International Civil Aviation Organization
North American, Central American and Caribbean Office

WORKING PAPER

Sixth Eastern Caribbean Network Technical Group (E/CAR/NTG/6) and Fourth Eastern Caribbean Radar Data Sharing Ad-hoc Group (E/CAR/RD/4) Meetings
Miami, United States, 13 - 14 July 2015

Agenda Item 3:   E/CAR Aeronautical Fixed Service (AFS) Network Performance and Operation
3.1   Network performance analysis and general aspects

**NETWORK PERFORMANCE ANALYSIS AND GENERAL ASPECTS**

(Presented by France)

EXECUTIVE SUMMARY	
The new E/CAR AFS network has significantly improved its performance. This paper identifies possible improvements.	
Action:	The suggested actions are presented in Section 4.
Strategic Objectives	• Safety • Air Navigation Capacity and Efficiency
References	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 E/CAR/AFS network is globally compliant with operational requirements, but some improvements may be needed, both in technical and procedural aspects.

1.2   The connection of FWI to E/CAR/AFS network is shown below:
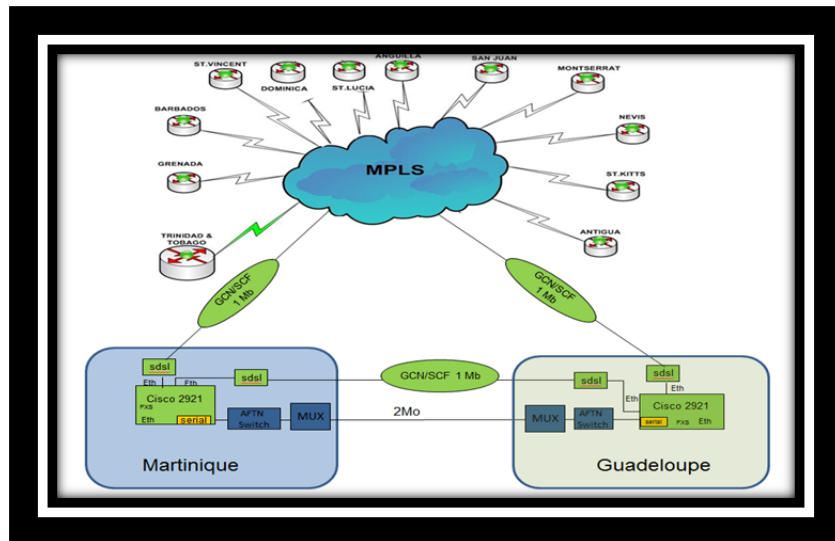
2.   Status of the FWI Nodes

2.1   *Guadeloupe hardware:*

- For months, only one Cisco2921 router was available in Guadeloupe. That router was not fully equipped: the integrated power module is missing (dismounted by TSTT after a failure): when in use, powered only through ARPS module. A problem with fans was detected.
- Backup router was delivered to Guadeloupe, but with RPS card missing. That router was set as Main.
- Conclusion: backup router: power module missing, fan tray to be replaced, main router: RPS module missing.

2.2   *Martinique hardware:*

- Martinique has two (2) routers fully equipped (power module and RPS).

2.3   Backup routing is not functioning properly for FWI nodes:

- As the routers are not connected directly to MPLS, a backup was set between Martinique and Guadeloupe (see picture above).
- In case of failure of the direct link Guadeloupe - Antigua, only AFTN is still routed to Guadeloupe via Martinique.
- In case of failure of the direct link Martinique - Trinidad, no services are available.
- TSTT during the last visit indicated that investigations will be conducted.

2.4   Cisco 2921 configurations need to be more prepared and cross checked:

- Comparison between Martinique and Guadeloupe configurations show differences in the description of backup routing (much more information in Guadeloupe configuration). Backup routing for FWI shall be addressed by TSTT and set up and tested for next visit.
- FWI would appreciate getting configuration changes prior to installation.
- Prior information to end users shall be sent before remotely configuration changes.

- French law requests that for ATS systems, every configuration is stored with period of validity. FWI propose to have this quality control on configuration changes done by TTCAA, unless FWI would manage that traceability but in that case need to be informed and to receive the modified configuration.

2.5 *Lines and local connections:*

- Lines from FWI to MPLS are leased to GCN/Mediserv Telecom operator. A weakness was detected in Martinique, implying 3 total ECAR losses (both connections to Piarco and Guadeloupe were lost) due to Mediaserv terminal connections shut down: 1 lightning strike on the terminal line, 2 problems of powering Mediaserv routers.
- To improve terminal connections in Martinique, FWI proposed to TTCAA to replace Martinique Guadeloupe Mediaserv line by a France Telecom line. TTCAA is studying technical and financial offer.
- If accepted, the backup routing for Guadeloupe and Martinique would be really independent for main lines: optical fiber vs copper lines, France Telecom vs GCN/Mediaserv.
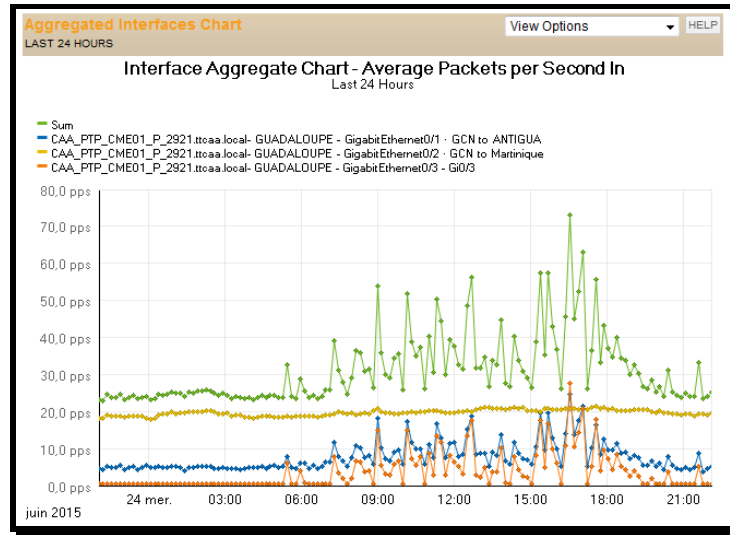- GCN NOC services are appreciated, as being responsive and with good scheduling of service interruptions.

2.6 *Performances (Metro-e)*

	Martinique	Guadeloupe
Availability / 1 year	98.7 %	95.7%
Average response time (night)	34 ms	38 ms
Average packet /sec	4 by night, peaks to 28	Min : 4 + 20 pps peaks 28 +20

Martinique Traffic:
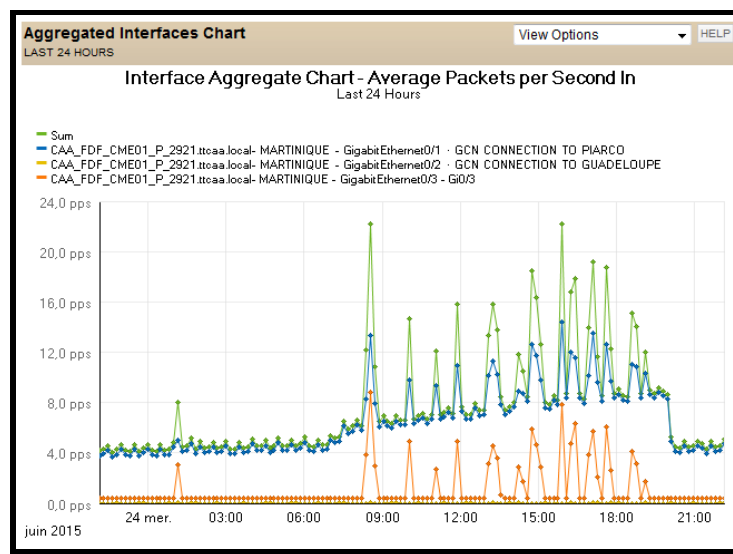
Guadeloupe Traffic:

These diagrams are not coherent as far Guadeloupe - Martinique traffic is concerned.

2.7   *Maintenance Procedures and Fault Reporting*

      (a) Fault reporting and analysis: when a ticket is reported, feedback is too poor. No technical information is exchanged.

      (b) Information is required before any configuration change, even if no impact has been identified.

      (c) FWI still support the setup of a common maintenance agreement for E/CAR network and associated tools (SPATIA and CADAS).

      (d) Regular TSTT preventive maintenance on site needs more coordination with sites.

2.8   *Supervision Developed by Guadeloupe*

Principles:

- A basic computer on Linux (distribution ELLOPAC 5.4 32bits) using NAEMON freeware (Network And Event MONitoring), accessing via a web interface to a basic E/CAR monitoring.
- Connections: see picture.
- Equipment monitored :
  o ECAR routers for ATS having voice communications with Guadeloupe (i.e. TAPA, TFFF, TFFR, TPDP, etc).
  o ECAR routers Interconnection to MPLS (i.e. Antigua Hub).
  o Cadas (clients and Piarco server : i.e. Cadas_BRIA_PTP, CISECA_PROXY)
  o SPATIA (clients and Piarco server : i.e. Spatia_BRIA_PTP, SPATIA_SERVEUR)
  o Interface between local AFTN switch and ECAR AFTN (AFTN_PIARCO)
  o Other equipments : STS_ECAR_PTP, SWITCH_BRIA_PTP
- Commands used for monitoring :
  o PING (routers, computers, proxys). Note TDCF and TDPD not responding
  o HTTP (Cadas and Spatia)

o ROUTE (to know for instance when the data come from Guadeloupe or Martinique).
o AR routers for ATS having voice communications with Guadeloupe (i.e. TAPA, TFFF, TFFR, TPDP, etc).

- Extensions possible: using SNMP for detailed monitoring of the Cisco29211 router (need TSTT authorization). Some trials were successfully achieved on backup router (in volatile mode to return to original configuration once trials are done).
- Configuration of the monitoring system and of monitored devices: via web interface and files edition.
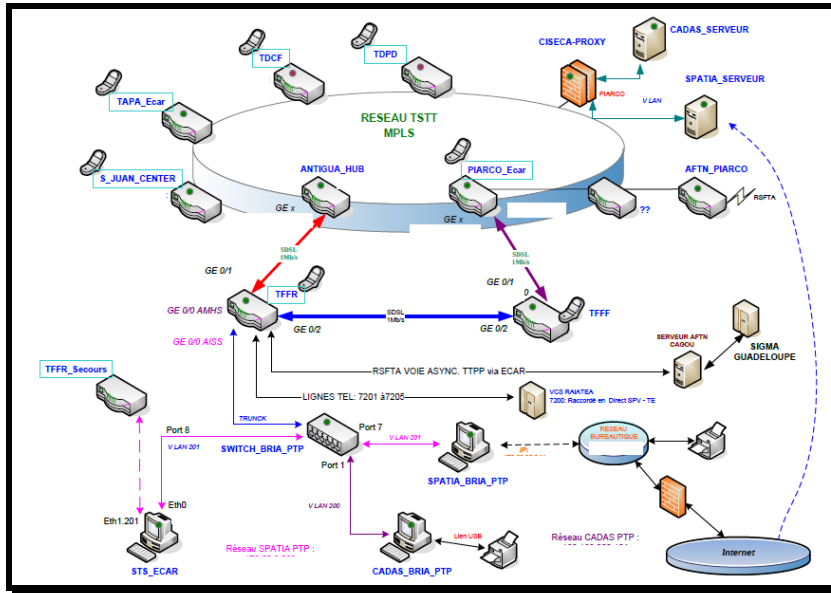
2.9 **Presentation:**

- Synthesis
- Detailed status for equipment and services
- Alerts and events notification
- Reports
- Basic configuration and administration

Login to Guadeloupe E/CAR Monitoring: see annexed document Picture 1
Summary page:

Detailed status for equipment and services:

Other views: see annexed document pictures 4 to 7.

3. **Conclusion**

3.1   The ECAR2 network is globally operating correctly in FWI, and improvements are
proposed:

- To complete Guadeloupe routers hardware, to replace fan tray
- To complete Guadeloupe E/CAR monitoring, editing manual and sending out to States that require
- To order a France Telecom (Orange) IP line between Martinique and Guadeloupe (in replacement of GCN present one)
- To improve communication with end users
- To complete a maintenance procedures
- To enhance communication prior to TSTT preventive maintenance on sites, and to plan them on a regular basis

4. **Suggested Actions**

4.1   The Meeting is invited to:

a)   take in consideration FWI point of view regarding the E/CAR AFS Network performance;

b)   take action for completing the E/CAR AFS Network actions for FWI;

c)   decide whether Guadeloupe monitoring tools can be useful for E/CAR States, and discuss about possible improvements; and

d)   define actions to complete the pending agreed actions on Maintenance Procedure and SLA.

— END —