Evolution of the United States Automated Data Exchange (ADE) Interfaces within the North American, Central American and Caribbean (NACC) Region – 2018 Update

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Presented To: NAM/CAR/SAM Regions Air Traffic Services Inter-Facility Data Communication (AIDC) Implementation Meeting

By: Dan Eaves, FAA Mission Support - En Route Requirements and Validations

Introduction

- The FAA provides air navigation services to over 29 million miles of domestic and international airspace with approximately 43 million aircraft handled annually.

- Operations across international boundaries can be based on domestic en route radar separation procedures, as is the case along most of the U.S. border with Canada, Mexico, Cuba and the Caribbean.

- Oceanic operations within international airspace and international boundaries can be based on non-radar procedural or Automatic Dependent Surveillance (ADS) separation, such as the oceanic operations at New York, Oakland and Anchorage Centers.

ATS Interfacilty Data Communication (AIDC)

- The ATS Interfacilty Data Communication (AIDC) NAM ICD Version 'E' document addresses messages exchanged between Air Navigation Service Providers (ANSP) or Area Control Centers (ACCs) for IFR aircraft. Within the NAM ICD, ATC operations units forward from unit to unit, as the flight progresses, necessary flight plan and control information. NAM ICD usage supports the **Notification, Coordination, Transfer of Control phases** outlined within the ICAO Doc. 4444, Pan Regional Interface Control Document (PAN ICD) for ATS Interfacility Data Communications and (AIDC) ICAO Doc 9694-AN/955 Manual of Air Traffic Services Data Link Applications.

- The described functionality is adept at supporting radar/surveilance and mixed domestic transition environments. The traditional AIDC message set is more attuned to oceanic operations where more controller interaction is required. In most NAM interoperability environments, radar is the operational norm and non-radar the exception. Radar handoff culminates the NAM ICD process in achieving voiceless automated data exchange across international boundaries.
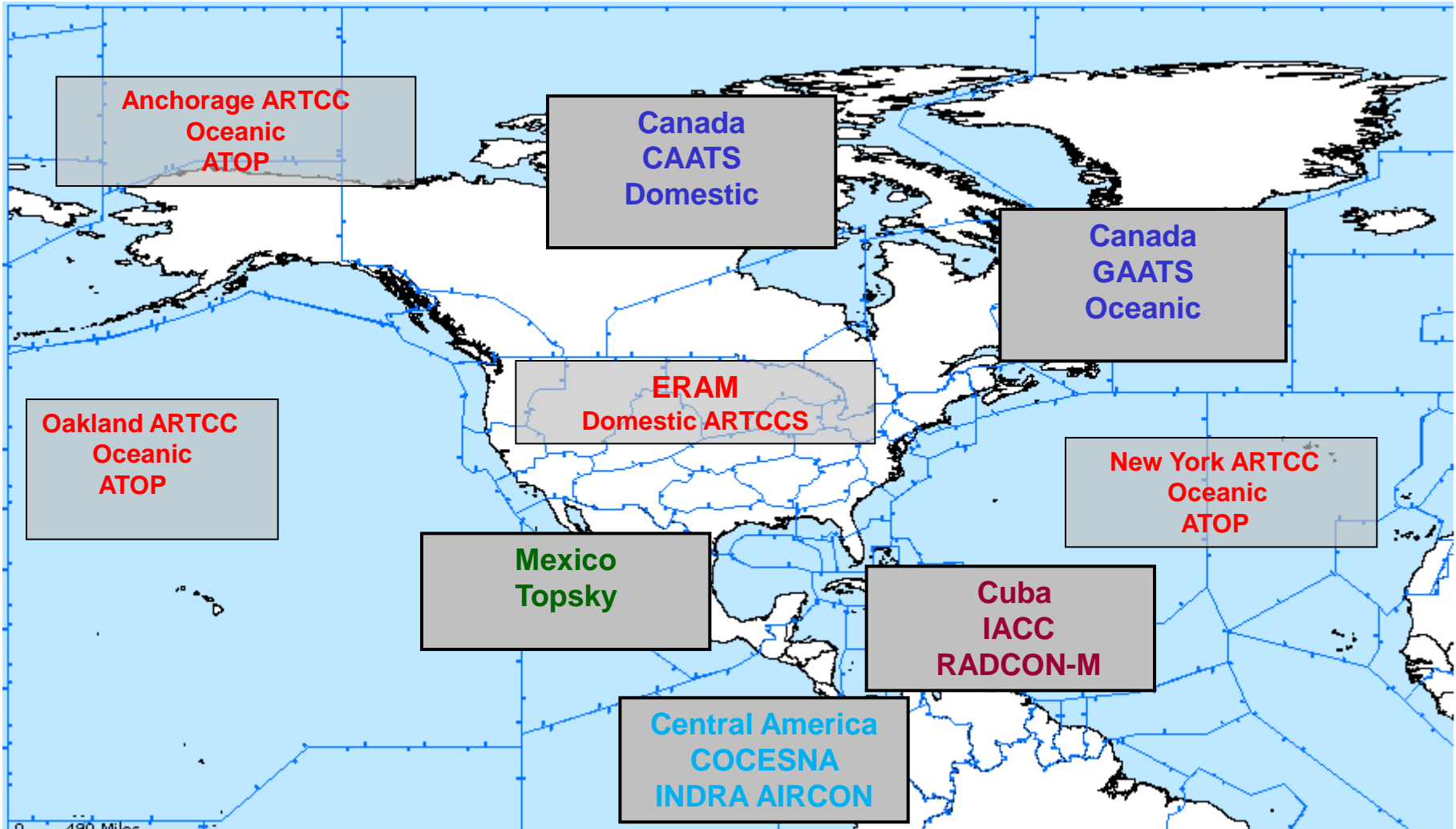
Outline

- US International Automation Interface Initiatives

- Ongoing ICAO North American, Central American and Caribbean (NACC) Regional interface activities

- Infrastructure Automation Progress

NACC En Route/Oceanic Operational Automation

NACC AIDC - ATS Interfacilty Data Communication (AIDC)

- In the North American, Central American and Caribbean (NACC) Region **AIDC and NAM protocols** are used in AIDC Technology interfaces. **NAM supports radar handoffs**.
- AIDC protocol is only used in 1 US **NACC Oceanic interface Oakland ATOP – Mazatlán ACC**

Automated International Boundaries

Interface Key
- NAM (black)
- AIDC (green)
- NAS (blue)

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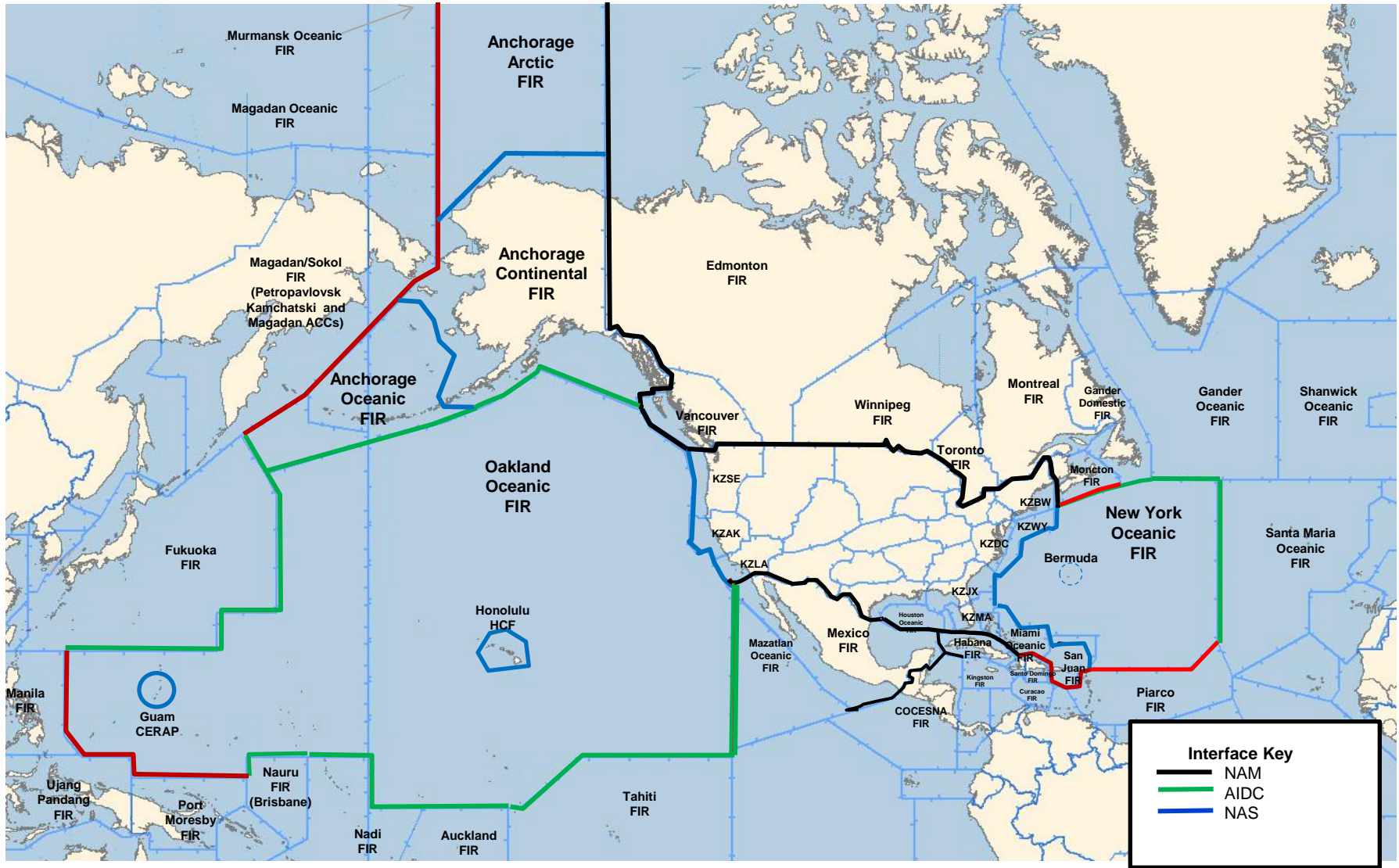
Working the Automation Interfaces

- In 2015 Oakland Oceanic's ATOP was interfaced with the Vancouver CAATS making it the first ATOP NAM ICD Class 2 interface.

- In 2015 Oakland Oceanic's ATOP was interfaced with the Mazatlan ACC Topsky system using the AIDC protocol.

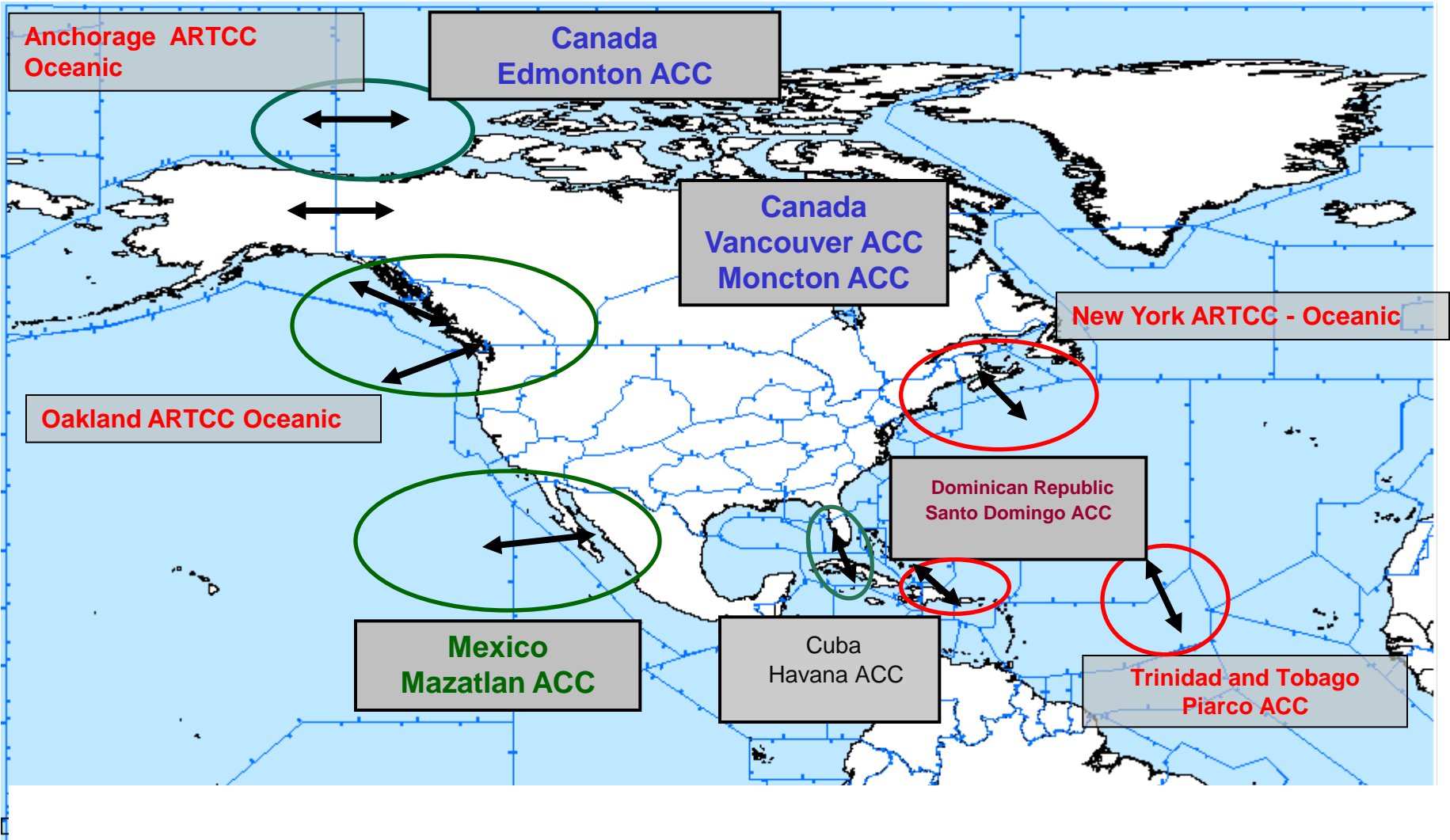- NAM ICD Interface between Dominican Republic and Miami ARTCC scheduled for 2018 testing

Working the Automation Interfaces

- The Interface between Havana – Miami is being up levelled on the Cuba with their new automation system to Class 2 with testing expected to begin Spring 2018

- The US and Canada are also working the interface of New York Oceanic's ATOP with Moncton ACC CAATS using the NAM ICD protocol. Software upgrade in spring 2018 to support the interface.

- New York Oceanic is also working toward implementing an AIDC interface with Piarco ACC. San Juan and New York Oceanic have borders with Piarco. Currently on hold.

# 2018 US Interface Initiatives
En Route/Oceanic Systems

Anchorage ARTCC Oceanic

Canada
Edmonton ACC

Canada
Vancouver ACC
Moncton ACC

New York ARTCC - Oceanic

Oakland ARTCC Oceanic

Dominican Republic
Santo Domingo ACC

Mexico
Mazatlan ACC

Cuba
Havana ACC

Trinidad and Tobago
Piarco ACC

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Annual US – NACC FIR Border Crossings

FIRs	Traffic	Notes
Canada	2,400,000	6 FIRs
Mexico	410,000	3 FIRs
Habana	245,000	ZMA
Santo Domingo	171,000	ZMA & ZSU
Piarco	82,000	ZNY & ZSU
Maiquetia	13,000	ZSU
Curacao	6,900	ZSU

NAM U.S. Automated Interfaces
Canada , Mexico and Cuba
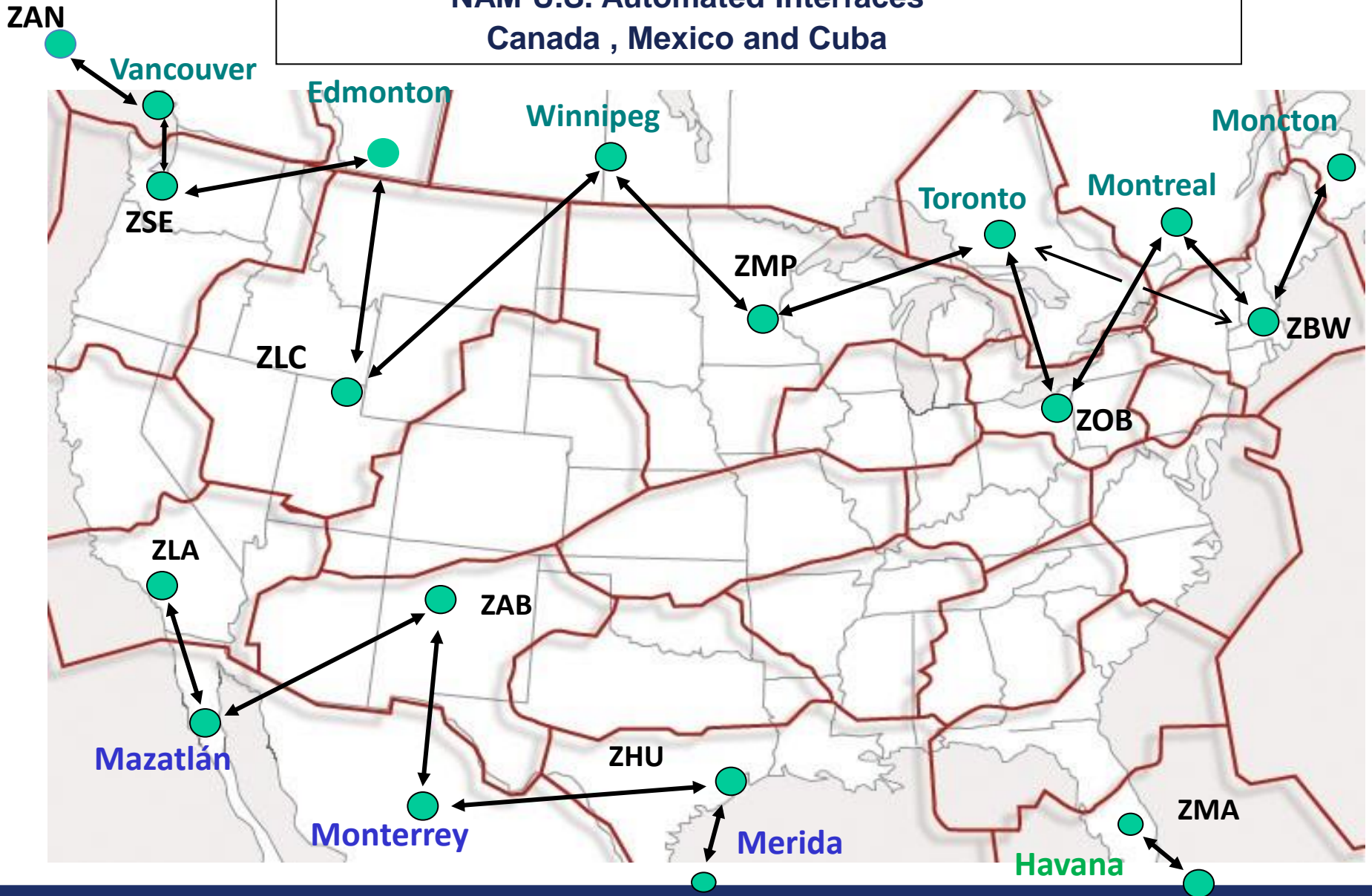
US Automated Interfaces

- US Operational Interfaces within NACC (green shading) totals indicated; 21 NAM and 2 AIDC

Neighboring FIR	Operational Interfaces	NAM	AIDC	Pending
Canada FIRs	16	15	1	1
Mexico FIRs	6	5	1	
Habana_FIR	1	1		
Japan_FIR	2		2	
Santo Domingo_FIR				1
Piarco_FIR				1
Santa Maria_FIR	1		1	
Port Au Prince_FIR				
Russia_FIR				
Maiquetia_FIR				
Port_Moresby_FIR				
Auckland_Oceanic_FIR	1		1	
Curacao_FIR				
Manila_FIR				
Nadi_FIR	1		1	
Tahiti_FIR	1		1	
Nauru_FIR	1		1	
Ujung_Pandang_FIR				
*Note: Anchorage and Oakland have an AIDC connection	1		1	
Grand Total	**31**	**21**	**10**	**3**

Today Automated Data Exchange Using NAM ICD

Tomorrow 'Voiceless' Automated Data Exchange Using NAM ICD

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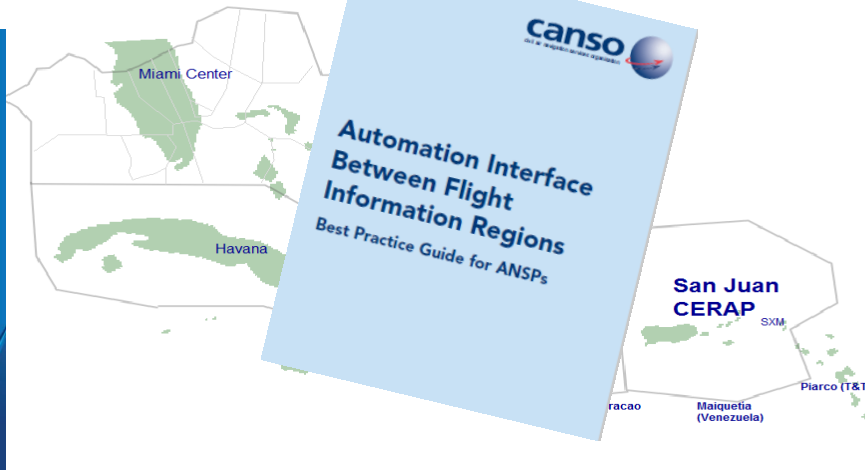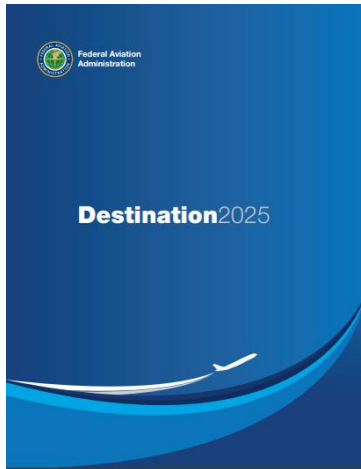
North America – Caribbean
NAM ICD
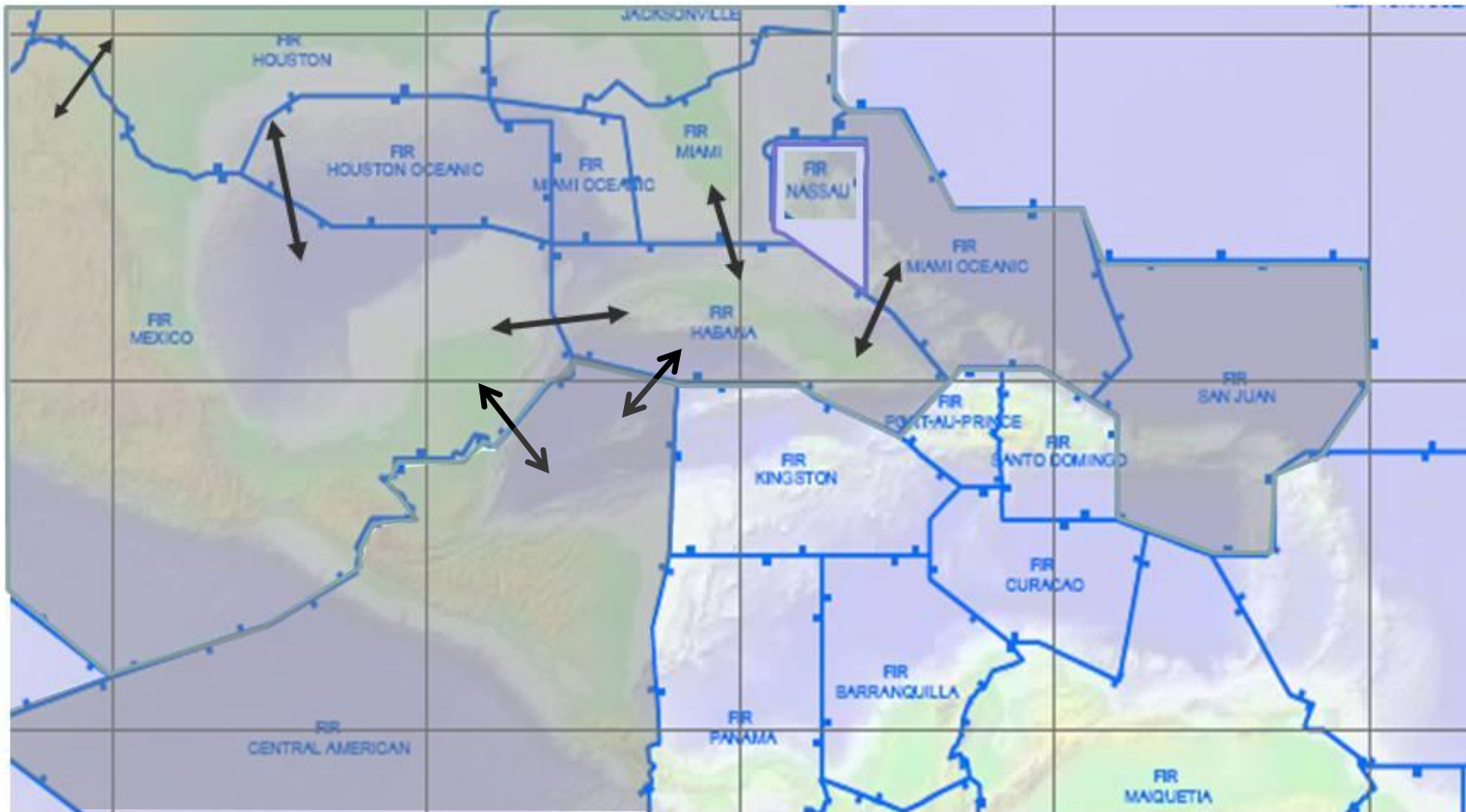
North American Common Interface Control Document (NAM ICD)

- NAM ICD Automated Data Exchange has been implemented between 5 member states and 23 NACC FIRs to include US, Mexico, Canada, Cuba and Honduras (COSESNA) .Operational NAM ICD Interfaces Include:

  - **Canada – US   14**
    - North America Domestic 11
    - Anchorage   2
    - Oakland Oceanic (ATOP) - Vancouver ACC 1
    - New York Oceanic (ATOP) – Moncton ACC (Pending 2018)
  - **Mexico - 7**
    - US   5
    - Cuba   1
    - COCESNA 1
  - **Cuba – 3**
    - US   1
    - Mexico (Merida) 1
    - COCESNA 1

Infrastructure Automation Evolution

Two trans-border Automation interface Initiatives are ongoing with the United States

- **Eastern Regional Task Group (ERTG) Caribbean Initiative**

- **NAM ICD Class 3 Handoff between US & Canada**

Eastern Regional Task Group:
Recommendations to Improve
Operations in the Caribbean

North American (NAM) Common Coordination
Interface Control Document (ICD)

Area Control Center (ACC) to ACC

NAS –IC – 21009205
Revision E
15 April 2016

North American, Central American and Caribbean Automation Systems Interface
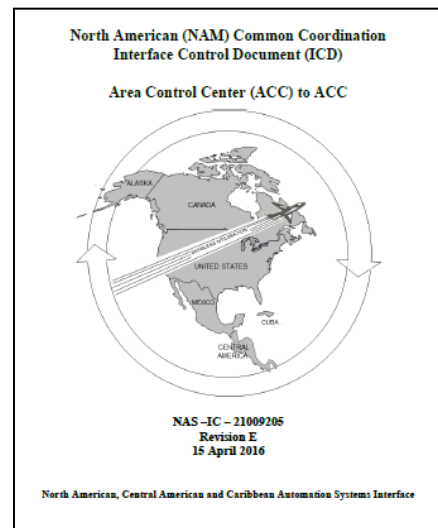
Projected Growth

- FAA Performance Analysis Group projects ZMA only Center projected to grow by 2019

- ZSU expectations are similar

- *Source: FAA AJR-G Five Year Projection (FYRP) for the NAS*

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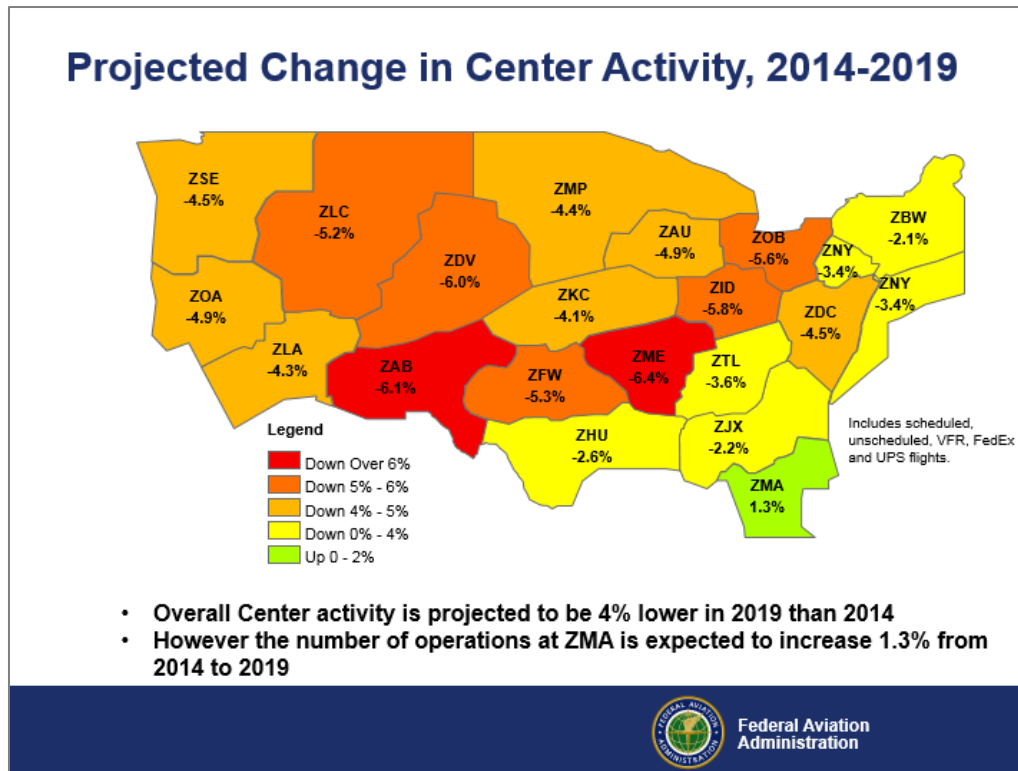
Background to ERTG Tasking

- Ongoing stakeholder concern regarding safety and operational performance in the Caribbean

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Eastern Regional Task Group (ERTG) Infrastructure: Automation

Recommendations

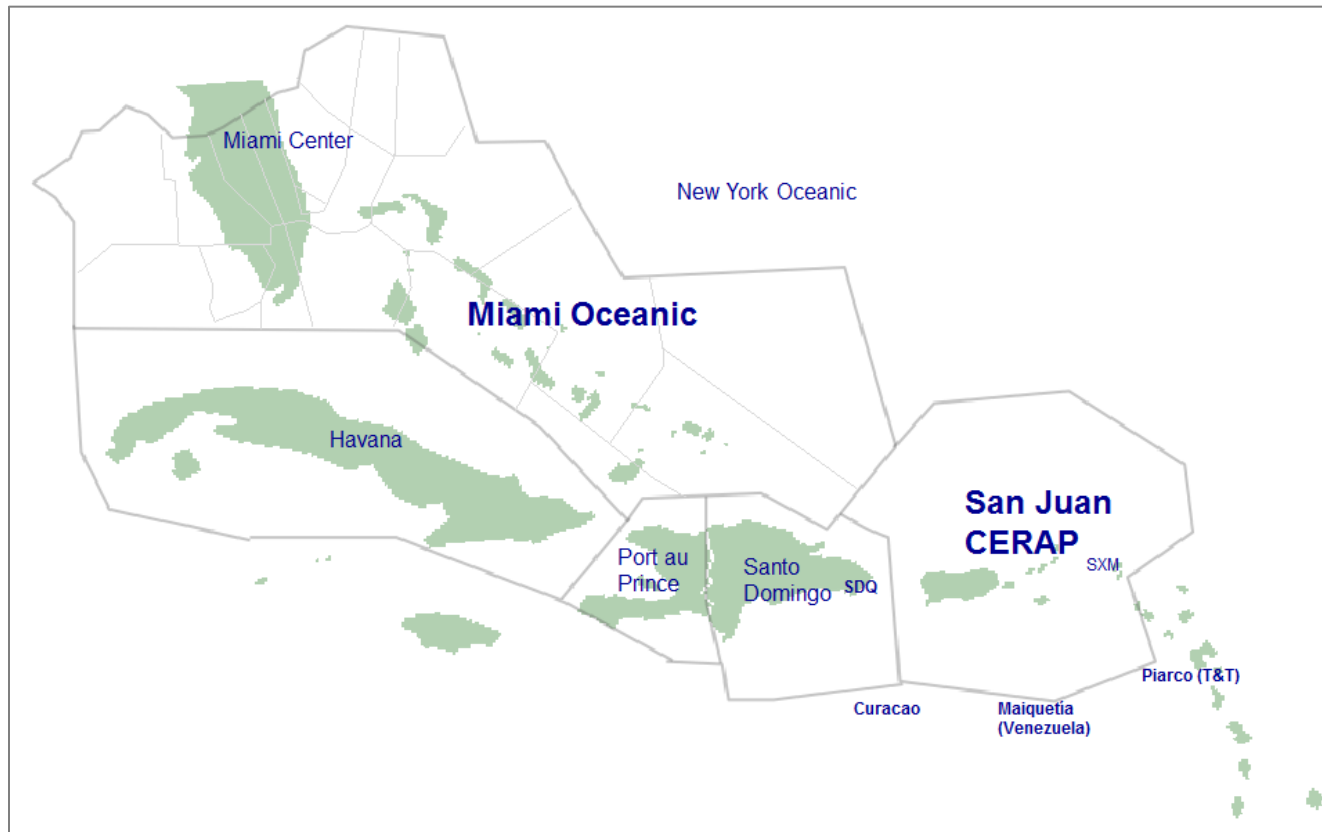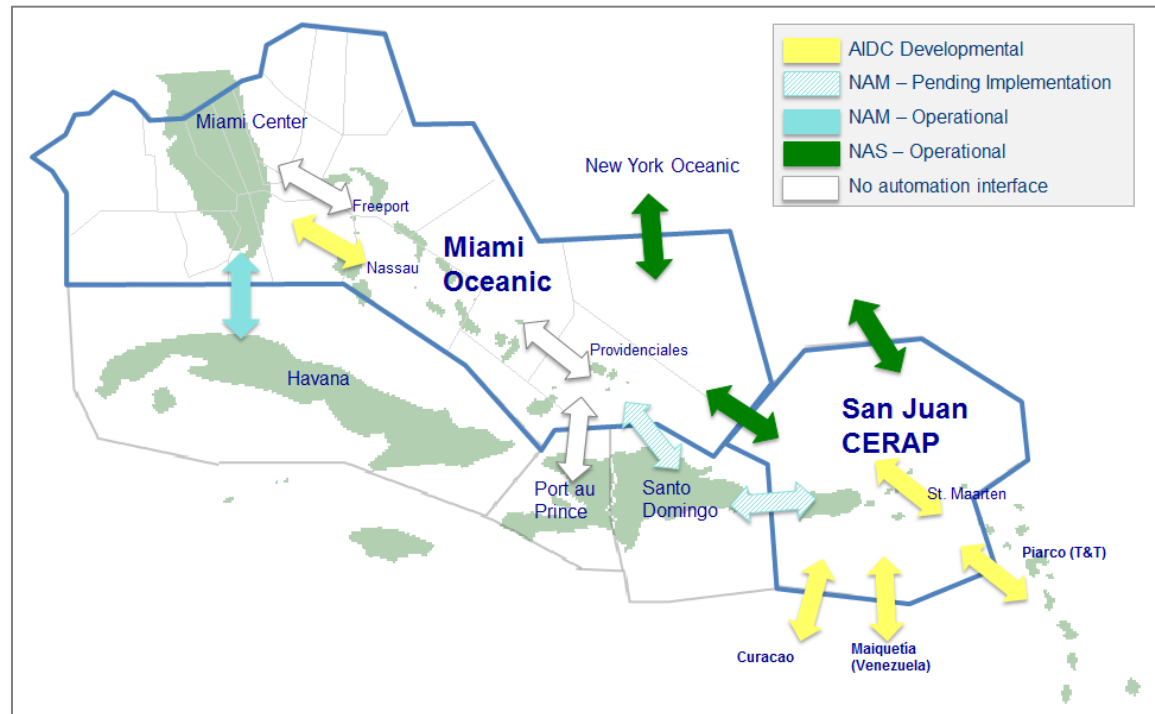- Regional Implementation of Automation:
  - Continue implementation of ADE with Santo Domingo
  - Explore software translation for neighboring facilities with AIDC protocol
  - Ensure ERAM software upgrades associated with ADE stay on schedule
- Implement Independent Flight Data Processing in ZSU

Automation Interface Protocols between/within NAS and Foreign Facilities in Caribbean

Legend:
- AIDC Developmental
- NAM – Pending Implementation
- NAM – Operational
- NAS – Operational
- No automation interface

Map labels: Miami Center, Freeport, Nassau, Miami Oceanic, New York Oceanic, Havana, Providenciales, Port au Prince, Santo Domingo, San Juan CERAP, St. Maarten, Piarco (T&T), Curacao, Maiquetía (Venezuela)

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RTCA Eastern Regional Task Group's recommendation for an integrated redesign of ZMA and ZSU airspace
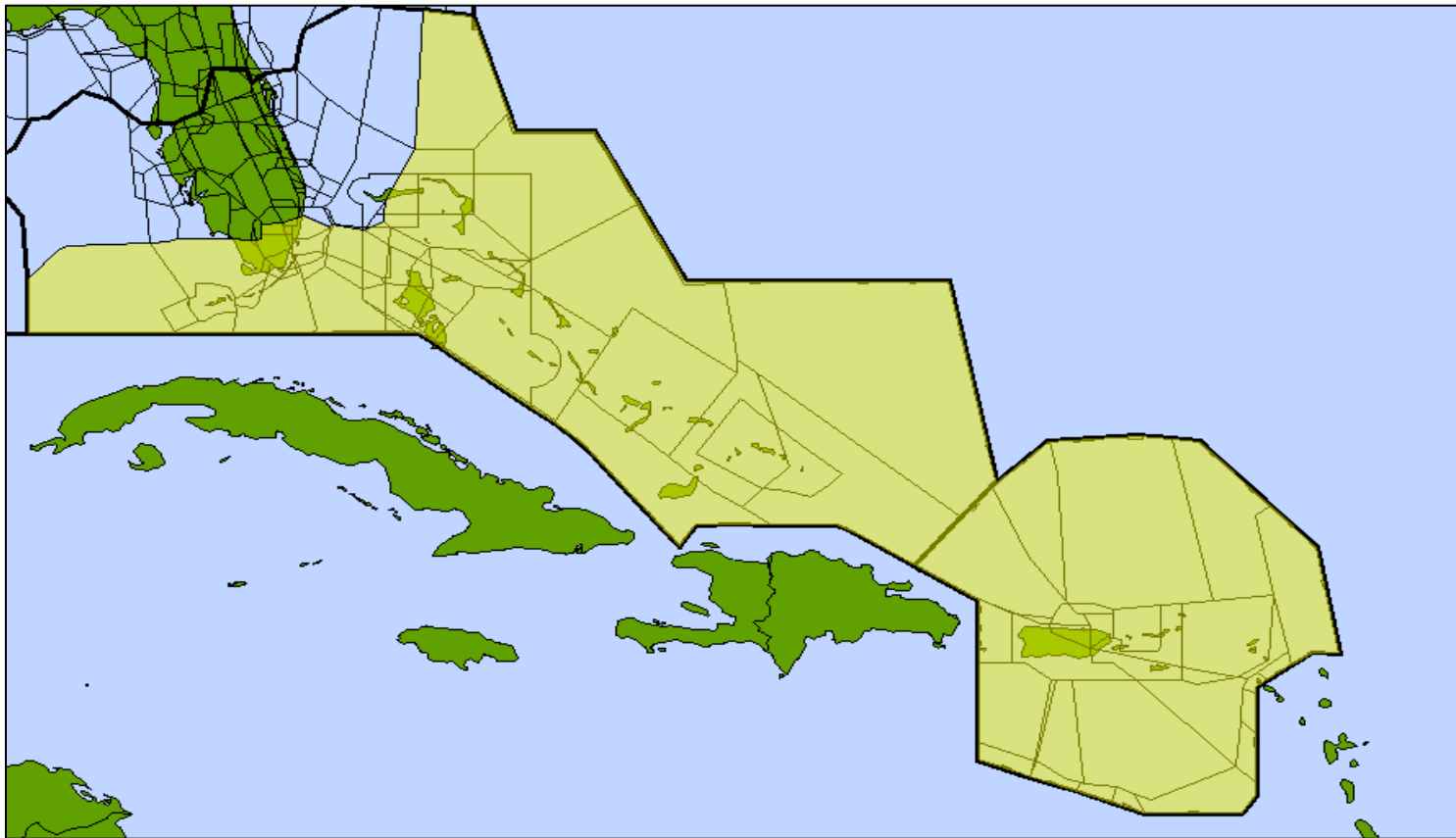
ZMA / ZSU Offshore Airspace Study Area

US - Canada Cross Border Handoff

- Since NAM ICD handoff model was taken from US domestic capability , US – Canada was scheduled to partner for development of the technical cross border solution

- Ongoing Technical Interchange Meetings (TIMs) are defining how each system will process the handoff messages and the international communications infrastructure design

- 2017/18 Meetings have included multiple telecons and face to face meetings in:
    FAA HQ Washington DC

    NAV CANADA HQ Ottawa, Ontario

- The timeline for handoff implementation defines engineering tasks in 2018, software development in 2019 and implementation in 2020

NAM ICD Message Classes Overview

- Class 1 Capabilities
    - Active flight plans for IFR Flights (via CPL)
    - Proposed flight plans for IFR flights (via FPL) – where agreed between ANSPs
    - Logic Accept Message (LAM)

- Class 2 Capabilities
    - Filed flight plans for IFR flights (via FPL and EST)
    - Modifications to CPL/FPLs that were activated by an EST (via MOD)
    - Modification of an FPL (via CHG)
    - Cancellation of CPL/FPLs (via CNL)
    - Logic Reject Message (LRM)

- **Class 3 Capabilities**
    - **Radar Handoff (via RTI, RTU, RTA, RLA)**
    - **Point Outs (via POI, POA, POJ)**
    - **Application Status Message (new ASM message)**
    - **Interface Management Messages**

Handoff Development – NAM ICD Tip of the Iceberg

- What, Where, How and Why represents the bulk of the adaptation and processing of handoff functionality
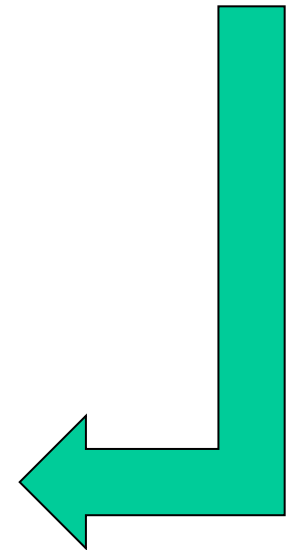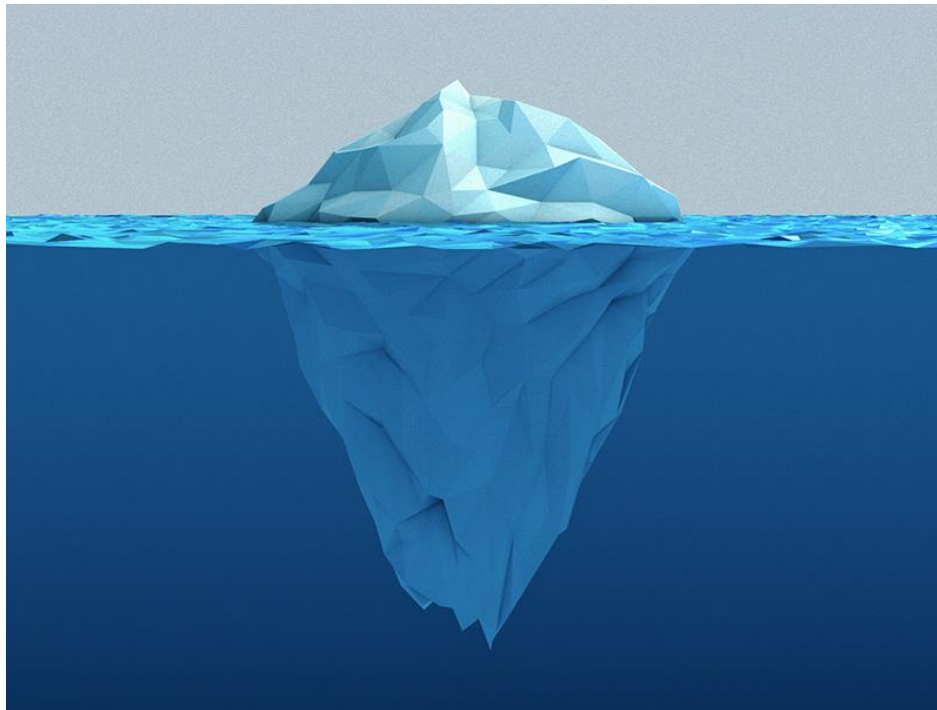
Handoff Developmental Interest Items

- NAM Telecommunication - <u>Direct Connectivity Required</u>
  - Due to real time track messaging per NAM ICD

- NAM ICD Messages should be software selectable to maintain capability flexibility with adjacent ANSPs

- First Order Dependency of Interface Messages
  - CPL Success Required/ FPL-EST Success Required

- US – Canada NAM ICD Boundary Agreement to capture specific handoff technical and procedural usage items; derived lessons learned

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Handoff - First Order Dependency of Interface Messages

CPL Success Required

CPL ➡️ ⬅️ LAM

ANSP1 | **ANSP2**

For Voiceless Automation Handoff

RTI - RLA - RTU - RTA – LAM
or **LRM** or **LRM**

FPL-EST Success Required

FPL ➡️ ⬅️ LAM EST ➡️ ⬅️ LAM

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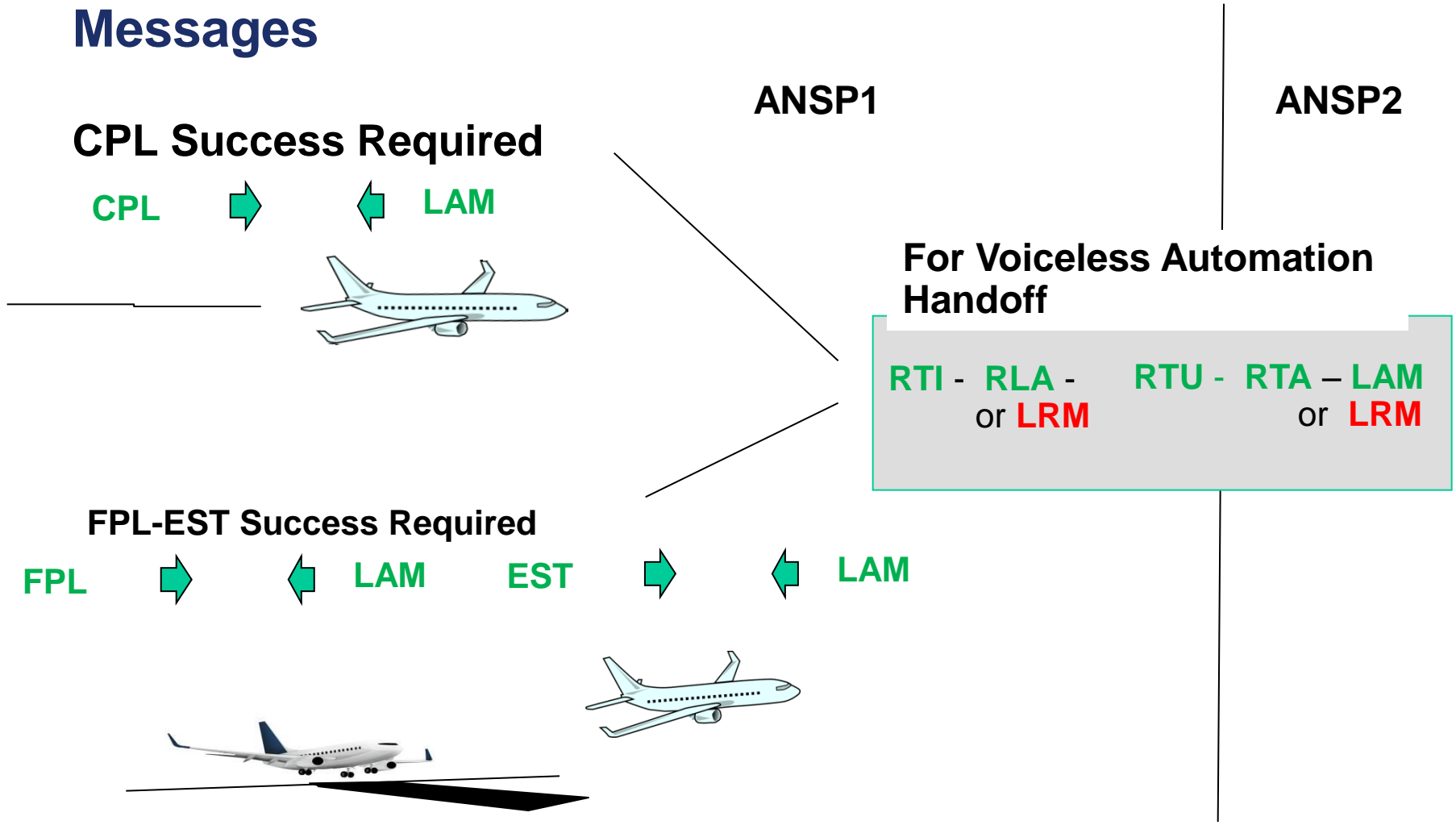
Cross Border Communication for Handoff

- Upgrade current AFTN to Internet Protocol (IP) and AMHS service
  - Direct IP service through NADIN MSN Replacement required
  - Existing US-Canada interface has begun IP for existing ERAM – CAATS within the near term; waterfall currently being worked expected complete by mid - 2018
    - These interfaces will be modified to support direct IP connectivity for cross border handoff
  - MEVA III is being looked at to support enhanced capabilities between the US and NACC partners for future interface support

Handoff Interest Items

- Surveillance Coverage
- Coincidence of tracks
    - How close is close enough?
- Directing the Handoff to facility or sector
- What fields to error check beyond format/syntax
- System to system differences

Conclusion

- Substantial progress has been made in interfacing between the NACC neighbor countries but pending NAM ICD capabilities will move users into significantly increased automation compatibility and efficiency.

- The AIDC automation activity has a direct benefit on our collective ability to provide more efficient and seamless service. Automation enhances our safety and efficiency interests extending beyond the borders of our airspace and systems. Operational efficiencies gained in contiguous automated airspace benefit aircraft service providers and the flying public.

- Standardization of automated data exchange technologies and procedures is critical to cross-border, regional and multi-regional interoperability. This, in turn, drives the seamless operation of regional and global systems.