The System will be considered to have failed when it does not give any support for the execution services, such operational inactive mode being not the result of a deliberate maintenance action.

4.9.1.2   Itemised reliability figures of the critical hardware components (MTBF and MTTR) shall be provided.

4.9.1.3   The Supplier shall describe the scenario where the System cannot restart automatically following a System failure, for example, failure of the power supply or a software error that prevents the System from restarting, and describe specifically how the System can be restarted.

4.9.1.4   The User States intend to place a 2-year maintenance contract with the Supplier. Therefore, the Supplier shall declare his willingness to support a maintenance contract after the warranty has ended.

4.9.2   Hardware Maintainability

4.9.2.1   The Supplier shall describe how the hardware and software maintenance will be conducted during the warranty period. When submitting this plan, the Supplier shall bear in mind that the User States shall carry out first-line hardware maintenance, including Line Replaceable Unit (LRU) swapping. The appropriate training shall be provided.

4.9.2.2   The Supplier shall propose a list of spare parts necessary to keep the System at the level of availability stated above.

4.9.2.3   The Supplier shall state the turn-around time of failed hardware components during the warranty period. It shall be detailed whether the time stated is valid during weekends and holidays.

4.9.3   Software Maintainability

4.9.3.1   The Supplier shall give a detailed description on:

     a) The services offered for software maintenance during the warranty period (e.g. how a software problem can be investigated, fixing of bugs, System restart with a new application software release);
     b) The availability of those services (office hours, at night, during the weekend); and
     c) The responsibility of the Supplier and the User.

4.9.3.2   The Supplier shall include in his proposal the facility to provide remote maintenance support. This may consist for instance in accessing the System over the Internet to log into the system and perform investigation of software faults as if the supplier was on site.

4.9.4   <u>Notification and monitoring</u>

4.9.4.1   Supplier shall propose a SMS text message notification to predefined mobile telephone numbers for major faults and catastrophic failures. Tenderer shall describe his interpretation of major faults and catastrophic failures.

4.9.5   <u>Tools for the maintenance of the system</u>

4.9.5.1   Tender shall propose as an option a monitoring device for maintenance and supervision

4.9.5.2   Tender shall propose as an option a configuration device (display configuration, map editor).

5. Technical Specifications for the basic system

5.1   The Surveillance displays shall be supported by a state-of-the-art COTS computer, and a high resolution, high quality Traffic Situational Flat Panel colour (minimum 1024 X 1024 pixels, minimum 22).

5.2   Latest commercially available equipment with special emphasis on locally acquirable within or close to the E/CAR region.

5.3   <u>Interfaces</u>

5.3.1   Ethernet (UDP/IP) should be available for data acquisition.

5.4   The equipment shall have a menu to allow the operator to modify the different parameters such as brightness, tones, range, label size, colour, content of the information presented in the zones of general and specific information.

5.5   The equipment shall be capable of the following:

- Multi-layer colour map
- Adaptable map projection
- Centre, offset, pan and zoom
- Flight position from surveillance or flight plan
- Adaptable flight position symbols that depict flight attributes
- Adaptable multi-page flight data tag (full, limited, basic)
- Automatic tag relocation to avoid overlap
- Predicted track line
- Flight position history
- Range rings
- Lat/Long grid
- Special use airspace dynamic display

5.6   <u>Basic software features</u>

- Presentation zooming
- Windows management
- Data storage and export options

5.7   <u>Display information from MRT and other available sources</u>

- Reserved SSR codes including 7500, 7600 and 7700, SPI/operation of IDENT, safety-related alerts and warnings as well as information related to automated coordination etc., in a clear and distinct manner
- Squawk code, Mode C and Mode S, Flight ID
- Flight level / Altitude, Trend(climb, descent, stable), Speed, Vertical speed

5.8   <u>Display SURVEILLANCE Map information</u>

5.8.1   Capability to display Radar Asterix Categories (Cat 1&2, Cat 34&48), Multiradar Asterix Category 62, ADS-B Asterix Category 21 data.

5.8.2   The workstation(s) shall be provided with English characters to input the commands included in the operational software.

5.8.3   The following features (minimum requirements) shall be available on the Surveillance Display:

- a) Surveillance track identification and display;
- b) Surveillance data monitoring;
- c) Aircraft identification, automatic and manual SSR code correlation
- d) Graphic tools interaction;
- e) Alarms and warnings (STCA, MSAW, DAIW, RVSM, MTCD, etc.) when received;
- f) Operational data management;
- g) Automatic and manual labels overlapping management

5.8.4   When power is restored after a power failure, the display system shall present the information with the last configuration parameters.

5.8.5   The appropriate Surveillance maps for Surveillance display overlays shall be provided. These would have a wide range of user functions including user-configurable range features. When such source data is available, all maps shall apply the accepted world standard, WGS-84 earth-centred coordinate system.

5.8.6   Maps provided shall meet the following minimum requirements:

- a) The ability to overlay specific maps and routes on a global digitized map.
- b) Ability to plot new air routes.
- c) Maps to cover extrapolated flight following and conflict prediction information areas.

5.8.7   The Surveillance displays shall indicate detected information and extrapolated information displayed in different colours to demark the difference between actual Surveillance tracks and extrapolated tracks based on MRT extrapolation and/or flight plan and other input information.

5.8.8   A redundant GPS[8] based master clock with multiple input system to enable system time coordination and to synchronise all equipment provided in this document.

5.8.9   Aircraft positions on track labels display, either RADAR data, or ADS, or flight plan data shall contain information/data about that aircraft position accordingly, and to be continuously displayed by numerical characters in the predefined formats suitable for air traffic control and management. The movement of track labels position shall assure that:

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[8] GPS – Global Positioning System

- Two overlapping labels if any, shall automatically separate when controllers select automatic function (auto rotation); or
- Controllers shall be able directly change track label position by clicking/releasing the mouse-buttons (manual rotation).

5.8.10   The system should be able to display surveillance from different sources (TTCAA MRT[9], monoradar information when available, ADS-B local data if available, local MRT if available), each surveillance display should be activated simply by the user (click on an icon for instance).

6. Technical Specifications for advanced system

6.1   The System should be capable of following additional features:

6.1.1   Safety nets server system (STCA, MWSAM, APW, etc.)

6.1.2   Flight data processing system (ICAO messages, FDP data base, FP trajectory calculation, internal and external coordination, Air Space Management, SSR allocation vs SID/STAR, internal and external distribution of flight data, Flight plan based trajectory, etc..).

6.1.3   Surveillance data processing system (multi sensor tracker)

6.1.4   Billing and statistics module

6.1.5   Air Traffic simulator / training system

7. Customization

7.1   Supplier shall be provide customization of the HMI[10] and the Billing and Statistics modules to suit the specific requirement of the user.

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[9] MRT – Multi Radar Tracker
[10] HMI – Human Machine Interface