TRINIDAD AND TOBAGO

PIARCO FIR/NATIONAL ASBU PLAN

ICAO ASBU WORKSHOP

PRESENTED BY
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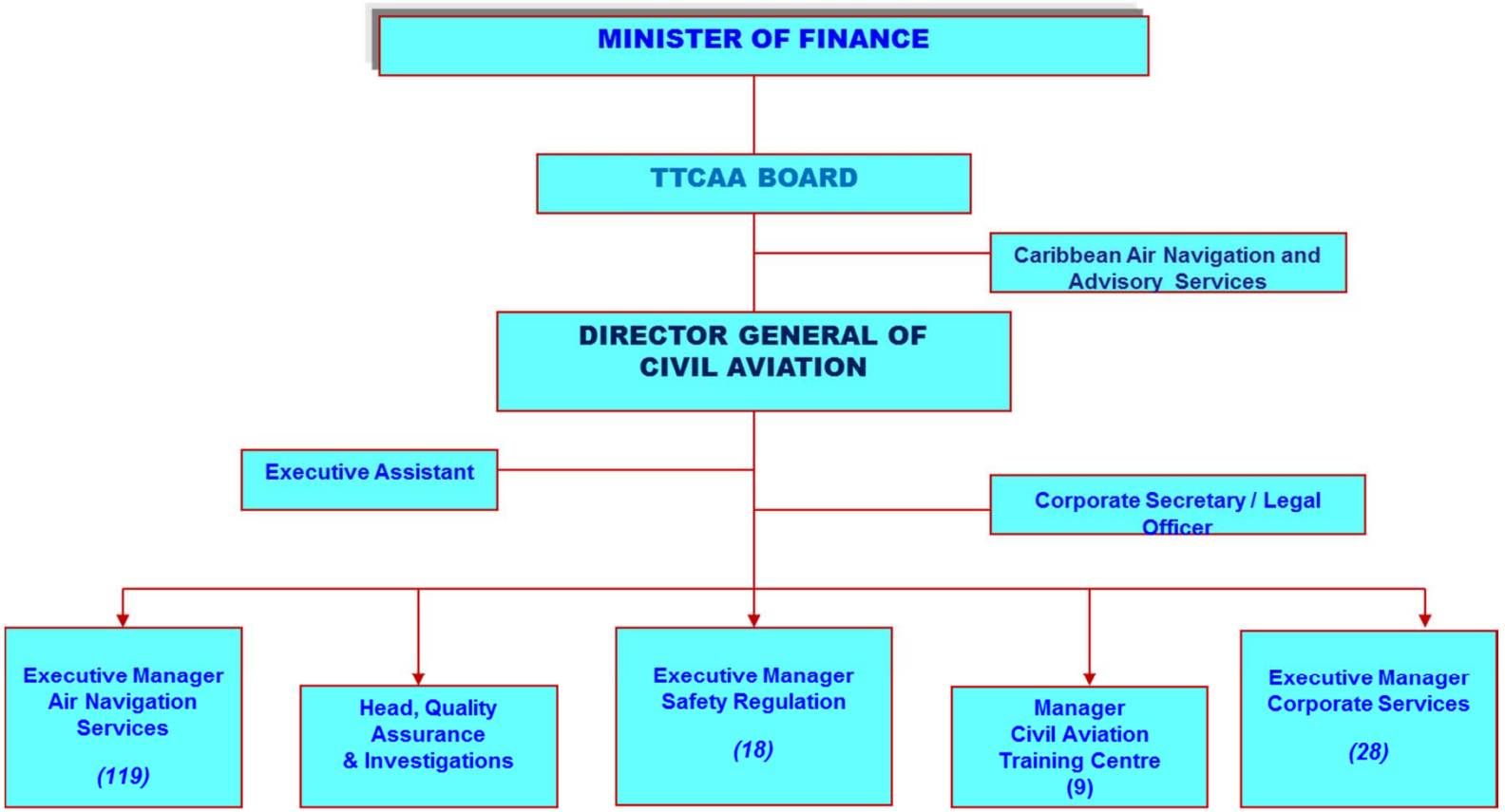
ROHAN GARIB

ICAO Regional NAM/CAR Workshop on the Aviation System Block Upgrades (ASBU) Framework: Planning, Implementation and Monitoring

ICAO NACC Regional Office, Mexico City, Mexico

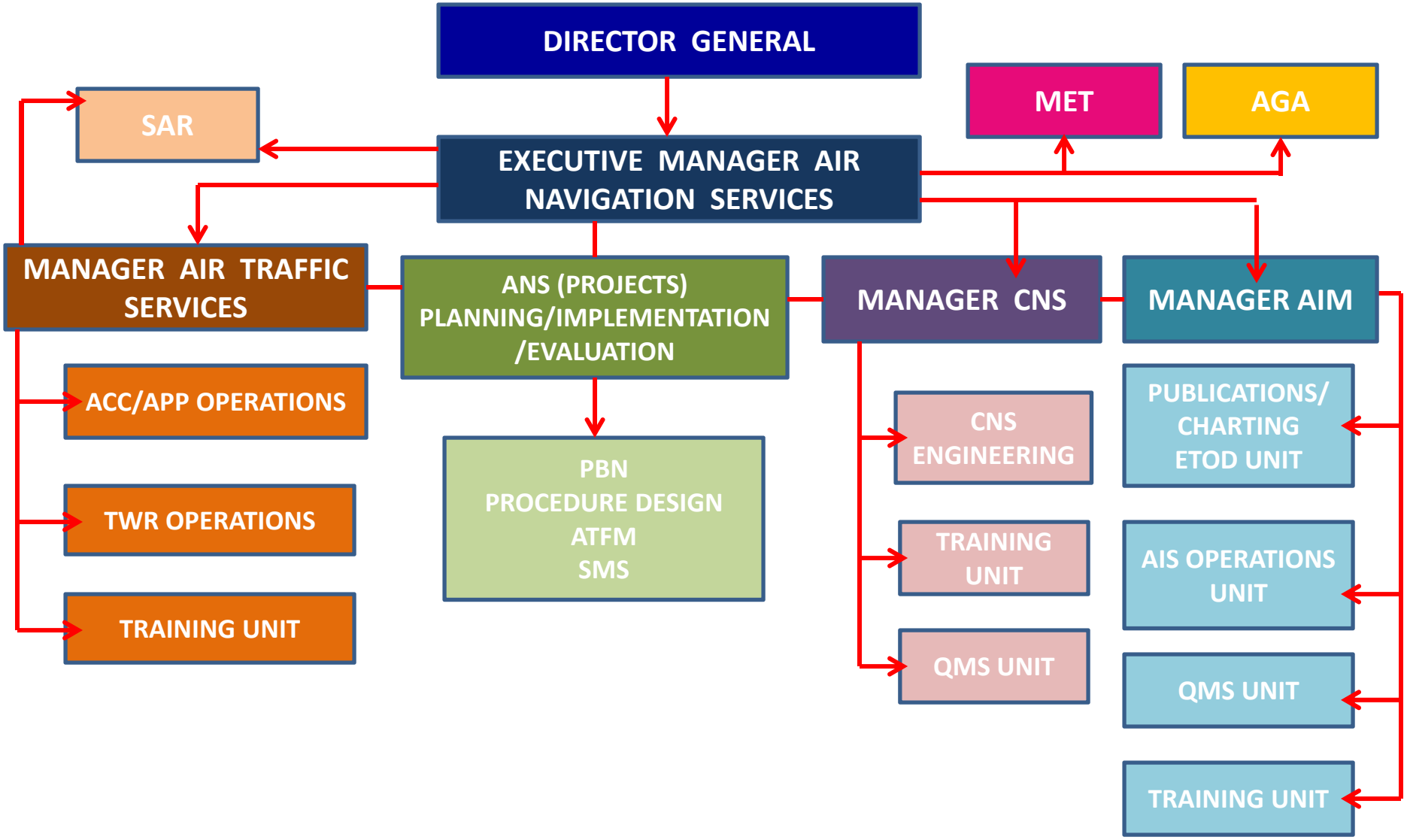
July 22-26, 2013

APPROVED ORGANISATIONAL STRUCTURE



NUMBER OF EMPLOYEES - 193

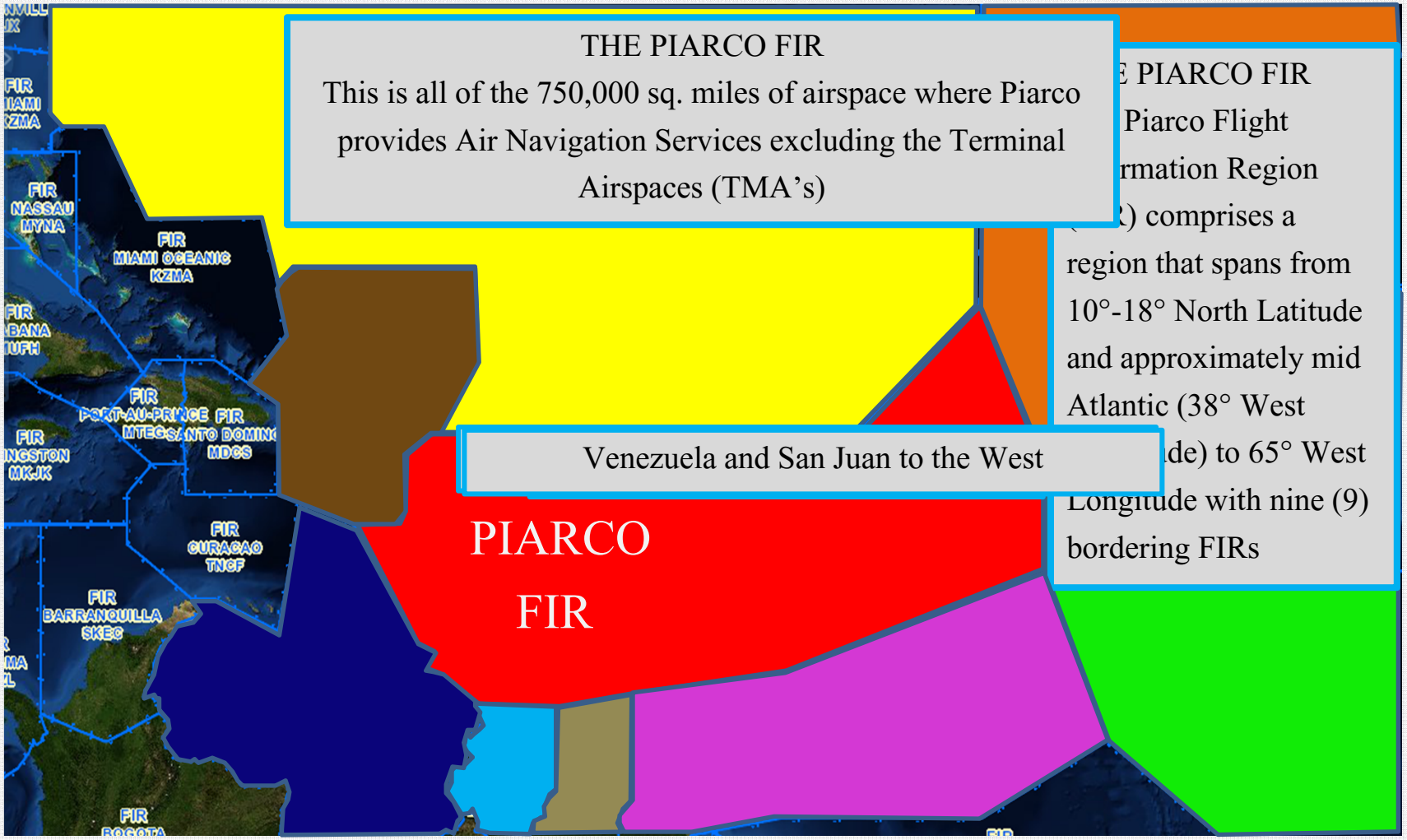
PROPOSED ANS STRUCTURE



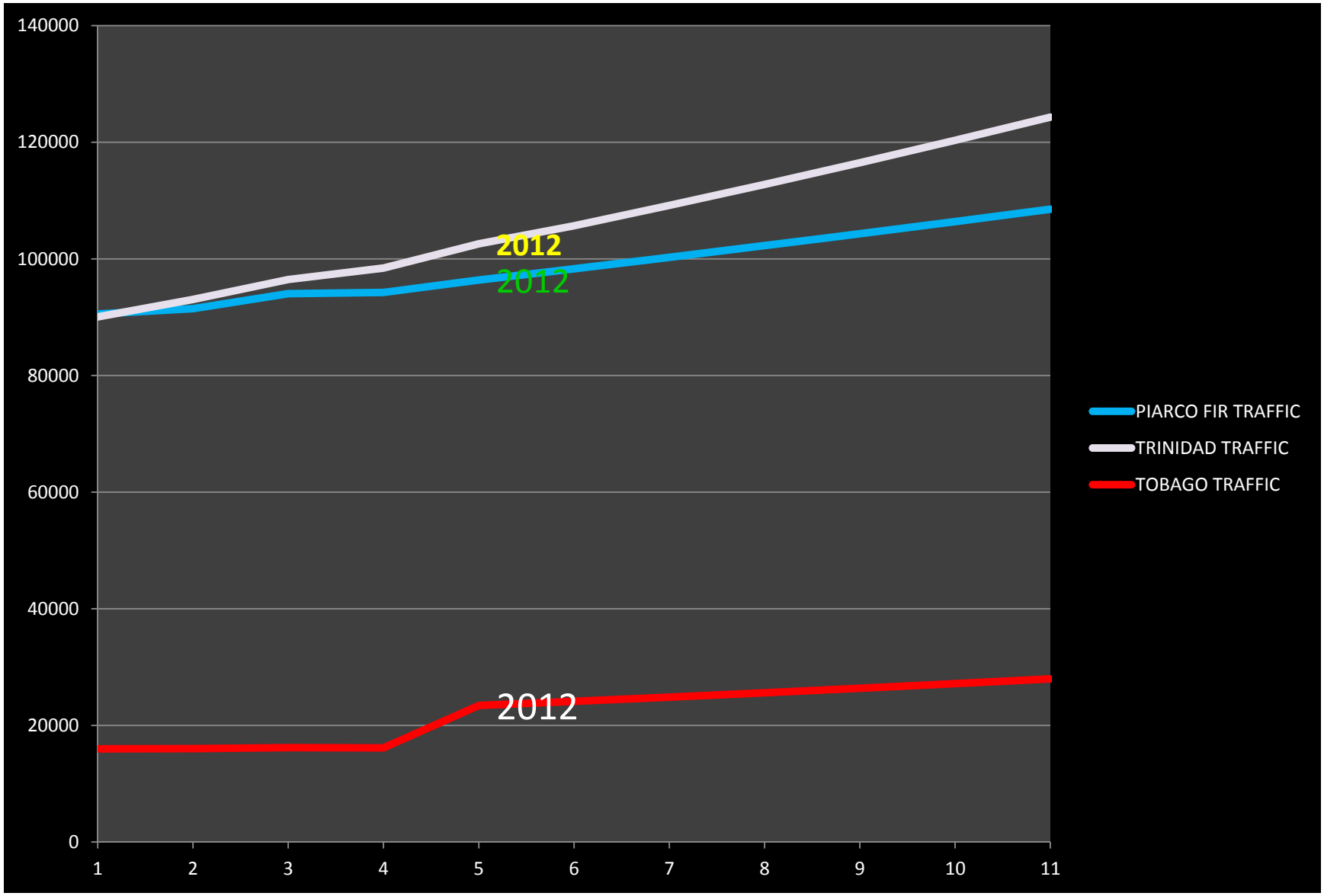
THE PIARCO FIR

REGIONAL LOCATION

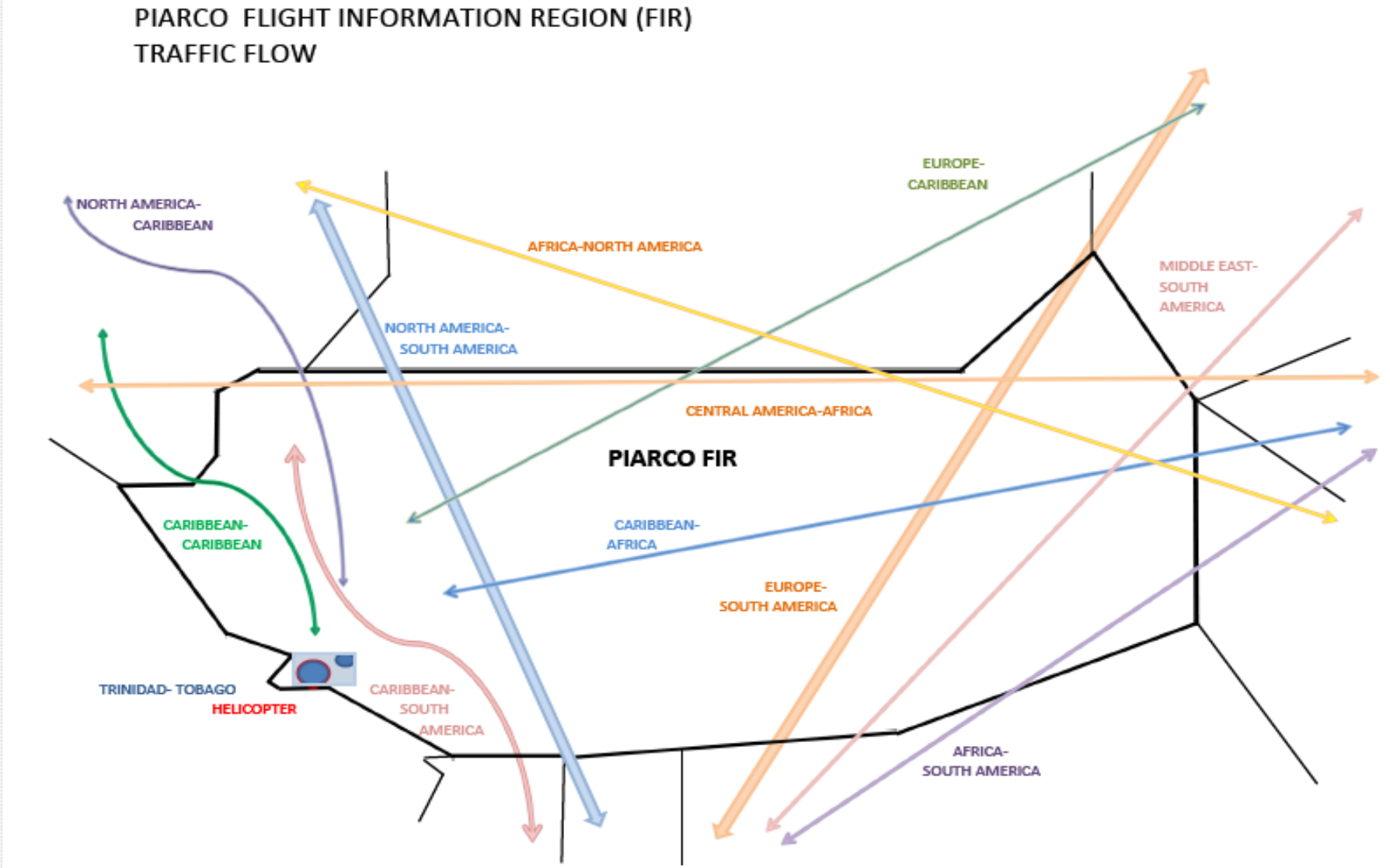
THE PIARCO FIR



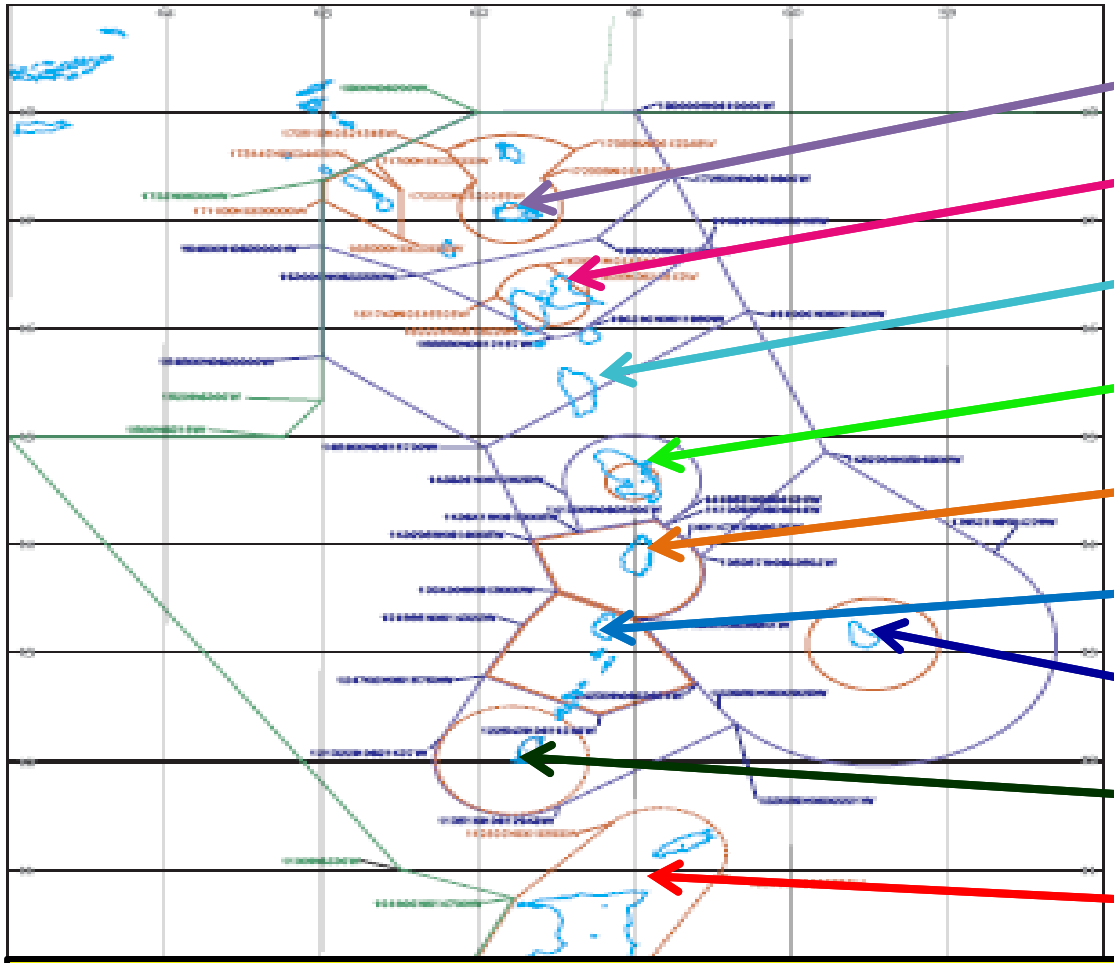
TRAFFIC GROWTH – NATIONAL AND PIARCO FIR



TRAFFIC FLOWS – PIARCO FIR



STATES WITHIN THE PIARCO FIR



- ANTIGUA
- GUADELOUPE
- DOMINICA
- MARTINIQUE
- ST. LUCIA
- ST. VINCENT AND THE GRENADINES
- BARBADOS
- GRENADA
- TRINIDAD AND TOBAGO

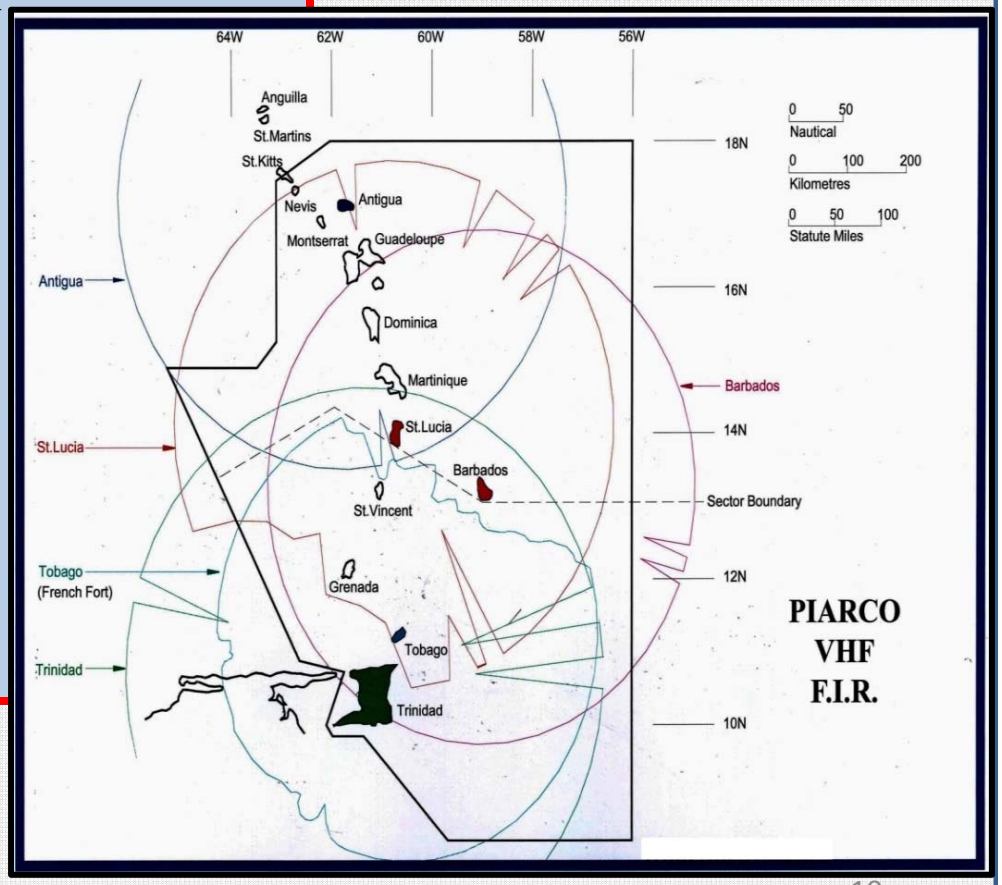
24 International Aerodromes

CNS INFRASTRUCTURE

COMMUNICATIONS

- High Frequency Single Side Band (AIRINC)
  - Trinidad and Tobago *(May 2011)*
- Flight Plan Processing System
- Eastern Caribbean Aeronautical Fixed Services (E/CAR AFS) Network
  - Eastern Caribbean *(Sept 2007)* Enhancement
  - Eastern Caribbean *(Feb 2012)* Replacement
- Aeronautical Fixed Telecommunication Network (AFTN) and Air Traffic Services Message Handling System (AMHS)
  - Eastern Caribbean – AFTN *(Aug 2005)*
  - Eastern Caribbean – AMHS *(October 2012)*
- Aeronautical Information Services System (AISS)
  - Eastern Caribbean *(March 2013)*

- AMS (VHF)
  - Eastern Caribbean (Oct 2010)
  - Five (5) New Air/ Ground Frequencies

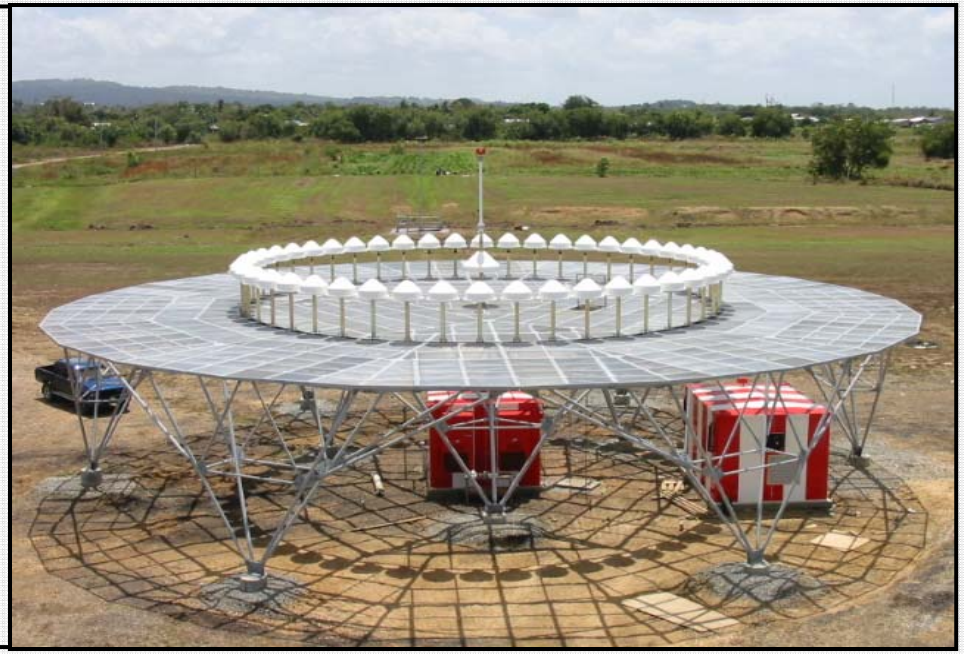


CNS INFRASTRUCTURE

NAVIGATION

To date Air Navigation Equipment and Facilities have been installed throughout the Eastern Caribbean

Trinidad and Tobago *(2007)*	NDB (Trinidad)
Trinidad and Tobago *(2007)*	NDB (Tobago)
Trinidad and Tobago *(2007)*	DME (Trinidad)
Trinidad and Tobago *(2007)*	DVOR (Trinidad)
Barbados (N/A)	DVOR(50%)
Dominica *(2007)*	NDB
Grenada (N/A)	DVOR & DME (50%)
St. Lucia *(2006)*	NDB



CNS INFRASTRUCTURE

SURVEILLANCE

RADAR Sharing:

- Guadeloupe *(June 2009)*
- Martinique *(June 2009)*
- Barbados *(April 2013)*
- Venezuela *(To Be Determined)*
- St. Maarten *(To Be Determined)*
- Suriname *(To Be Determined)*

RADAR

Trinidad and Tobago *(Dec 2010)*

Automatic Dependent Surveillance– Contract (ADS-C / CPDLC)

Controller Pilot Data Link Communication (CPDLC) *(APRIL 2013, Testing)*
ADS-C CPDLC (ARINC FANS 1/A)

Automatic Dependent Surveillance Broadcast – (ADS-B)

CHALLENGES

TECHNICAL	OPERATIONAL	ECONOMIC
Lack of CDM with all Stakeholders - making more efficient use of equipment (including within ANS/TTCAA-IT, Maintenance)	Lack of CDM with all Stakeholders - supporting operational requirements (including within ANS/TTCAA - Regulatory)	Lack of CDM with all Stakeholders - making investment/use of resources (including within ANS/TTCAA-Finance)
Lack of harmonisation between States in acquiring equipment	Lack of effective co-ordination between States in Airspace Development/Procedures	Lack of Funding for Equipment
	Meeting training requirements in all areas of ANS	Lack of Human Resource for Operations and Projects
Lack of sufficient redundancy to meet proper surveillance capability		Lack of Funding for Projects

CHALLENGES

TECHNICAL	OPERATIONAL	ECONOMIC
Difficulty in getting Stakeholders, Airports and Airlines to purchase equipment to support ANS initiatives	Difficulty in getting Stakeholders, Airports and Airlines to attend meetings to support operations	Difficulty in getting Stakeholders, Airports and Airlines to invest resources to support ICAO/ANS initiatives /projects
Lack of equipment to support QMS/SMS	Lack of procedures to support SMS	Lack of resources required for the implementation of SMS

STAKEHOLDER NEEDS/PERFORMANCE GAPS

STAKEHOLDER NEEDS	PERFORMANCE GAPS
INCREASED SAFETY:	ALL BELOW
Savings on Fuel	Lack of full implementation of PBN (Routes, SIDS, STARS,) CDOs, CCOs
Optimum Levels	Lack of surveillance in Oceanic Sector
Preferred Routes Flexible Use of Airspace	Lack of full implementation of PBN Routes Lack of surveillance in Oceanic Sector
Timely Operations	Lack of proper airport planning and infrastructure. ACDM
Airport accommodation (Gates, Runway, Taxiways	Lack of ACDM, Funding
More accurate MET Information system	Lack of MET Data Link Implementation of AWOS System

PERFORMANCE IMPROVEMENT AREA 1
Airport Operations

MODULE	CATEGORIZATION	PRIORITIZATION
B0-APTA Optimization of Approach Procedures including vertical guidance	**Trinidad and Tobago National ASBU Plan** **E** Target date Sept 2014	**HIGH** • Improve efficiency and safety of operations Both international airports currently have LNAV procedures for both RWY ends. Based on procedure design project, it is expected that by Sep 2014, they will be upgraded to LNAV/VNAV (APV).
	PIARCO FIR ASBU PLAN **N/A** Note: Each State within the Piarco Fir is responsible for producing its National plan. Based on responsibility for the FIR and to ensure harmonization for gate to gate operation, Trinidad and Tobago is coordinating with States Eg. CASSOS initiatives	**N/A**
B0-WAKE Increased Runway Throughput through Optimized Wake Turbulence Separation	**Trinidad and Tobago National ASBU Plan** **O**	**Not required** • At this time, traffic density and forecasts does not require expending resources into this module
	PIARCO FIR ASBU PLAN **N/A**	**N/A**
B0-RSEQ Improved Traffic Flow through Sequencing (AMAN/DMAN)	**Trinidad and Tobago National ASBU Plan** **S** Target date: Beyond 2016	**VERY LOW** • Current traffic density data suggests that this is not a high priority for implementation within the next 3 years
	PIARCO FIR ASBU PLAN **N/A**	**N/A**
B0-SURF Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	**Trinidad and Tobago National ASBU Plan** **O**	**Not Required** • At this time, traffic density and forecasts does not require expending resources into this module
	PIARCO FIR ASBU PLAN **N/A**	**N/A**
B0-ACDM Improved Airport Operations through Airport-CDM	**Trinidad and Tobago National ASBU Plan** **D** Target date: DEC 2016	**MEDIUM** • While overall traffic density is low to medium, there are periods during the day and also certain times of the year, when demand exceeds capacity. The TTCAA has already engaged in CDM discussions with the Airports Authority of Trinidad and Tobago, Aircraft operators and other stakeholders and is looking at increasing efforts in 2014
	PIARCO FIR ASBU PLAN **N/A**	**N/A**

PERFORMANCE IMPROVEMENT AREA 2
Globally Interoperable Systems and Data

MODULE	CATEGORIZATION	PRIORITIZATION
B0-FICE Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration	**Trinidad and Tobago National ASBU Plan** **E** Target date: DEC 2013	**HIGH** • Reduces controller workload in ACC improving Capacity, Safety, Efficiency Trinidad and Tobago's Automated System is capable of electronic coordination between ACC/APP/TWR. Some elements of this are already implemented and it is expected by DEC 2014, full implementation.
	PIARCO FIR ASBU PLAN **E** Target date: JAN 2015	**HIGH** • Reduces controller workload in ACC improving Capacity, Safety, Efficiency Trinidad and Tobago's Automated System is capable of AIDC/CPDLC. Procedures, Training of staff, LOA's are being worked on.
B0-DATM Service Improvement through Digital Aeronautical Information Management	**Trinidad and Tobago National ASBU Plan** **E** **PIARCO FIR ASBU PLAN** **E** Target dates: Electronic AIP - Implemented Digital NOTAMS - Software Acquired Testing to begin 2014	**HIGH** • Reduces AIM workload and increase safety and efficiency of operations Trinidad and Tobago has already acquired equipment (hardware and software) capable of digital processing and management of Information (use of aeronautical information exchange model (AIXM 5.1)) and has migrated to electronic aeronautical information publication (AIP) Trinidad and Tobago is also seeking to acquire software capable of managing an electronic terrain and obstacle database .
B0-AMET Meteorological information supporting enhanced operational efficiency and safety	**Trinidad and Tobago National ASBU Plan** **E** **PIARCO FIR ASBU PLAN** **E** Target dates: Weather information currently available to ground stations via internet Testing to be conducted with regard to use of data link to ACFT– June 2015	**HIGH** • Due to the prevalence of Tropical Storms in the Piarco FIR Region, it is considered necessary to develop this module so as to provide accurate, real time weather data to operators. Trinidad and Tobago's ATM system is capable of receiving and transmitting electronic meteorological data. Discussions between TTCAA and Trinidad and Tobago Meteorological Services have been taking place. TTMS is in the process of installing an Automated Weather Observing System (AWOS)

PERFORMANCE IMPROVEMENT AREA 3
Optimum Capacity and Flexible Flights

MODULE	CATEGORIZATION	PRIORITIZATION
B0-FRTO Improved Operations through Enhanced En-Route Trajectories	**Trinidad and Tobago National ASBU Plan** **N/A**	**N/A**
	PIARCO FIR ASBU PLAN **E** Target dates: JUN 2015	**HIGH** • Increase efficiency and reduce carbon emissions in this sector. A large portion of the East Oceanic Sector of the Piarco FIR already caters for flexible routing. Data is currently being analysed and a proposal is being drafted to allow for all of the Oceanic Airspace to operate based on the flexible routing concept.
B0-NOPS Improved Flow Performance through Planning based on a Network-Wide view	**Trinidad and Tobago National ASBU Plan** **S** Target date: Beyond 2016	**LOW** • Current traffic density data suggests that this is not a high priority for implementation within the next 3 years
	PIARCO FIR ASBU PLAN **D** Target date: DEC 2015	**MEDIUM** • While overall traffic density within the Piarco FIR is low to medium, there are periods during the year, when there are increases into some of the TMAs and the demand exceeds capacity. (Special events such as Carnival, Sporting events, etc.) • Also, during the hurricane season, there are times when Telecons are required to discuss airspace/routing closures. In the past TTCAA created a website to deal with CWC2007. Trinidad and Tobago does not require a sophisticated ATFM system and is looking at the possibility of using a web-based solution to fulfil the seasonal requirement.
B0-ASUR Initial Capability for Ground Surveillance	**Trinidad and Tobago National ASBU Plan** **O** **PIARCO FIR ASBU PLAN** **O**	**Not required at this time** • Ground traffic movements in the region are not great enough to warrant this.
B0-ASEP Air Traffic Situational Awareness (ATSA)	**Trinidad and Tobago National ASBU Plan** **O** **PIARCO FIR ASBU PLAN** **O**	**Not required at this time** • Requires ADSB-IN

PERFORMANCE IMPROVEMENT AREA 3
Optimum Capacity and Flexible Flights

B0-OPFL Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	Trinidad and Tobago National ASBU Plan **N/A**	**N/A**
	PIARCO FIR ASBU PLAN **O**	**Not required at this time** • Traffic density does not require it. • ADSB-IN required.
B0-ACAS ACAS Improvements	Trinidad and Tobago National ASBU Plan **S** Target date: DEC 2018	**MEDIUM** • Analysis is required with regard to the equipage status of aircraft operating within the region.
	PIARCO FIR ASBU PLAN **S** Target date: DEC 2018	**MEDIUM** • Analysis is required with regard to the equipage status of aircraft operating within the region.
B0-SNET Increased Effectiveness of Ground-based Safety Nets	Trinidad and Tobago National ASBU Plan **E** IMPLEMENTED	**HIGH** • Safety The ATM system at Piarco provides the ATCO with STCA, MSAW and APW. It is also capable of medium term detection conflict alerts.
	PIARCO FIR ASBU PLAN **E** IMPLEMENTED	

PERFORMANCE IMPROVEMENT AREA 4
Efficient Flight Path

MODULE	CATEGORIZATION	PRIORITIZATION
B0-CDO Improved Flexibility and Efficiency in Descent Profiles (CDO)	Trinidad and Tobago National ASBU Plan **E** Target date: SEP 2014	**HIGH** • Reduces carbon emissions, fuel burn and improves efficiency. Trinidad and Tobago is in discussion with airlines operating into Piarco Int. Airport in order to design CDOs. This will reduce carbon emissions, reduce fuel burn and improve efficiency. It is expected that by September 2014, PBN STARs will be developed for PIARCO and ANR Robinson Airport.
	PIARCO FIR ASBU PLAN **E** Target date: SEP 2014	**HIGH** • Reduces carbon emissions, fuel burn and improves efficiency. Trinidad and Tobago is in discussion with several States within the FIR in order to design PBN STARs and CDOs.
B0-TBO Improved Safety and Efficiency through the initial application of Data Link En-Route	Trinidad and Tobago National ASBU Plan **NA**	**NA**
	PIARCO FIR ASBU PLAN **E** Target dates: Testing - JAN 2014 Implementation – JAN 2015	**HIGH** • Reduces ATCO workload, increases safety and capacity. Trinidad and Tobago's Automated System is capable of ADSC/CPDLC. Testing of CPDLC is scheduled to begin in 2014. Procedures, Training of staff, LOA's are being worked on.
B0-CCO Improved Flexibility and Efficiency in Departure Profiles - Continuous Climb Operations (CCO)	Trinidad and Tobago National ASBU Plan **E** Target date: SEP 2014	**HIGH** • Reduces carbon emissions, fuel burn and improves efficiency. It is expected that by September 2014, PBN SIDs will be developed for PIARCO and ANR Robinson Airport.
	PIARCO FIR ASBU PLAN **E** Target date: SEP 2014	**HIGH** • Reduces carbon emissions, fuel burn and improves efficiency. Trinidad and Tobago is in discussion with several States within the FIR in order to design PBN SIDs and CDOs.

AIR NAVIGATION REPORT FORM (ANRF)
Trinidad and Tobago National Planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-65/APTA: Optimization of Approach Procedures Including Vertical Guidance Performance Improvement Area 1: Airport Operations					
3. ASBU B0-65/APTA: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	Y	Y	Y	Y	Y

4. ASBU B0-65/APTA: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. APV with Baro VNAV	• April 2012 - Trinidad and Tobago trained personnel in Basic PANSOPS • September 2012 – Trinidad and Tobago received FPDAM Software and initial training • August 2013 – ETOD survey of TTPP and TTCP • August 2013 – Trinidad and Tobago will send personnel on IFPD internship • September 2014 – Validated procedures for all RWYs at TTPP and TTCP
2. LNAV	• Already implemented for all RWYs at TTPP and TTCP

7. ASBU B0-65/APTA: Implementation Challenges					
Elements	Implementation Area				
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
1. APV with Baro VNAV	NIL	Currently only 65% of ACFT equipped.	Lack of trained personnel Cost of surveys and training is very high	Regulatory section needs training in this area
2. LNAV	NIL	NIL	NIL	NIL

8. ASBU B0-65/APTA: Performance Monitoring and Measurement 8A. B0-65/APTA: Implementation Monitoring	
Elements	Performance Indicators/Supporting Metrics
1. APV with Baro VNAV	Percentage of international aerodromes having instrument runways provided with APV with Baro VNAV procedure implemented = 0% Number of international airports having approved APV with Baro VNAV procedure implemented = 0
2. LNAV	Percentage of international aerodromes having instrument runways provided with LNAV procedure implemented = 100% Number of international airports having approved LNAV procedure implemented = 2

ASBU B0-65/APTA: Performance Monitoring and Measurement 8 B. ASBU B0-65/APTA: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Greater accesibility for RWY 28 at Piarco and RWY 29 at TTCP
Capacity	Significant improvements to capacity when RWY 28 (TTPP) and RWY 29 (TTCP) are being used
Efficiency	Major improvements expected in terms of more efficient approach path. Less chance of missed approach. During bad weather.
Environment	Reduced emissions due to reduced fuel burn. Noise reduction in case of RWY 28 operation in TTPP.
Safety	Increased safety through stabilized approach paths.

AIR NAVIGATION REPORT FORM (ANRF)
Piarco FIR Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-40/TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route Performance Improvement Area4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-40/TBO : Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	N	Y	Y	Y	Y

4. ASBU B0-40/TBO: Planning Targets and Implementation Progress	
5. Elements	6. Targets and implementation progress (Ground and Air)
1. ADS-C over oceanic and remote areas	• JULY 2012 – New Piarco ATM SYSTEM with ADS-C/CPDLC capabilities in use • First Quarter 2013 – Successful testing of ADS-C • MARCH - OCTOBER 2014 – Training for ATCOS • January 2015 – Implementation of ADS-C in Oceanic sector
2. Continental CPDLC	• JULY 2012 – New Piarco ATM SYSTEM with ADS-C/CPDLC capabilities in use • Last Quarter 2013 –Testing of CPDLC • MARCH - OCTOBER 2014 – Training for ATCOS • January 2015 – Implementation of CPDLC (for acft so equipped) in Continental sector

AIR NAVIGATION REPORT FORM (ANRF)
Piarco FIR Planning for ASBU Modules

4. ASBU B0-40/TBO: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. ADS-C over oceanic and remote areas	• JULY 2012 – New Piarco ATM SYSTEM with ADS-C/CPDLC capabilities in use • First Quarter 2013 – Successful testing of ADS-C • First Quarter 2014 – Operational Procedures to be finalized • MARCH - OCTOBER 2014 – Training for ATCOS • January 2015 – Implementation of ADS-C in Oceanic sector
2. Continental CPDLC	• JULY 2012 – New Piarco ATM SYSTEM with ADS-C/CPDLC capabilities in use • Last Quarter 2013 –Testing of CPDLC • First Quarter 2014 – Operational Procedures to be finalized • MARCH - OCTOBER 2014 – Training for ATCOS • January 2015 – Implementation of CPDLC (for acft so equipped) in Continental sector

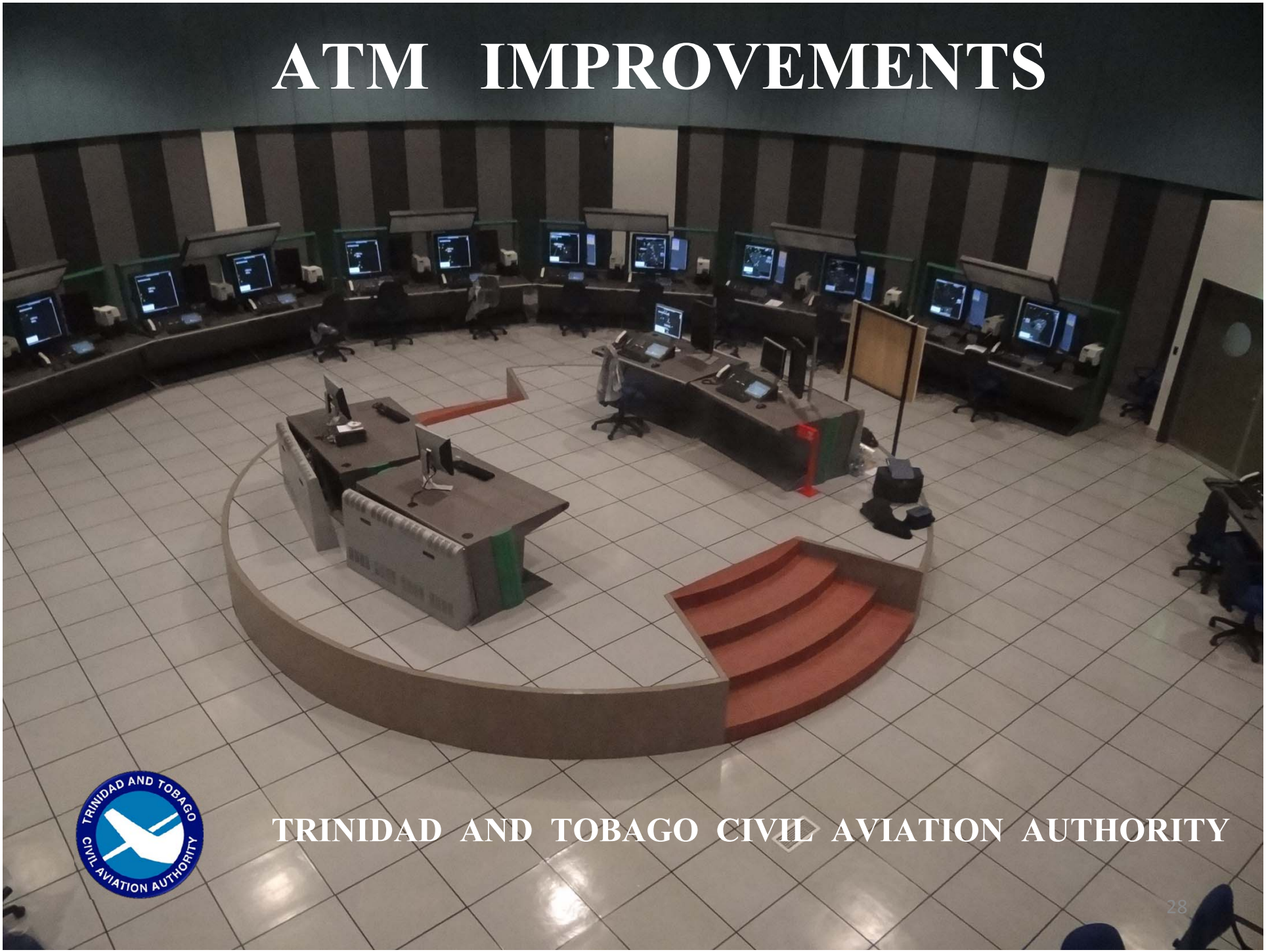
AIR NAVIGATION REPORT FORM (ANRF)
Piarco FIR Planning for ASBU Modules

7. ASBU B0-40/TBO: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. ADS-C over oceanic and remote areas	Some testing of CPDLC still required in ATM system	Only 80% of ACFT in Oceanic Sector ADSC equipped Although ACFT equipped, Crew not trained Coordination of "live testing" has proved difficult	Local Operating Procedures still being drafted ATCO Training required	Lack of duly trained inspectors for operational approval
2. Continental CPDLC	Some testing of CPDLC still required in ATM system	Less than 50% of ACFT operating in Continental sector are CPDLC equipped	Local Operating Procedures still being drafted ATCO Training required pending	Lack of duly trained inspectors for operational approval

8. ASBU B0-40/TBO: Performance Monitoring and Measurement 8A. ASBU B0-40/TBO: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. ADS-C over oceanic and remote areas	Percentage of FIRs with ADS C implemented = 0% Number of ADS C approved procedures over oceanic and remote areas = 0
2. Continental CPDLC	Percentage of CPDLC implemented in Continental sector = 0% Number of CPDLC approved procedures over continental areas = 0

8. ASBU B0-40/TBO: Performance Monitoring and Measurement 8 B. ASBU B0-40/TBO: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	Reduced Communication (especially in delivery of Oceanic Clearances) will greatly reduce ATCO workload, leading to increased capacity. Possibility of use of RNP 4 will bring increased capacity as well.
Efficiency	Routes/tracks and flights can be separated by reduced minima, allowing to apply flexible routings and vertical profiles closer to the user-preferred ones
Environment	Reduced emissions as a result of reduced fuel burn
Safety	ADS-C based safety nets supports cleared level adherence monitoring, route adherence monitoring, danger area infringement warning and improved search and rescue. Reduced occurrences of misunderstandings; solution to stuck microphone situations.

ATM IMPROVEMENTS



TRINIDAD AND TOBAGO CIVIL AVIATION AUTHORITY

INTEGRATING THE CARIBBEAN


TRINIDAD AND TOBAGO
CIVIL AVIATION AUTHORITY
Safe Skies For All