

Evolution of the United States Automated Data Exchange (ADE) Interfaces within the North American, Central American and Caribbean (NACC) Region – 2017 Update

Presented To: ICAO NACC AIM/AIDC Task Force/FPL Monitoring Group

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Federal Aviation Administration



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 Interfacility Data Communication (AIDC)

- The ATS Interfacility 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/surveillance 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.

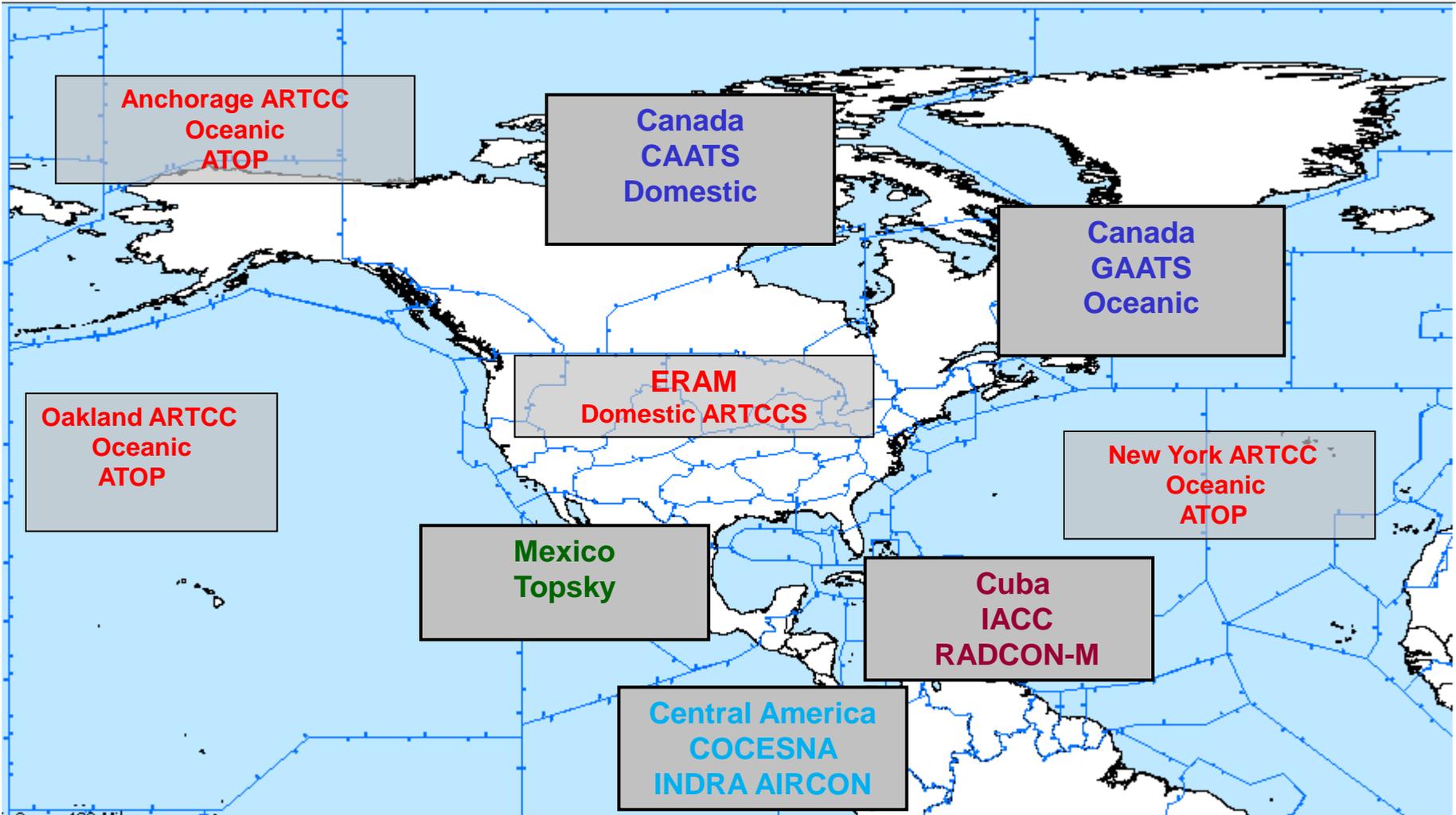


Outline

- US International Automation Interface Initiatives
- Ongoing ICAO North American, Central American and Caribbean (NACC) Regional interface activities
- Infrastructure Automation Progress



NACC En Route/Oceanic Automation

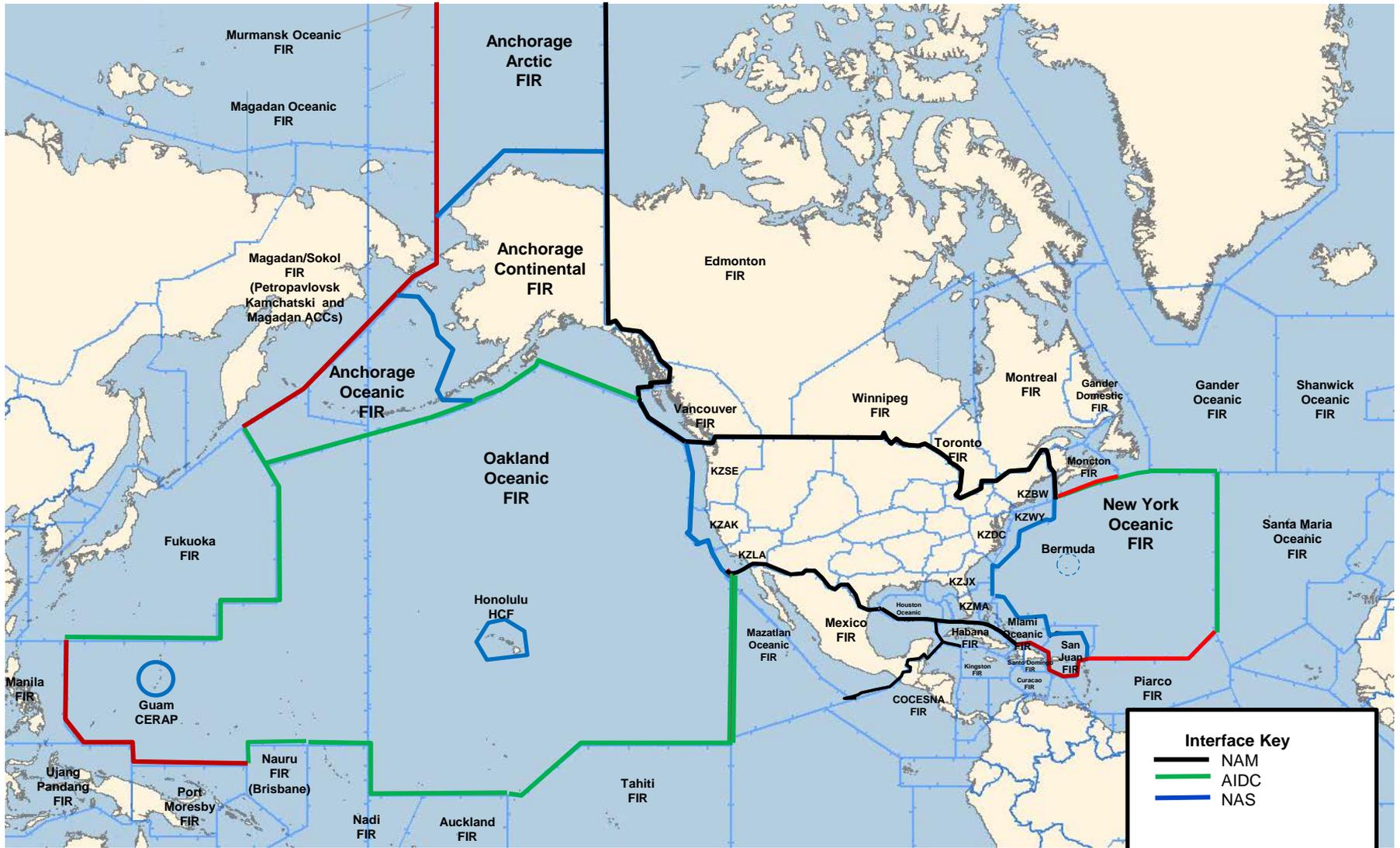


NACC AIDC - ATS Interfacility Data Communication (AIDC)

- 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

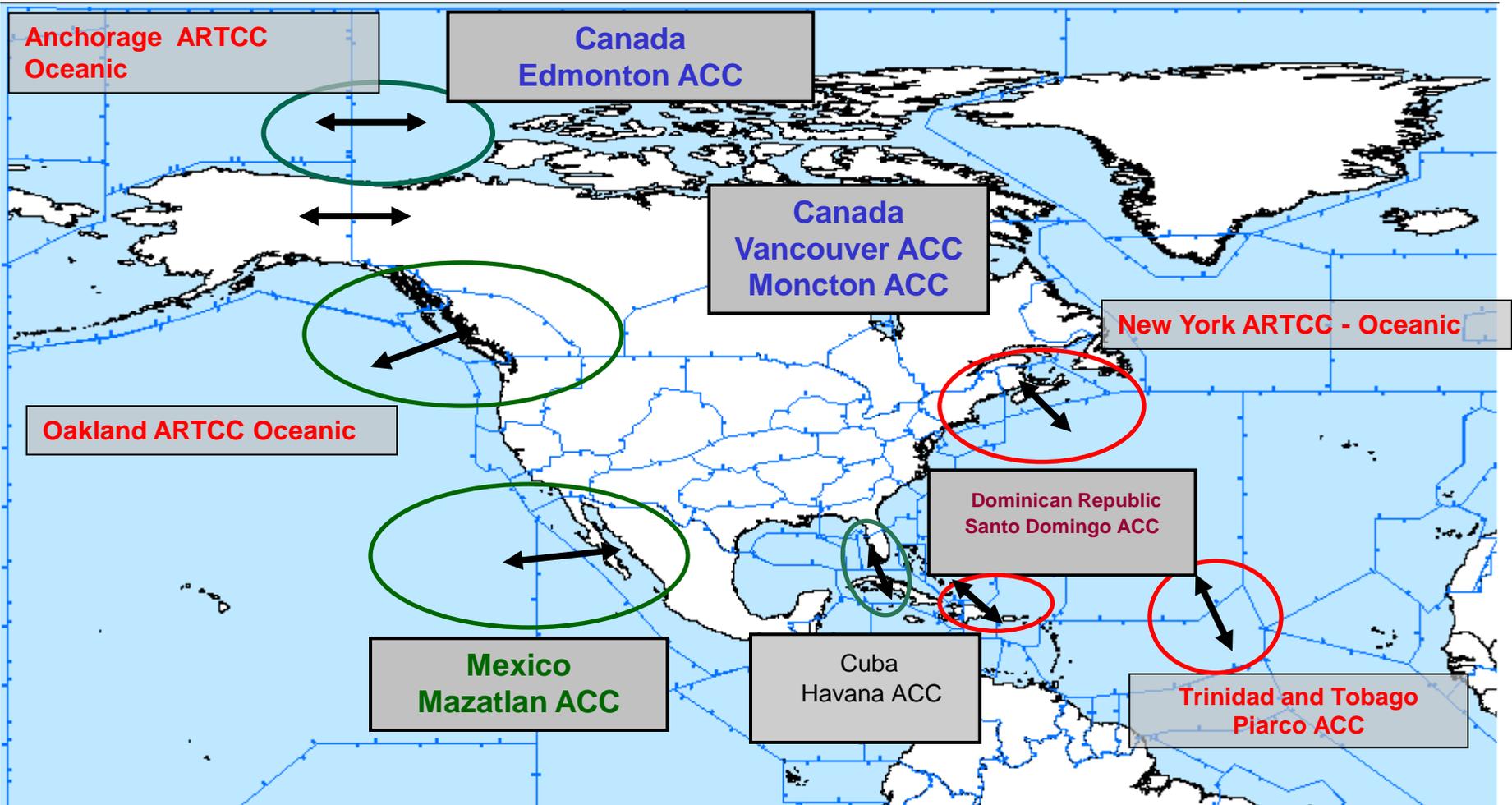


Working the 'New' Interfaces

- 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.
- The Interface between Havana – Miami is being up levelled on the Cuba side to Class 2 with testing expected to begin early 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 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.



2017 US Interface Initiatives En Route/Oceanic Systems



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



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



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)
 - **Mexico - 7**
 - US 5
 - Cuba 1
 - COCESNA 1
 - **Cuba – 3**
 - US 1
 - Mexico (Merida) 1
 - COCESNA 1



Infrastructure Automation Evolution

NAM/CAR Regional Performance-Based Air Navigation Implementation Plan (RPBANIP)

12.1 - April 2014
International Civil Aviation Organization

North American (NAM) Common Coordination Interface Control Document (ICD)
Area Control Center (ACC) to ACC

NAS-IC - 11069706
Revision 5
19 April 2016

North America, Central America and Caribbean Automation System Interface

RTCA
THE GOLD STANDARD FOR AVIATION SINCE 1932

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

Destination 2025

Federal Aviation Administration

canso
COUNCIL OF NORTH AMERICAN NATIONALS OPERATORS

Automation Interface Between Flight Information Regions
Best Practice Guide for ANSPs

Miami Center
Havana
San Juan CERAP
Piarco (T&T)
Maiquetía (Venezuela)

FY2016 2nd Quarter Performance Report
March 2016

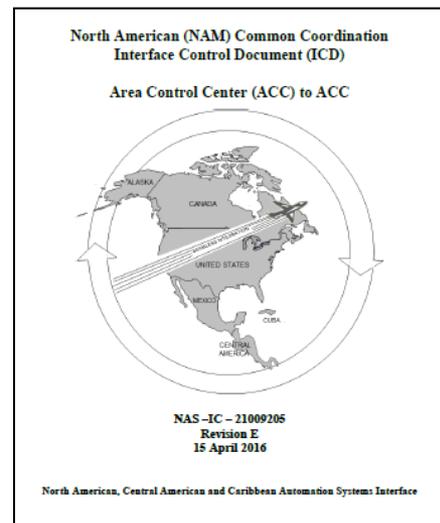
Legend
OSI: OSI
CSTI: Corporate STI
APQ: Agency Priority Goals
DOT: DOT Goals
S: FAA Strategic Initiatives
STI: STI

Identifier	Description	OSI	CSTI	APQ	DOT	STI	Target	Actual	Status
NSC 310550	ADS-B NAS Wide Implementation	*	*				1	1	Green
NSC 50774	NSC 50774	*	*				Green	Green	Green
NSC 444	NSC 444	*	*				1	1	Green
NSC 444.12	NSC 444.12	*	*				Green	Green	Green
NSC 5410	NSC 5410	*	*				1	1	Green
NSC 565	NSC 565	*	*				42	11.27	Green
NSC 702.72	NSC 702.72	*	*				Green	Green	Green
NSC 801.71	NSC 801.71	*	*				Green	Green	Green
NSC 801.72	NSC 801.72	*	*				Green	Green	Green
NSC 804.1	NSC 804.1	*	*				Green	Green	Green
NSC 804.13	NSC 804.13	*	*				Green	Yellow	Yellow
NSC 808.1	NSC 808.1	*	*				Green	Green	Green
NSC 808.13	NSC 808.13	*	*				Green	Green	Green
NSC 148	NSC 148	*	*				93%	87.80%	Green
NSC 150	NSC 150	*	*				1,313	945	Green
IMPROVE GLOBAL LEADERSHIP									
NSC 21	NSC 21	*	*				2	2	Green
NSC 21.1	NSC 21.1	*	*				Green	Green	Green
NSC 21.2	NSC 21.2	*	*				2	2	Green
EMPOWER AND INNOVATE WITH THE FAA'S PEOPLE									
NSC 21.4	NSC 21.4	*	*				Green	Green	Green
NSC 21.5	NSC 21.5	*	*				Green	Green	Green
NSC 21.6	NSC 21.6	*	*				2.33%	2.06%	Yellow
NSC 21.7	NSC 21.7	*	*				Green	Green	Green
NSC 21.8	NSC 21.8	*	*				Green	Green	Green
NSC 21.9	NSC 21.9	*	*				Green	Green	Green
NSC 21.10	NSC 21.10	*	*				Green	Green	Green
NSC 21.11	NSC 21.11	*	*				Green	Green	Green
NSC 21.12	NSC 21.12	*	*				Green	Green	Green
NSC 21.13	NSC 21.13	*	*				Green	Green	Green
NSC 21.14	NSC 21.14	*	*				Green	Green	Green
NSC 21.15	NSC 21.15	*	*				Green	Green	Green
NSC 21.16	NSC 21.16	*	*				Green	Green	Green
NSC 21.17	NSC 21.17	*	*				Green	Green	Green
NSC 21.18	NSC 21.18	*	*				Green	Green	Green
NSC 21.19	NSC 21.19	*	*				Green	Green	Green
NSC 21.20	NSC 21.20	*	*				Green	Green	Green
NSC 21.21	NSC 21.21	*	*				Green	Green	Green
NSC 21.22	NSC 21.22	*	*				Green	Green	Green
NSC 21.23	NSC 21.23	*	*				Green	Green	Green
NSC 21.24	NSC 21.24	*	*				Green	Green	Green
NSC 21.25	NSC 21.25	*	*				Green	Green	Green
NSC 21.26	NSC 21.26	*	*				Green	Green	Green
NSC 21.27	NSC 21.27	*	*				Green	Green	Green
NSC 21.28	NSC 21.28	*	*				Green	Green	Green
NSC 21.29	NSC 21.29	*	*				Green	Green	Green
NSC 21.30	NSC 21.30	*	*				Green	Green	Green
NSC 21.31	NSC 21.31	*	*				Green	Green	Green
NSC 21.32	NSC 21.32	*	*				Green	Green	Green
NSC 21.33	NSC 21.33	*	*				Green	Green	Green
NSC 21.34	NSC 21.34	*	*				Green	Green	Green
NSC 21.35	NSC 21.35	*	*				Green	Green	Green
NSC 21.36	NSC 21.36	*	*				Green	Green	Green
NSC 21.37	NSC 21.37	*	*				Green	Green	Green
NSC 21.38	NSC 21.38	*	*				Green	Green	Green
NSC 21.39	NSC 21.39	*	*				Green	Green	Green
NSC 21.40	NSC 21.40	*	*				Green	Green	Green
NSC 21.41	NSC 21.41	*	*				Green	Green	Green
NSC 21.42	NSC 21.42	*	*				Green	Green	Green
NSC 21.43	NSC 21.43	*	*				Green	Green	Green
NSC 21.44	NSC 21.44	*	*				Green	Green	Green
NSC 21.45	NSC 21.45	*	*				Green	Green	Green
NSC 21.46	NSC 21.46	*	*				Green	Green	Green
NSC 21.47	NSC 21.47	*	*				Green	Green	Green
NSC 21.48	NSC 21.48	*	*				Green	Green	Green
NSC 21.49	NSC 21.49	*	*				Green	Green	Green
NSC 21.50	NSC 21.50	*	*				Green	Green	Green



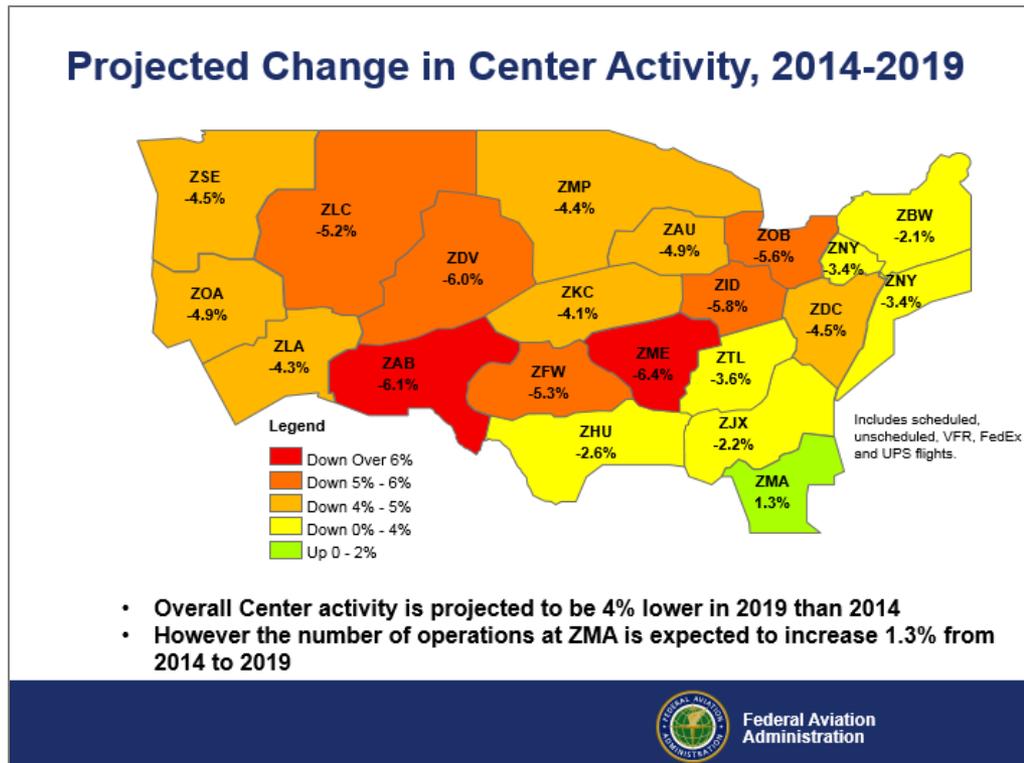
Two trans-border Automation interface Initiatives are ongoing with the United States

- Eastern Regional Task Group (ERTG) Caribbean Initiative
- NAM ICD Class 3 Handoff between US & Canada



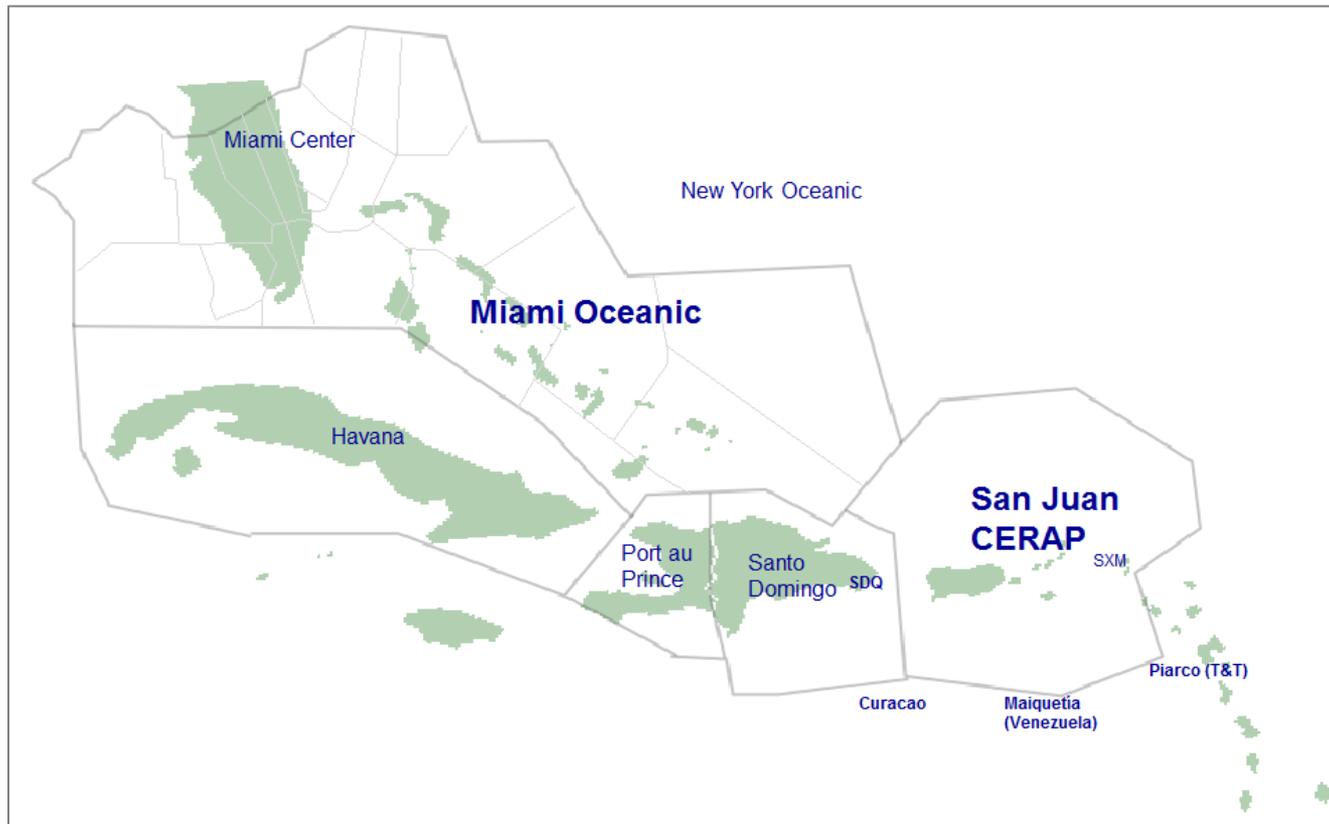
Projected Growth

- 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*



Background to ERTG Tasking

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



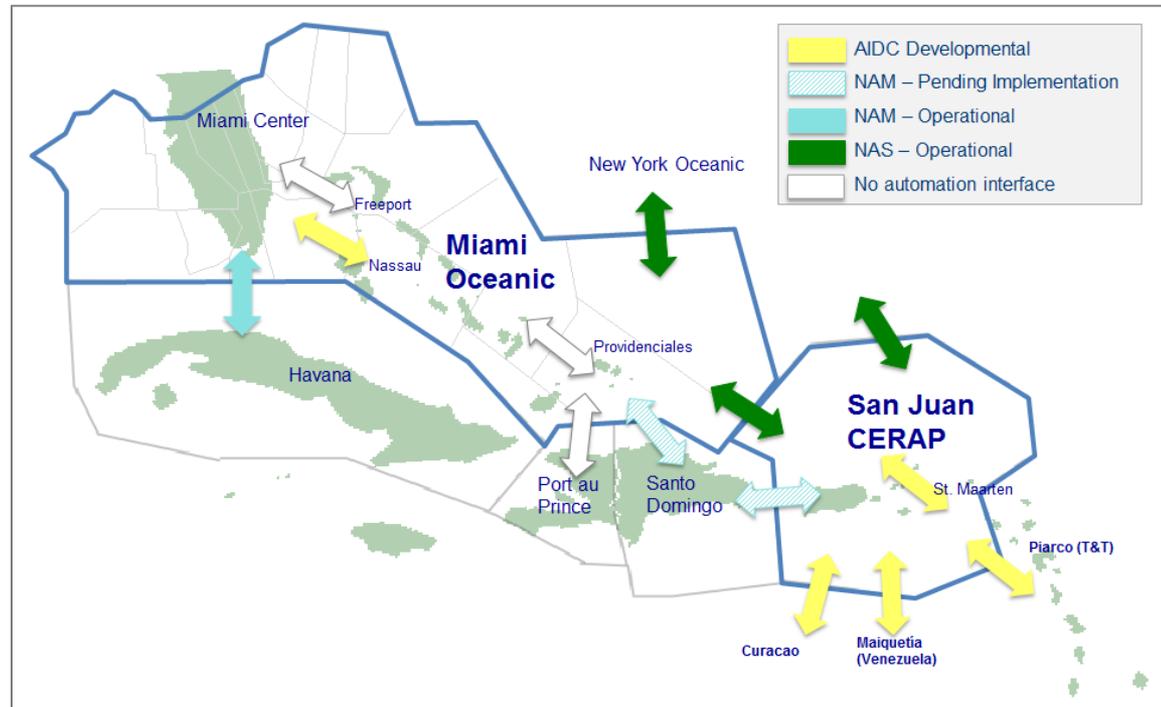
Eastern Regional Task Group (ERTG)

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

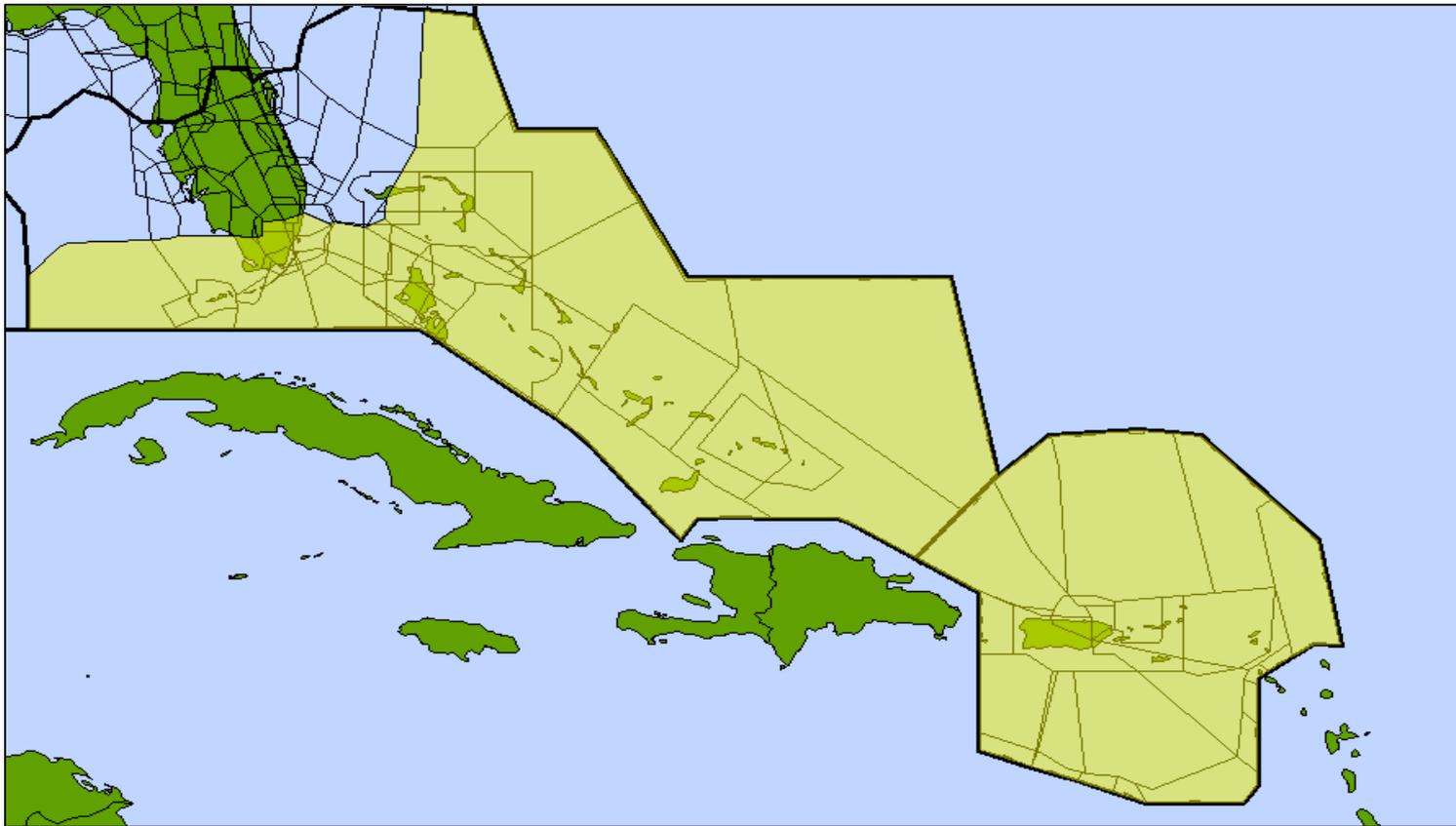


ERTG Recommendations

Category		Prioritized Recommendations
Infrastructure Priorities	Communications	Implement a New Communications Frequency at Saint Maarten
		Implement a New Communications Frequency at Abaco Island
		Install Dedicated Shout Lines with Certain Adjacent or Underlying International Facilities
	Automation	Regional Implementation of Automation: <ol style="list-style-type: none"> 1. Continue implementation of ADE with Santo Domingo 2. Develop software translation for neighboring facilities with AIDC protocol 3. Ensure ERAM software upgrades associated with ADE stay on schedule
		Implement Independent Flight Data Processing in ZSU
	Surveillance	Implement ADS-B in the Caribbean
		Input St. Maarten Radar into the ZSU Radar Mosaic System
		Identify and Access a Backup Option for Grand Turk Radar
	Technology Improvements	Investigate Option to Access Weather Information from Long Range DoD/DHS Radars
		If the Offshore Precipitation Capability (OPC) shows promise, expedite Caribbean access
		Enable ZSU to Participate in Data Comm
		Make Caribbean Radar Presentations Available to ZNY
	Airspace Priorities	Explore Options to Reduce Separation between ZNY and ZSU/ZMA
Implement a Shortcut Route between CARPX and RENAH		
Conduct an Integrated Redesign of ZMA and ZSU Airspace		
Improve Short Term Cuba Access in the Giron Corridor		
Prepare for Significant Growth in Cuba Operations		
Harmonization	FAA should establish one body to develop an integrated plan and lead implementation in the Caribbean	
	Maintain Active Coordination with ICAO's North America, Central America and Caribbean Offices	
	Ensure Active Involvement of the Office of International Affairs, Western Hemisphere Office	



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 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

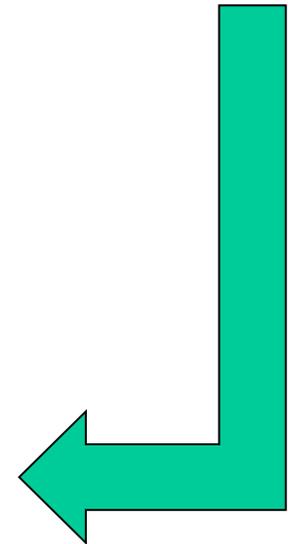
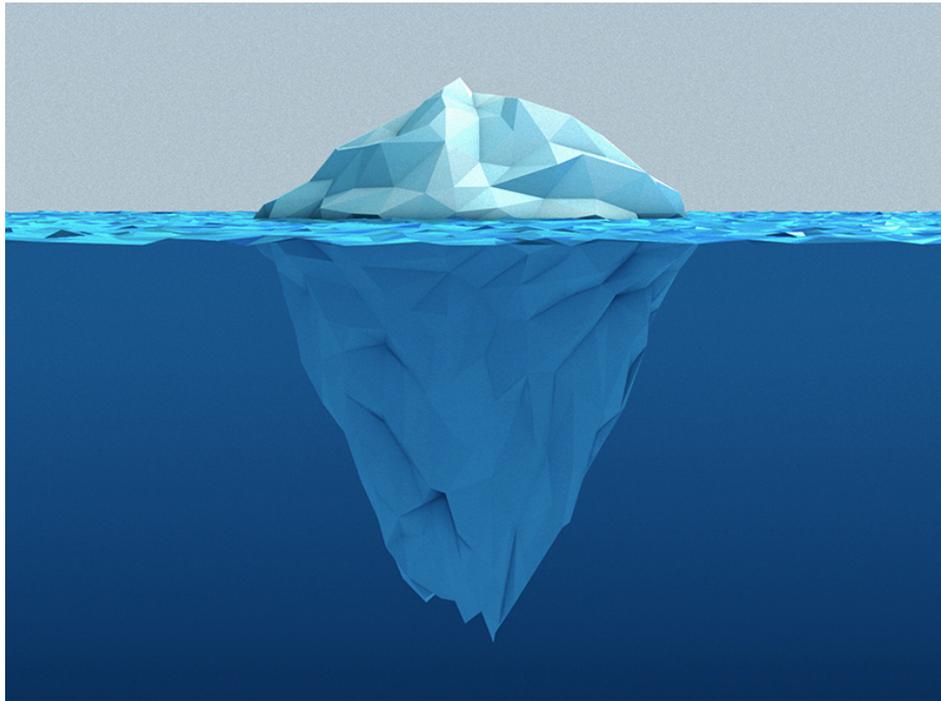


NAM ICD Message Classes Overview

- **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)**

Handoff Development – NAM ICD Tip of the Iceberg

- What, Where, How and Why represents the bulk of the adaptation and processing of handoff functionality

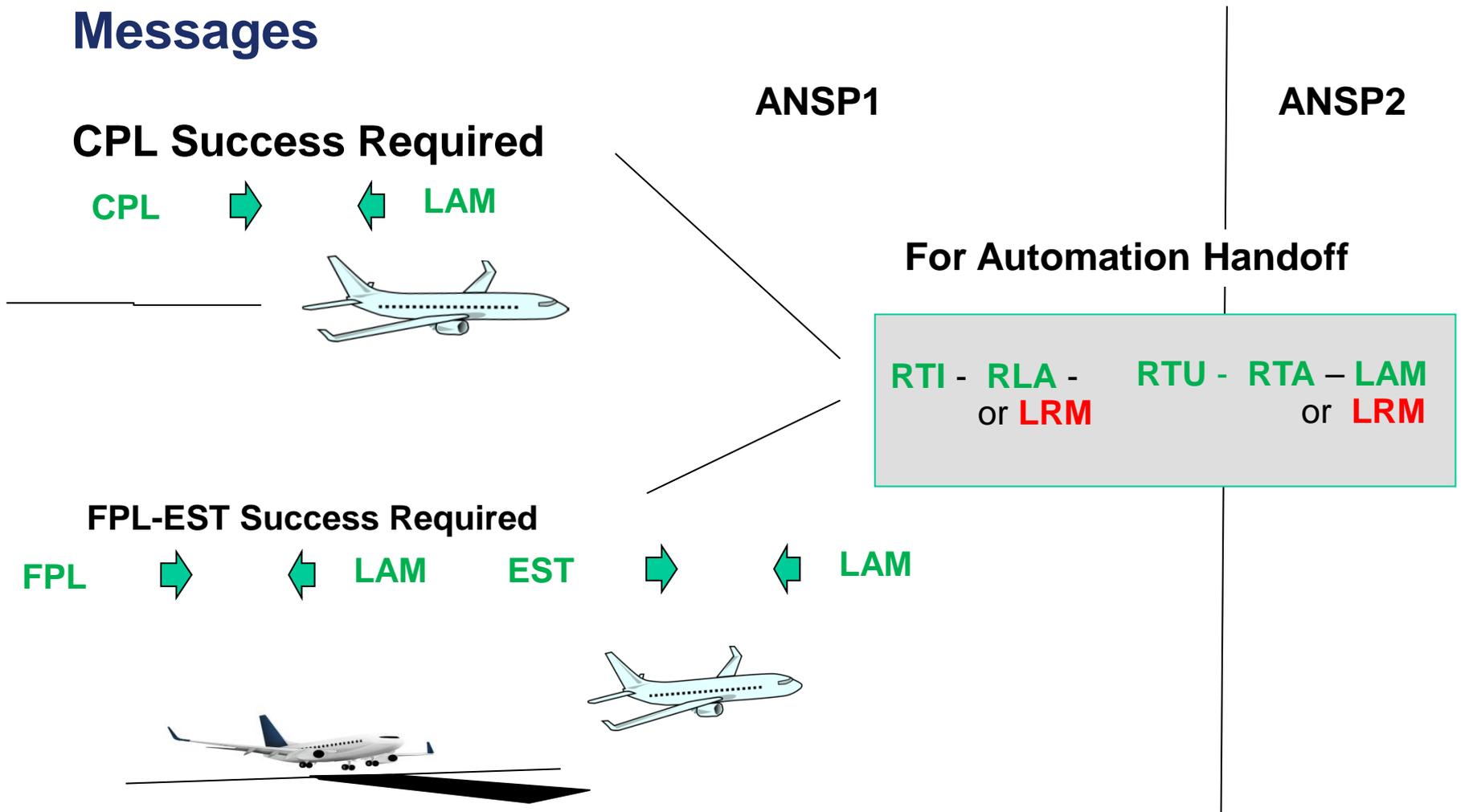


Handoff Developmental Interest Items

- NAM Telecommunication - Direct Connectivity Required
 - 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 usage items being used; derived lessons learned



Handoff - First Order Dependency of Interface Messages



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 is scheduled to transition to IP for existing ERAM – CAATS within the near term; waterfall currently being worked expected complete by end of 2017
 - 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 Developmental Interest Items

- Use of System Messages – not mandated but support for facility-facility handoff interconnection recommended when using NAM ICD handoff protocol
 - IRQ
 - IRS
 - TRQ
 - TRS
 - ASM



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.

