Regional telecommunication Networks for Integrated Telecommunications for Air Navigation Services

Automation System and Integrated Telecommunications for Air
Navigation Services/System-Wide Information Management (SWIM) Workshop
(AUTO/SWIM)
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Agenda

- Overview of Implementation References
- Regional telecommunication Networks implementation
- MEVA Network
- CAMSAT Network
- ECAR AFS Network
- NACC/WG/04 Implementation Results

OVERVIEW OF IMPLEMENTATION REFERENCES

- Regional Cooperative effort on telecommunication Networks

- Harmonized Air Navigation implementation

- Cost-effective regional solutions

- Regional Agreements: GANP, eANP and Regional Implementation Plans

- Promote collaboration and coordination

- Implementation based on ASBU methodology and performance based benefits

Overview of Implementation References: ANConf/12 Recommendations

Recommendation 1/6 – Data communications issues

That ICAO:

a) organize a multidisciplinary review of air traffic control communication requirements and issues;

b) review the operation, management and modernization of a regional digital network technical cooperation project and other similar regional experiences with the aim that this efficient practice can be adapted for use in other ICAO regions;

That States:

c) explore multi-modal solutions when appropriate to overcome transition issues; and

d) anticipate and accelerate the migration of air traffic management communication systems towards more efficient technologies to timely service the aviation system block upgrade modules.

Overview of Implementation References: ANConf/12 Recommendations

Recommendation 1/12 – Development of the aeronautical frequency spectrum resource

That States and stakeholders:

a) recognize that a prerequisite for the deployment of systems and technologies is the availability of adequate and appropriate radio spectrum to support aeronautical safety services;

b) work together to deliver efficient aeronautical frequency management and "best practices" to demonstrate the effectiveness and relevance of the industry in spectrum management;

c) support ICAO activities relating to the aviation spectrum strategy and policy through relevant expert group meetings and regional planning groups;

d) support Assembly Resolution A36-25* and the requirement for sufficient State representation of aviation interests at World Radio communication Conferences (WRCs) and relevant International Telecommunication Union WRC preparatory meetings

*: replace by A38 with A38-6: Support of the ICAO policy on radio frequency spectrum matters

Overview of Implementation References: ANConf/12 Recommendations

Recommendation 1/14 – Long-term very small aperture terminal spectrum availability and protection

That:

a) ICAO and Member States not support additional international mobile telecommunications spectrum allocations in the fixed satellite service C-band spectrum at the expense of the current or future aeronautical very small aperture terminal networks; and

b) ICAO and Member States pursue this matter in the International Telecommunication Union Radio Communication Sector (ITU-R) and during the World Radiocommunication Conference (WRC-15), with a coordinated proposal to promote a solution where the international mobile telecommunications spectrum allocation does not compromise the availability of the aeronautical very small aperture terminal networks.

Overview of Implementation References: ANConf/12 Recommendations

Recommendation 2/3 – Security of air navigation systems

That ICAO:

a) seek the support of States and stakeholders to complete its work in developing a robust, secure aeronautical telecommunication network; and

b) establish, as a matter of urgency, an appropriate mechanism including States and industry to evaluate the extent of the cyber security issues and develop a global air traffic management architecture taking care of cyber security issues.

Overview of Implementation References: GANP

Third Edition of GANP GPI-22 – *Communication infrastructure*

To evolve the aeronautical mobile and fixed communication infrastructure, supporting both voice and data communications, accommodating new functions as well as providing the adequate capacity and quality of service to support ATM requirements.
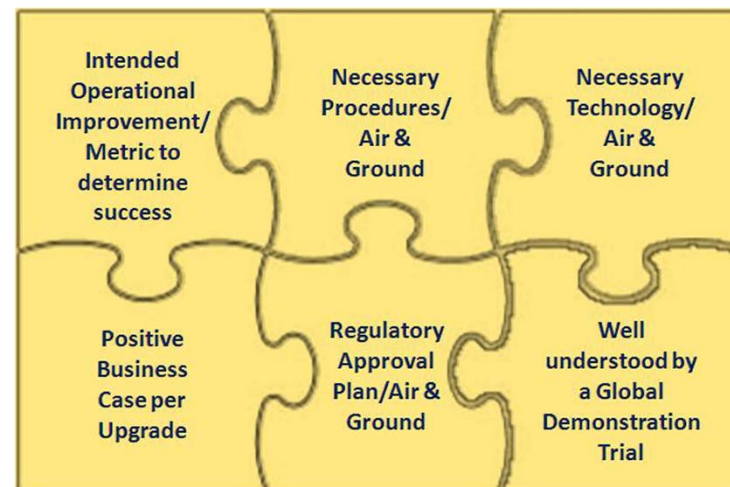
Common objective: to seek the most efficient communication network service providing the desired services with the required performance and interoperability required for aviation safety levels at minimum cost.

4th Edition of GANP

AVIATION SYSTEM BLOCK UPGRADE (ASBU) METHODOLOGY

(associated technology roadmaps and implementation experiences)

Intended Operational Improvement/ Metric to determine success

Necessary Procedures/ Air & Ground

Necessary Technology/ Air & Ground

Positive Business Case per Upgrade

Regulatory Approval Plan/Air & Ground

Well understood by a Global Demonstration Trial

Overview of Implementation References: CAR/SAM ANP

CARSAM Regional Strategy for the deployment of the ATN and its applications

Short term (1/2)

Actions	Implementation Status
Complete the updating of the aeronautical digital communication networks by providing intra and inter-regional interconnection and interoperability.	Completed
implementation of the AMHS to replace the AFTN.	On going
Carry out the strategic deployment of a limited number of ATN routers of the ATN backbone to support other ground-ground and air-ground applications.	On going with Network improvements
The referred ATN routers must provide AFTN/AMHS gateway during the transition phase.	completed
Beginning of implementation of the AIDC within control centres	On going

Overview of Implementation References: CAR/SAM ANP

CARSAM Regional Strategy for the deployment of the ATN and its applications

Short term (2/2)

Actions	Implementation Status
undertake the training of operational and technical personnel in order to provide the necessary knowledge to introduce the ATN and its ground-ground applications (AMHS and AIDC).	On going
Based on the relevant deployment of the ATN ground-to-ground infrastructures and ground applications, gradual introduction of ATN air-ground applications is suggested	2015 onwards
Implementation will be in full agreement with SARPs, ICAO PANS and GREPECAS guide.	completed

Regional telecommunication Networks implementation

Regional – multinational- National
Vsat Networks (Mexico, Bahamas,
St. Maarten) implementation

GREPECAS D
Project Support

All Regional networks
are interconnected

AMHS Task Force
Assistance

IP compatible
networks

Ad-hoc regional supporting
bodies: MEVA TMG, ECAR/NTG,
COCESNA, etc.

IPv4 Addressing Scheme
update / IPv6 Addressing
scheme
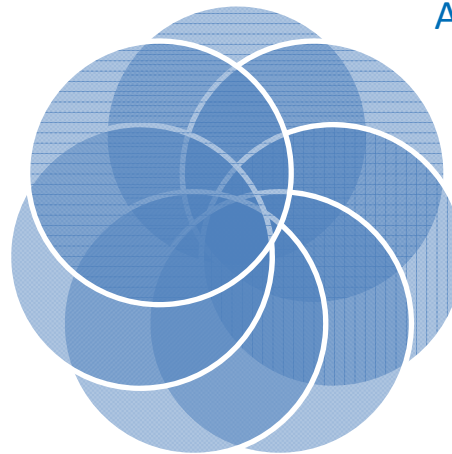
Regional telecommunication Networks implementation: Requirement completion Status

AFTN PLAN CNS TABLE 1A	☑
Table CNS 1Ba – Routers Regional Plan	**On-going**
Table CNS 1Bb – ATN G-G application Plan	**On-going**
ATS Direct Speech Circuits CNS Table 1C	☑
AMS Plan CNS Table 2A	☑
AMS HF Designator CNS Table 2B	☑
Surveillance Plan CNS Table 4	☑

ROUTERS REGIONAL PLAN / PLAN REGIONAL DE ENCAMINADORES
REGION CAR/ CAR REGION
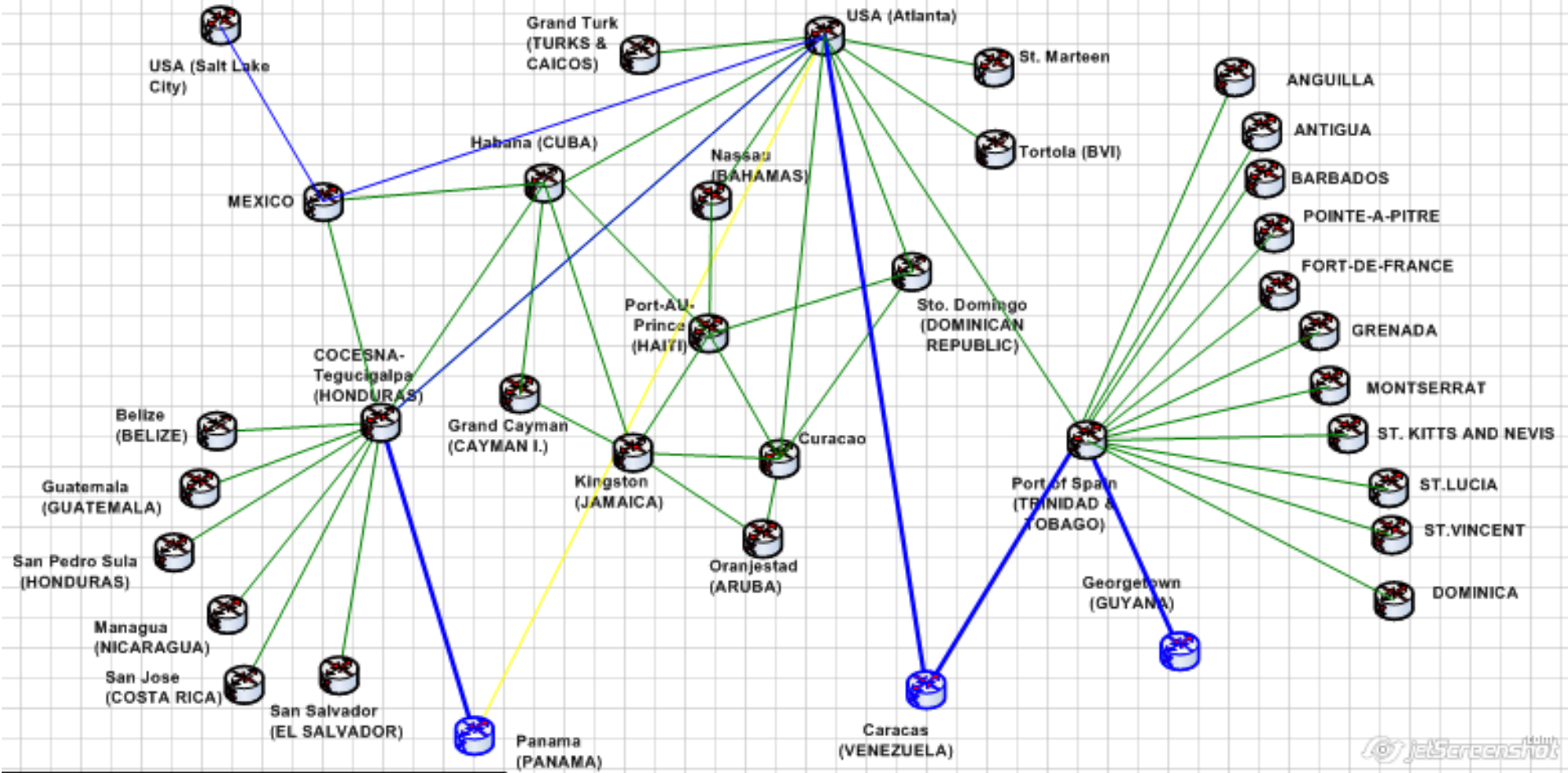
Update by AMHS TaskForce in NACC/WG/04

![ICAO | CAPACITY & EFFICIENCY]

Regional telecommunication Networks implementation: Current status

MEVA II Network:

VSAT Network / Frame Relay	Provides services to all Central Caribbean, Mexico and Central America	Main Network for AMHS implementation	interconnection with REDDIG and E/CAR Networks	Satisfactory Operation/ Performance

E/CAR Network:

MPLS Network / IP	Provides services to all Eastern Caribbean States	Main Network for AMHS implementation

CAMSAT Network:

VSAT Network / Frame Relay	Provides services to all Central America	In support of ground based Telecom Network	New node in Panama and Central America
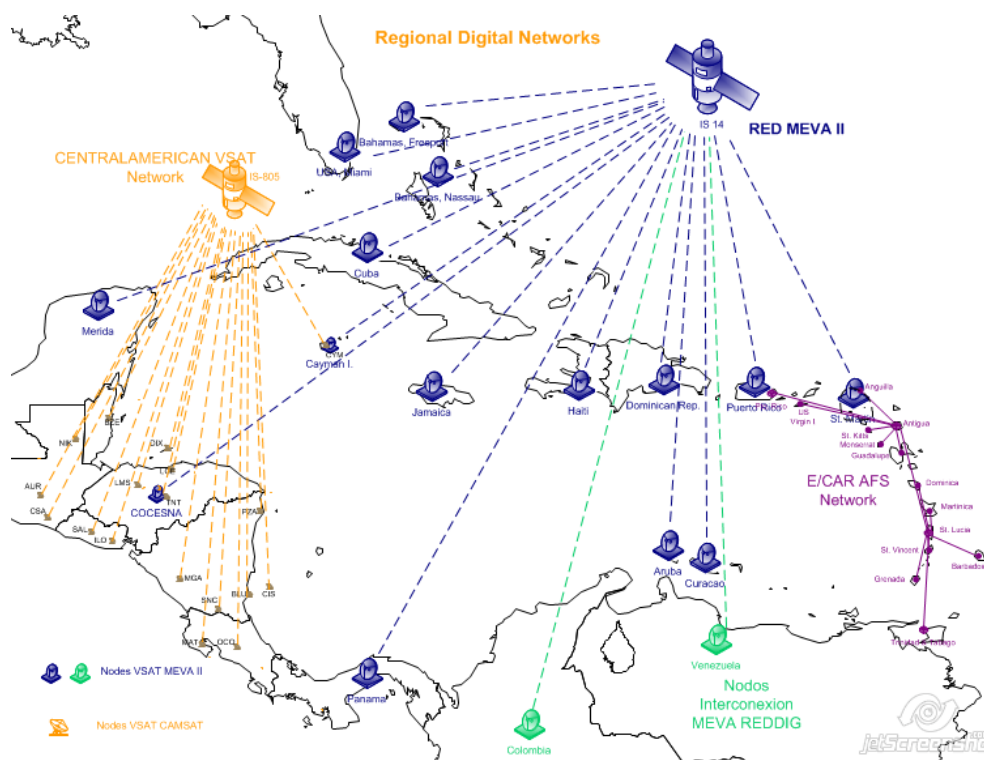
MEVA Network: Current status

- Regional CAR Telecommunication Network since 1996
- Civil Aviation Authorities and Organizations of Aruba, Bahamas, Cayman Islands, Cuba, Curacao, Dominican Republic, Haiti, Jamaica, Mexico, Panama, Puerto Rico, St. Maarten, United States of America, COCESNA, and REDDIG users (Venezuela and Colombia)
- Full-meshed VSAT
- TDMA Network
- Frame relay Network
- Satellite: IS-14
- MEVA II Network since Nov 2006
- Management body: MEVA Technical Management Group (TMG)

MEVA Network: Modernization to MEVA III

- MEVA III Tender Process conducted in 2013

- Expected implementation of MEVA III in 2014

- MEVA III features (1/3):
  - Fully meshed connectivity of the required voice and data services with ND SatCom's SkyWAN product as technical platform
  - flexible network topology, the efficient use of the satellite capacity and the low power requirements in the ground stations.
  - Accommodate current and future ATC communications in the given full meshed connectivity
  - Highest level of availability of a satellite network with optional MPLS backup network
  - Optimum satellite bandwidth efficiency
  - Seamless transition from the current network without interruption of critical applications
  - Guaranteed maintainability of the network over a period of minimum 10 years

MEVA Network: Modernization to MEVA III

- MEVA III features (2/3):
  - Support mesh, star and hybrid network topologies
  - Full support of TCP/IP protocols
  - Hub-less, which avoids a large investment and a central point of failure
  - Provides advanced security concept
  - Optimized end-to-end bandwidth efficiency
  - Minimum latency
  - Minimum transmission cost
  - High flexibility regarding network changes
  - highly efficient SkyWAN TDMA algorithm with up to 15-30% advantage in bandwidth utilization over competing VSAT systems
  - 8PSK modulation
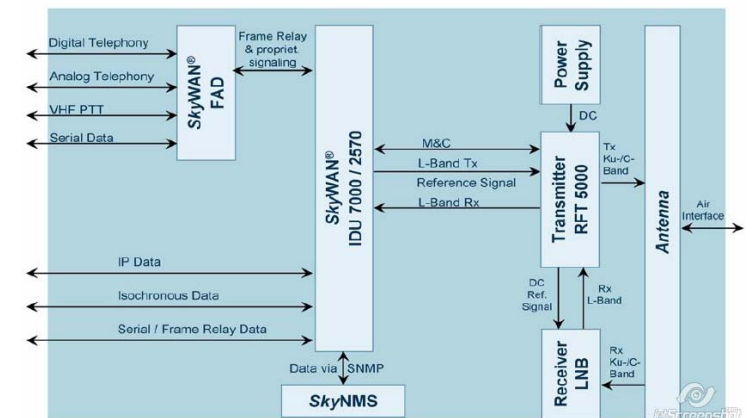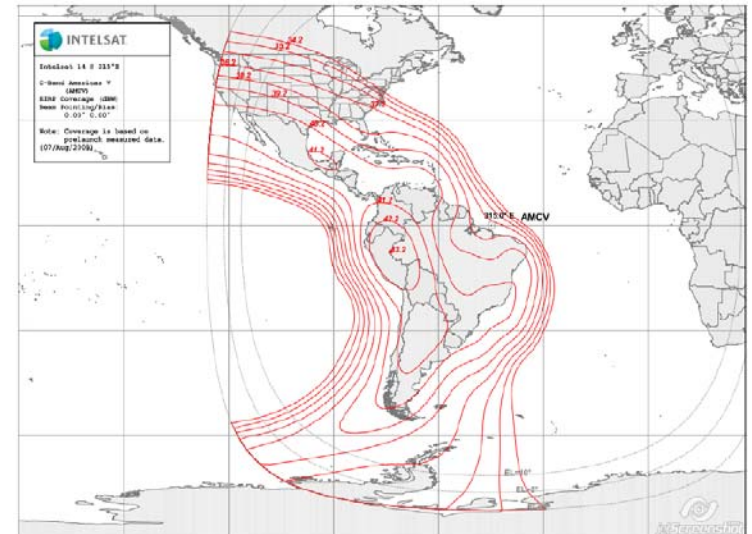
MEVA Network: Modernization to MEVA III

- MEVA III features (3/3):
  - Master / Back-Up Master Concept.
  - MF-TDMA allows to configure carriers of different bandwidths and thus can support the operation of terminals of different sizes and climatic zones in one network.
  - To support very small terminals the system can operate BPSK carriers (Binary Phase Shift Keying).
  - To support future network growth, increasing data rate requirements and the capability of more powerful satellites, each modem supports a maximum data rate of 10 Mbps.
  - For security reasons, changes in network traffic cannot be detected due to a mechanism to filling up the data containers with idle packets.
  - Optimal support applications like Video Conferencing and VoIP.

- Commercial off-the-shelf products
- Remote and local monitoring and statistics
- Satellite: IS-14
- New nodes in Bahamas
- Network interconnection with REDDIG and E/CAR AFS Network

CAMSAT Network

- Meshed VSAT Network

- Use for Aeronautical and internal administration Purposes

- Satellite IS-805, C Band (4-6 Ghz)

- MCPC/ FDMA

- Link availability: > 99.98%

- QPSK and FEC 3/4

- Frame Relay-IP upgrade

- Supports all Central American FIR Air Navigation Services: AMS, ATS, radar, AFTN, etc.

- now is use as backup to the Central American microwave telecommunication network

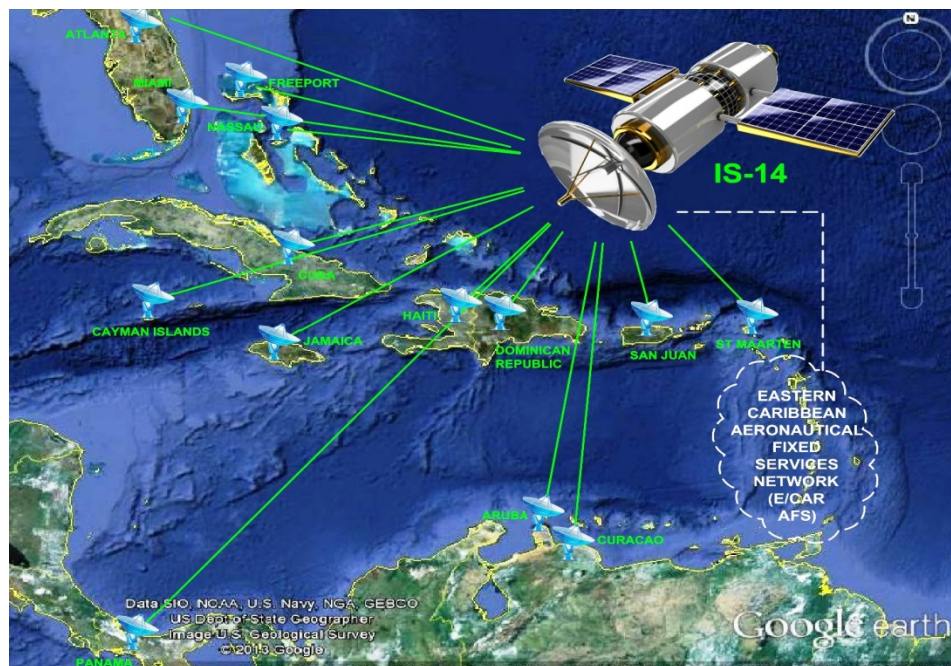# EASTERN CARIBBEAN AERONAUTICAL FIXED SERVICES (E/CAR/AFS) NETWORK

- Provides voice and data services (Switched and Direct Ground-to Ground) between States in the Eastern Caribbean: Anguilla, Antigua, Barbados, Dominica, Grenada, Guadeloupe, Martinique, Montserrat, Nevis, Saint Kitts, Saint Lucia, Saint Vincent, Sint Maarten, Trinidad and Tobago.

- CISCO based Multi-Protocol Label Switching (MPLS).

- International Private Leased Circuits (IPLCs) are integrated for those areas not covered by MPLS service.

- Owned and managed by the Trinidad and Tobago Civil Aviation Authority (TTCAA).

# EASTERN CARIBBEAN AERONAUTICAL FIXED SERVICES (E/CAR/AFS) NETWORK

- Owned and managed by the Trinidad and Tobago Civil Aviation Authority (TTCAA).
- The telecom service provider, Telecommunications Services of Trinidad and Tobago (TSTT) employs proactive real time monitoring via web portal access point and provides maintenance in accordance with a Service Level Agreement.
- Connects to Puerto Rico for voice services between San Juan and the E/CAR and also passes through San Juan for Piarco-Atlanta AMHS service and Piarco-New York voice service.
- Revision body: E/CAR Network Technical Group (NTG)
- Interconnect the MEVA and E/CAR Networks in San Juan (Sint Maarten-Trinidad and Tobagoradar data sharing, voice circuits).

EASTERN CARIBBEAN AERONAUTICAL FIXED SERVICES (E/CAR/AFS) NETWORK
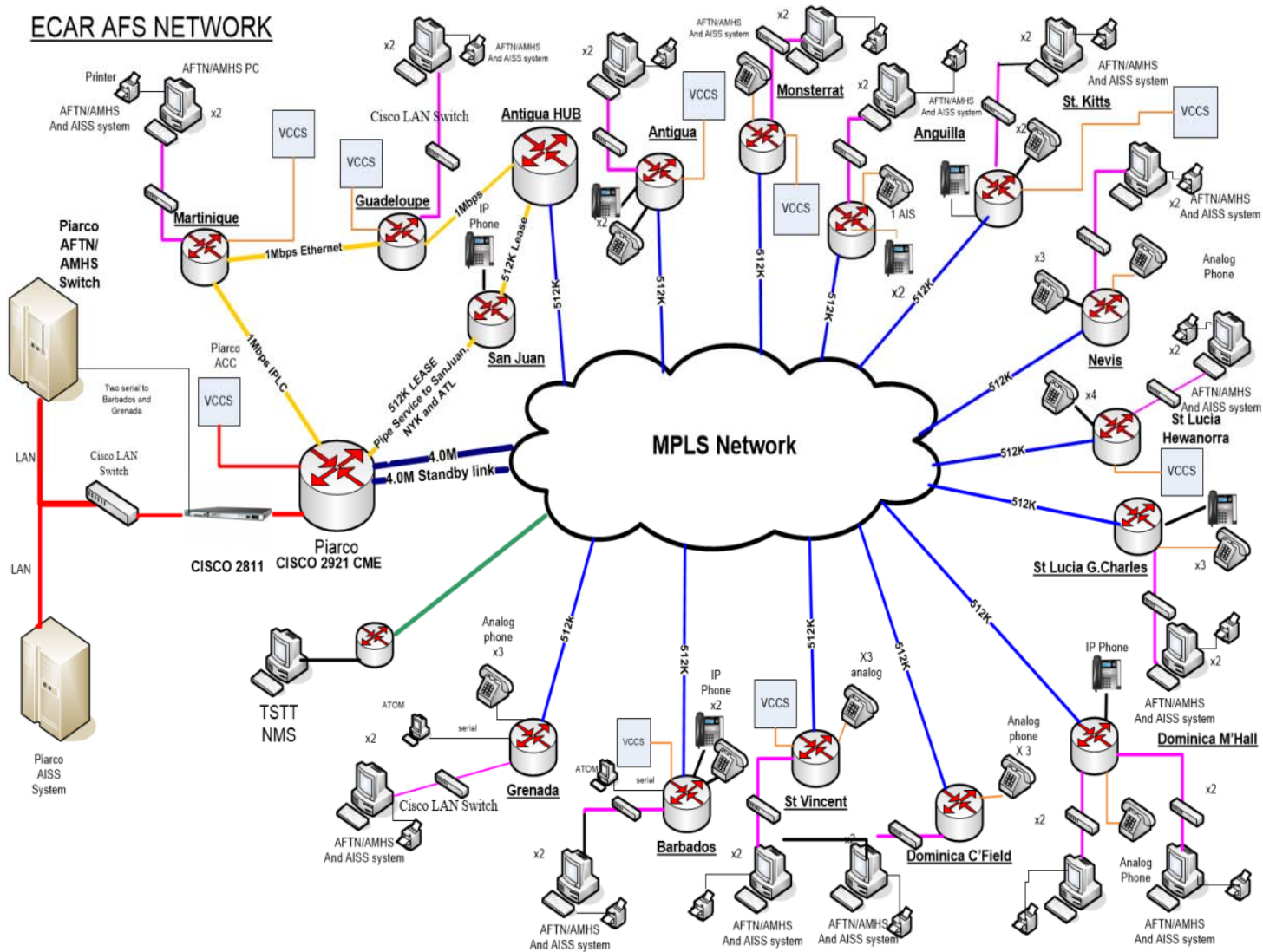
- Radar data sharing implemented through the network

- Trinidad and Tobago provides and hosts the radar data server for the sharing of radar data in the Eastern Caribbean
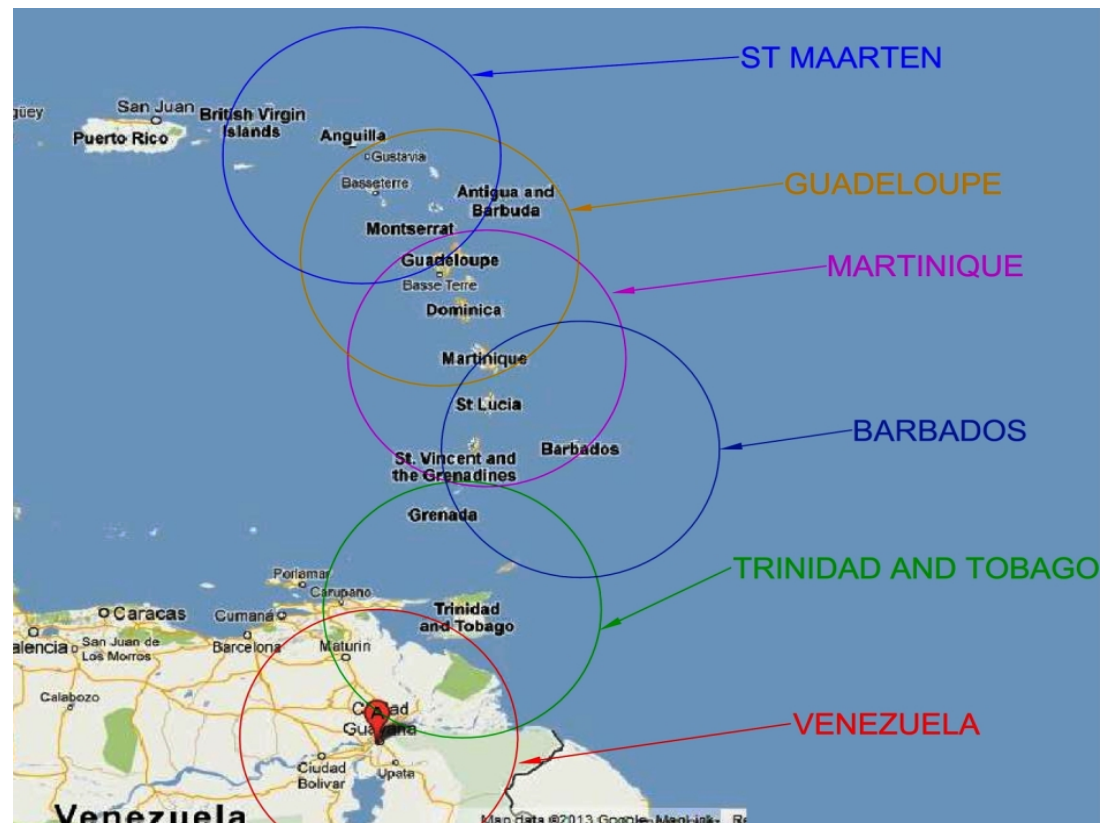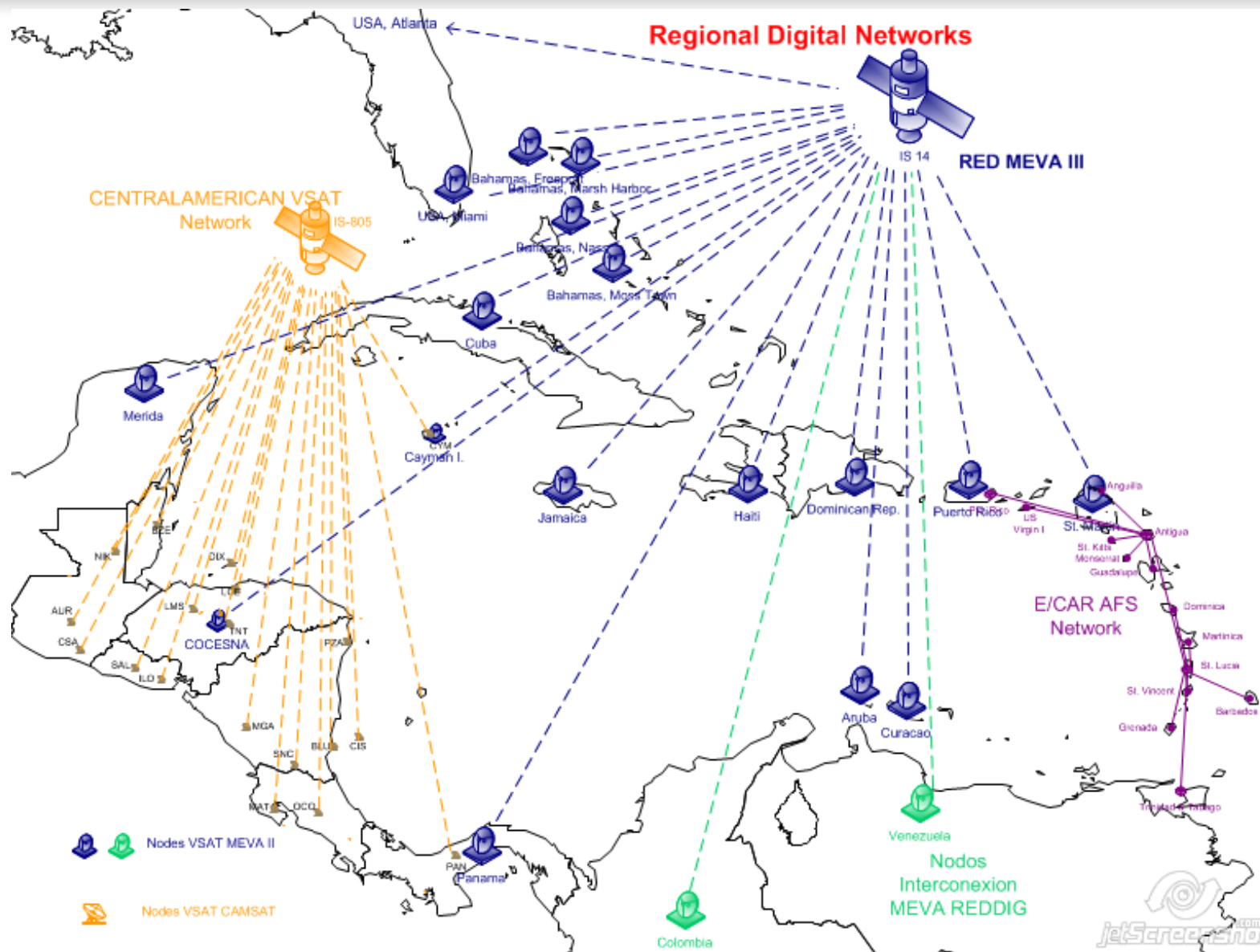
ECAR AFS NETWORK

NACC/WG/04 Implementation Results

CONCLUSION

NACC/WG/4/5   ACTIVE SUPPORT FROM STATES FOR ICAO POSITION FOR WRC-2015

That States/Territories, in order to ensure their active support for the ICAO WRC-15 Position for the protection of the aeronautical frequency spectrum and satisfy future frequency spectrum aviation needs.

CONCLUSION

NACC/WG/4/12   APPROVAL OF IPV4 ADDRESSING SCHEME, VER 1.0

That, in order to expedite and facilitate the implementation of the IPv4 ATN in the CAR Region, States/Territories of the CAR Region:

a)   approve the revised version of the CAR IPv4 Addressing scheme, version 1.0;

b)   implement their Aeronautical Telecommunication Networks (ATNs) in accordance to the IPv4 addressing scheme ver. 1.0, where applicable; and

c)   report its use/planned use to the ICAO NACC Regional Office no later than Dec 2015.