NAM/ICD Automation Updates FAA/Cuba/Dominican Republic, Canada and Mexico

Presented to: ICAO/NAM/AIDC 2022 Meeting

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Federal Aviation Administration

NAM/ICD FAA/ERAM Automation

- Current NAM/ICD Regional Operational Automated Interfaces
- Current Telecommunication Infrastructure
- Federal Aviation Administration (FAA) Technical Center cross systems Testing Capabilities
- Future/current NAM/ICD Regional Automation projects
- FPLs/ CPLs - Key Fields/Filing/issues/automation impacts
- Open Forum Conclusion/Questions

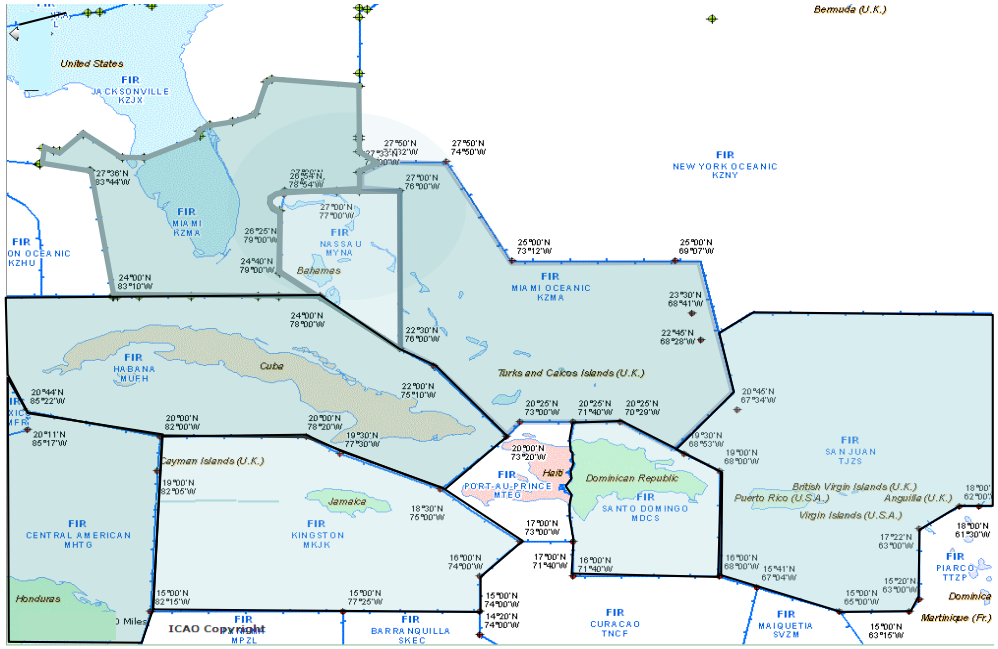
Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

NAM ICD : Revision F
Includes changes for the Automated Handoff messaging

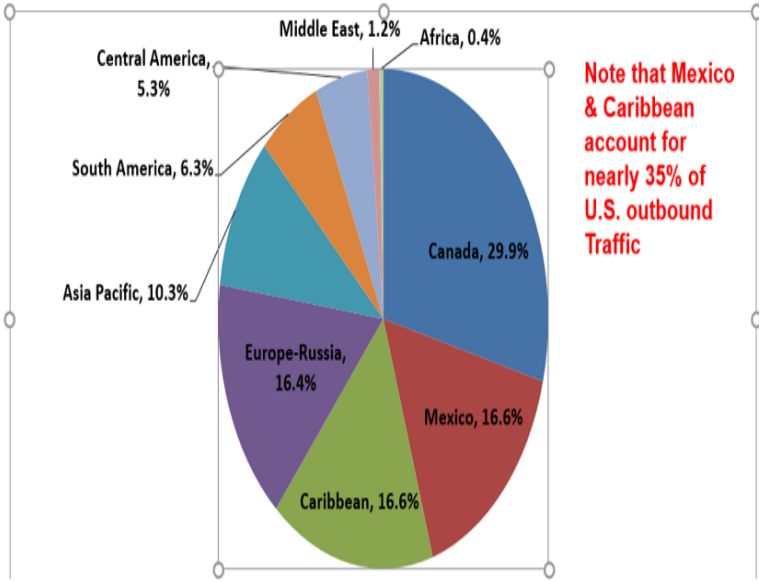
- **Class 1 Capabilities**
  - Active flight plans for IFR Flights (via CPL)
  - Proposed flight plans for IFR Fights (via FPL) – where agreed between ANSPs
  - Logic Accept Message (LAM)
- **Class 2 Capabilities**
  - Filed flight plans for IFP flights (via FPL and EST)
  - Modifications to CPL/FPLs that were activated by an EST (via MOD)
  - Cancellation of CPL/FPL (via CNL)
  - Logical Reject Message (LRM)
- **Class 3 Capabilities - Handoff**
  - Radar Handoff (via RTI, RTU, RTA, RLA)
  - Interface Management Messages – IRQ, IRS, TRQ, TRS, ASM
  - Point Outs (via POI, POA, POJ)

Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

- **NAM ICD Cross Border Automation has been implemented between 6 member states and 27 FIRs in US, Mexico, Canada, Cuba, Dominican Republic and Honduras (COCESNA) providing the opportunity for seamless interfaces between adjacent ATC systems.**
- **Regional Air Traffic growth is expected to continue in the incoming years.**



U.S. Outbound Air Traffic



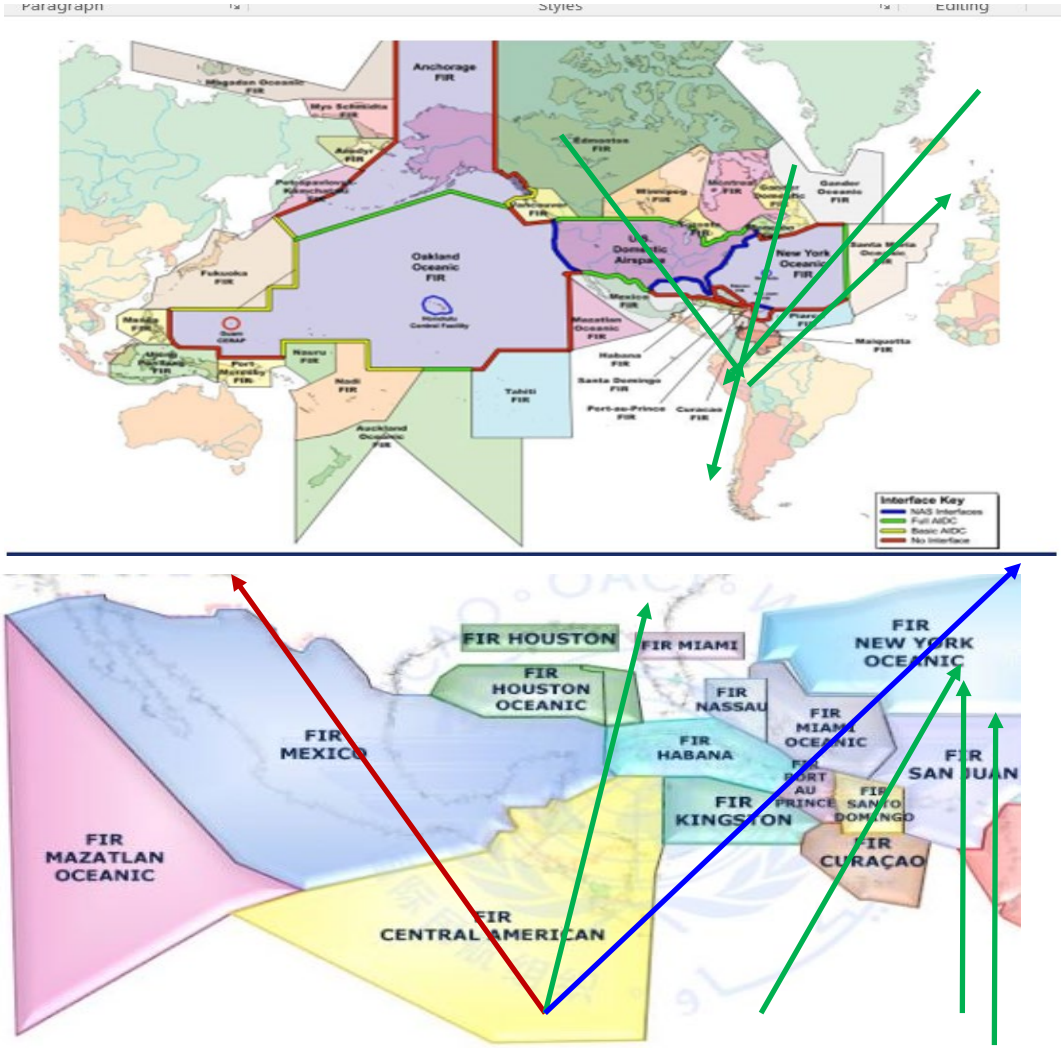
Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

- Canada – US 14
  - North America Domestic 11
  - Anchorage 2
  - Oakland Oceanic (ATOP) – NAM/ICD Vancouver ACC
  - New York Oceanic (ATOP) – NAM/ICD Moncton ACC
- Mexico - 6
  - US -Mexico Domestic NAM/ICD
    - US-ZOA oceanic AIDC
  - Cuba
  - COCESNA
- Cuba – 4
  - US -Miami NAM/ICD
  - US – Houston NAM/ICD
  - Mexico (Merida) NAM/ICD
  - COCESNA NAM/ICD

  Dominican Republic -2

  US – Miami NAM/ICD

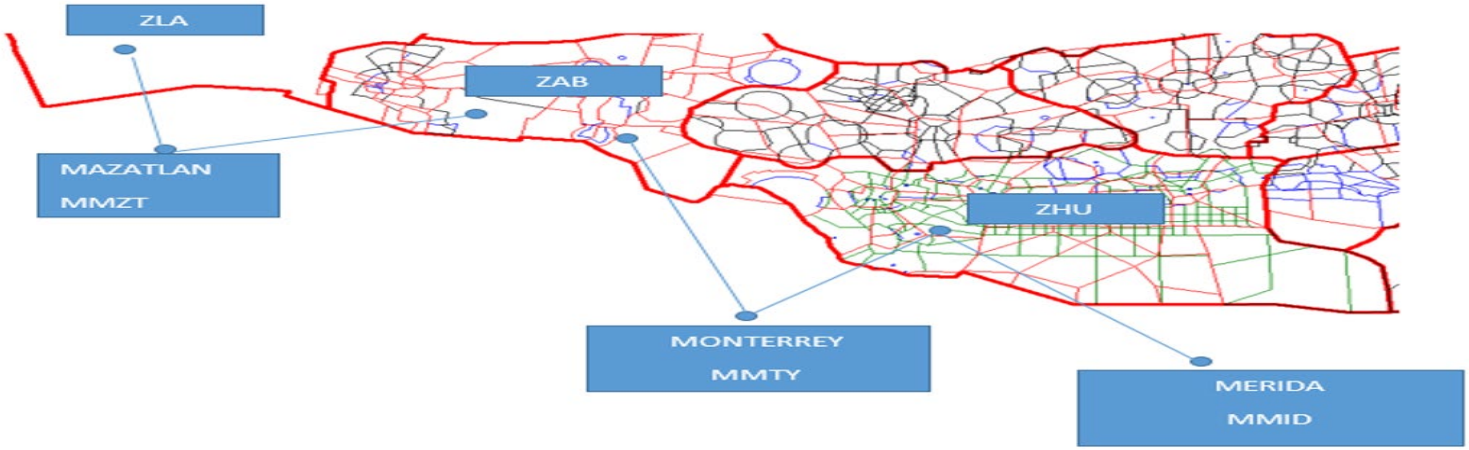
  US – San Juan CERAP NAM/ICD
- COCESNA - 2
  - Mexico (Merida) (NAM/ICD
  - Cuba (Havana) (NAM/ICD)



Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

Operational NAM/ICD MEXICO/UNITED STATES REGION

- **FAA-ZHU/ZAB/ZLA/ZOA –**
- **SENEAM MTY/MID/MZT**

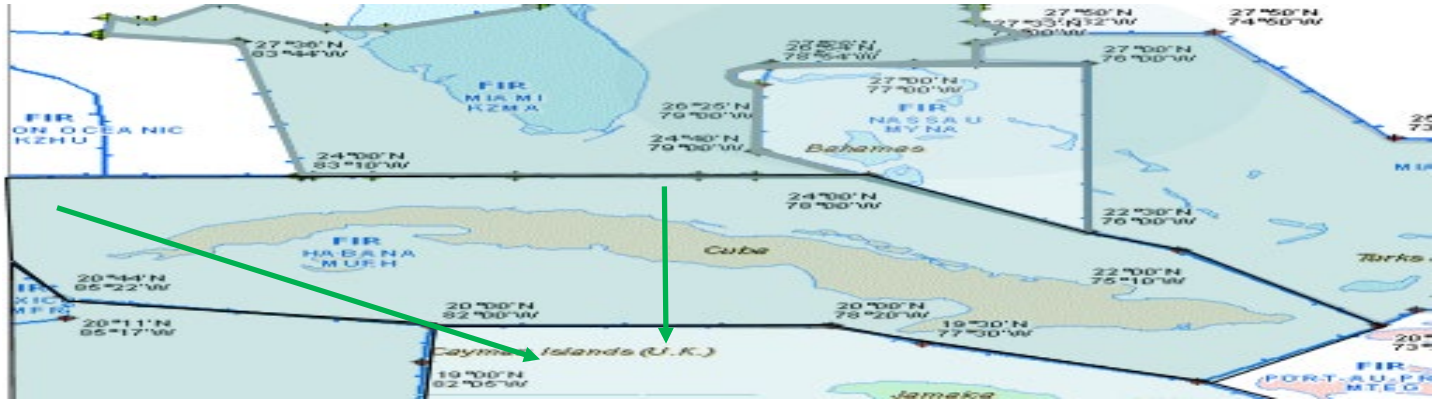


NAM/ICD automation message set CPL and LAM.
Established 2005. ZOA/MZT AIDC established around 2016.
Uses an AFTN network AMHS connections.
NAM/ICD message set future growth potential.

Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

Operational NAM/ICD CARIBBEAN /UNITED STATES REGION

FAA/ZMA/ZHU – CUBA



ZMA/CUBA - NAM/ICD automation messages set CPL, LAM and LRM. Established 2010.

ZHU/CUBA – NAM/ICD automation messages set CPL, LAM and LRM. Established 2021. This implementation was done to support Phase_3 PBN updates for the Caribbean Region.

Uses an AFTN network AMHS connections.

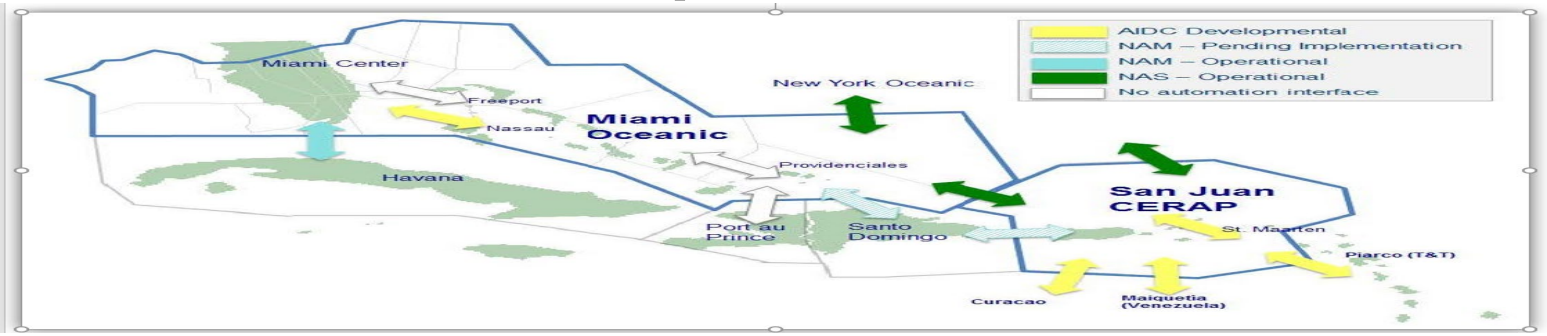
NAM/ICD message set future growth potential. Currently testing NAM/ICD CLASS2, MOD, CHG, EST, FPL and CNL.

CLASS3 Future.

Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

Operational NAM/ICD CARIBBEAN /UNITED STATES REGION

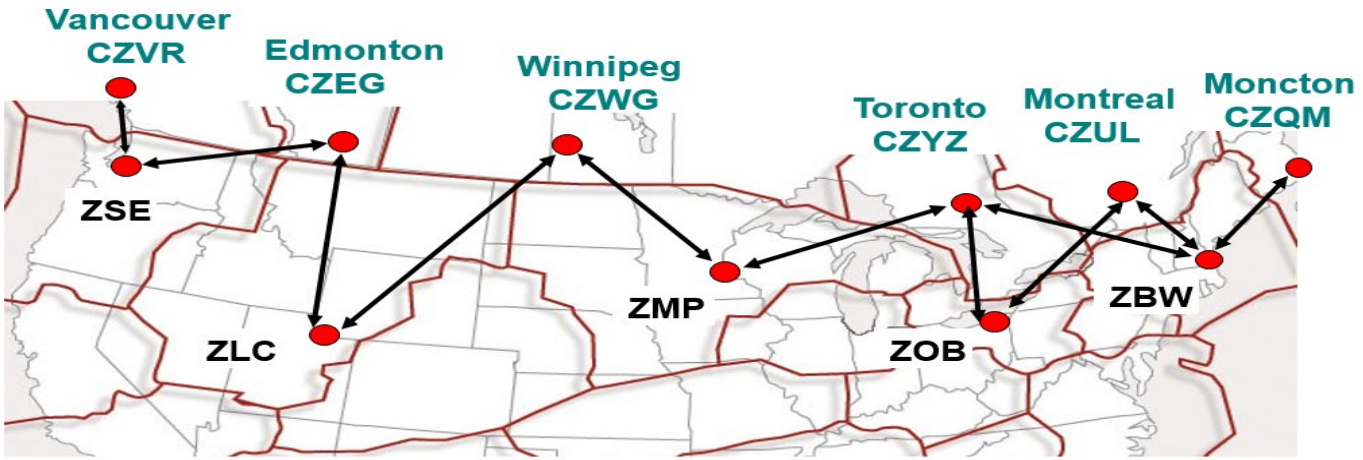
FAA/ERAM/CERAP/ZMA/ZSU – Dominican Republic



ZMA/ZMA/ZSU - NAM/ICD automation messages set CPL,LAM ,LRM and MOD messages. Established 2019.
Uses an AFTN network AMHS connections.
NAM/ICD message set future growth potential.
NAM/ICD CLASS3 Automated Radar handoff.

Current NAM/ICD Regional Operational Automated Interfaces (Cont.)

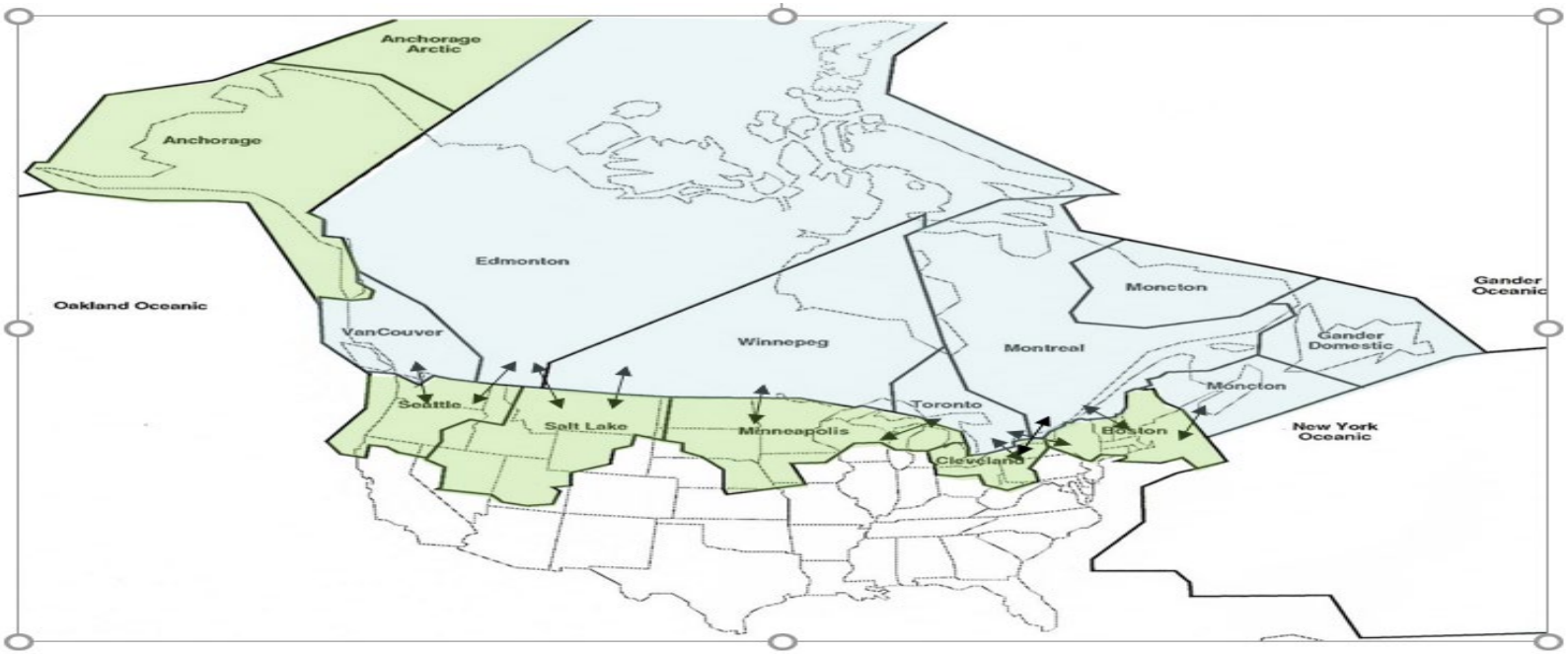
Operational NAM/ICD CANADA/UNITED STATES REGION



ERAM ZSE/ZLC/ZOB/ZMP/ZBW - CÄATS ZVR/ZEG/ZWG/ZYZ/ZUL/ZQM- NAM/ICD automation messages set FPL/CPL/EST/MOD/CNL/LAM/LRM and CHG.
Established 2007.
Interface Management messages IRQ, IRS, TRQ and TRS messages.
Uses an Internet protocol (IP) direct Gateways connections.
Established 2021.

NAM/ICD FAA Automated System Interfaces (Cont.)

- **FAA/ NAM/ICD Canada CLASS3 Automated Handoffs deployment Fall 2022 and Spring/Summer 2023.**



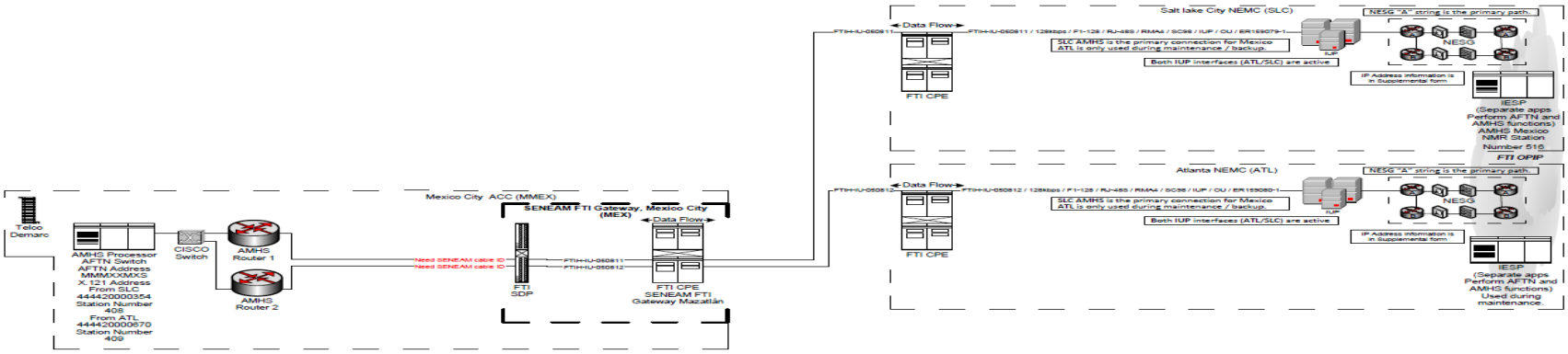
Current Telecommunication Infrastructure

Mexico – United States

Uses AMHS connections

- AMHS (Aeronautical Message Handling System) an ATN application between communication centers
- AIDC (ATS Interfaculty Data Communication) an ATN application between ATS centers

NOTE
Connectivity in Mexico is assumed and subject to ongoing correction as information becomes available.



SENEAM FTI Gateways Data Exchange AMHS

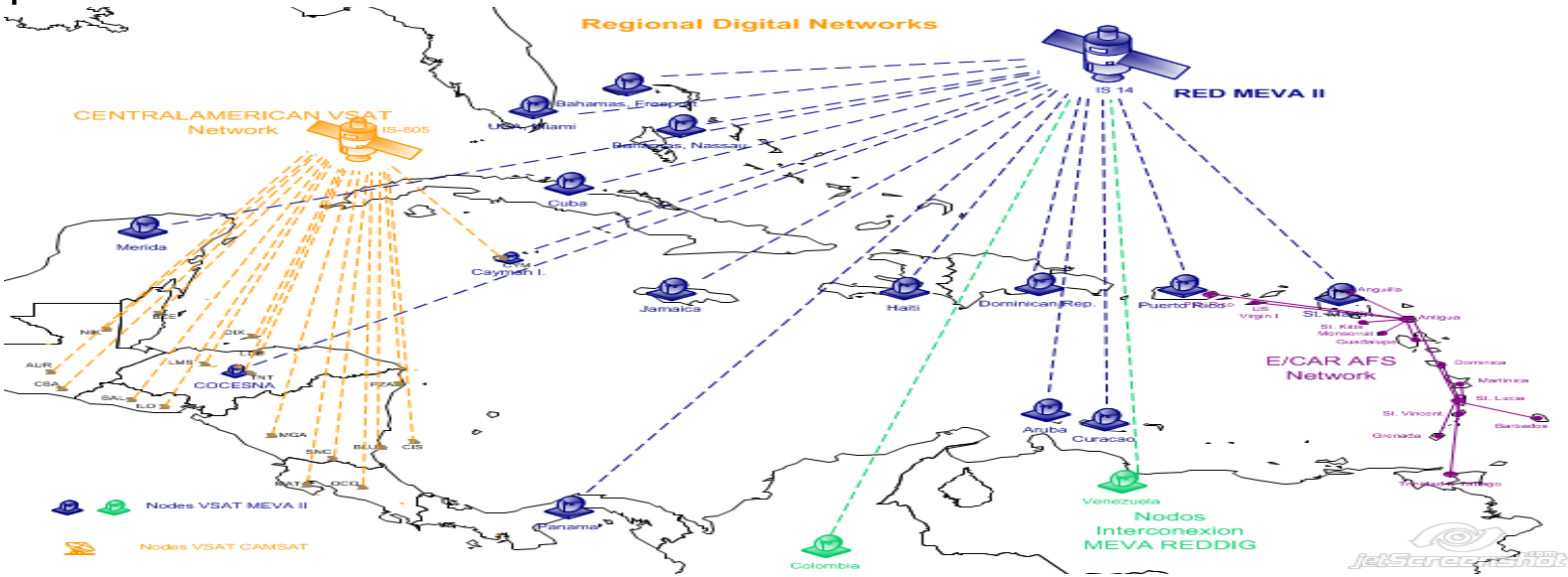
Current Telecommunication Infrastructure (Cont.)

Caribbean Region ZMA/ZSU/Cuba/Dominican Republic

Uses AMHS connections via MEVA

Uses an AMHS network with MEVA –III satellite connections to FAA AFTN/NMR networks in Atlanta and Salt Lake.

MEVA III evolution to MEVA IV is being looked at to support enhanced capabilities between the US and NACC partners.



Current Telecommunication Infrastructure (Cont.)

FAA/ Canada Region
TCP/IP Telecommunication

- The Direct TCP/IP interface is used for the exchange of Air Traffic Management (ATM) and Interface Management messages between ERAM and an adjacent Non-US ACC system in this case Canada/FAA. In order to use this interface for ATM messaging, it is necessary that:
- The Non-US ACC system establish a TCP/IP connection with ERAM via the FAA's FTI network and NESG security gateway, and then
- Interface Management Messages be exchanged between ERAM and the Non-US ACC system to establish a communication Session
- Telecommunication protocol is guided by the following documents which has been up level to ICAO regional website.

Current Telecommunication Infrastructure (Cont.)

The link below:

https://www.icao.int/NACC/Pages/regional-group-AIDC.aspx

Under interface control documents.

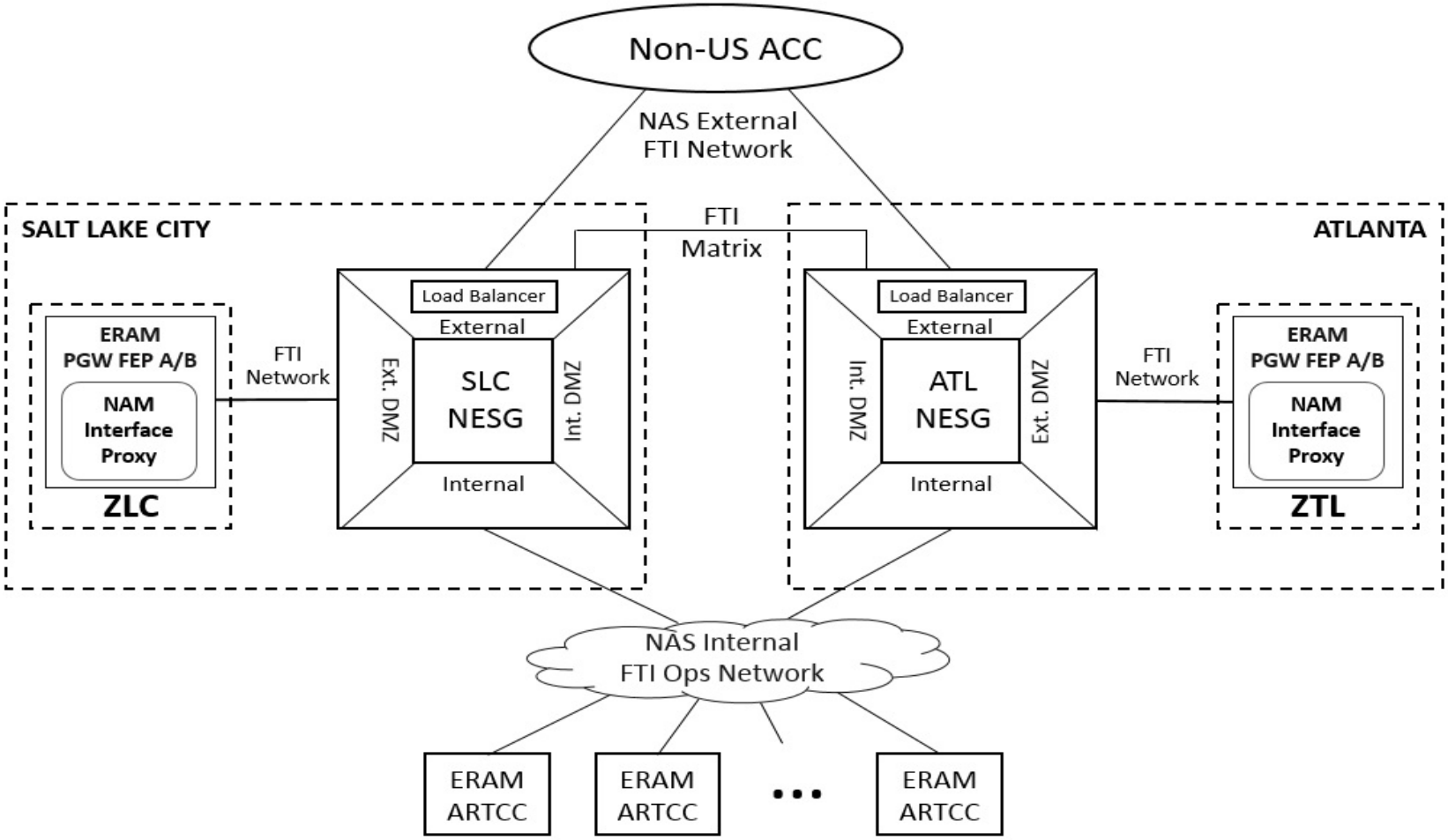
https://www.icao.int/NACC/Documents/RegionalGroups/ANIWG/AIDC/NAM%20ICD-E%2015APR2016_RevF_050521%20%28003%29.pdf

https://www.icao.int/NACC/Pages/regional-group-AIDC.aspx

- **Interface Control Document (ICD) NAS-IC-82422100 was prepared in accordance with FAA-STD-025f. It specifies the design characteristics to support Direct TCP/IP interfaces (NAM Direct IP) between the En Route Automation Modernization (ERAM) system and Non-US Area Control Center (ACC) systems via the FAA NAS Enterprise Security Gateway (NESG) and the FAA Telecommunications Infrastructure (FTI).**

- **Interface Requirements Document (IRD) NAS-IR-82422100 was prepared in accordance with FAA-STD-025f. It provides the requirements to support Direct TCP/IP interfaces between the En Route Automation Modernization (ERAM) system and Non-US ACC systems via the FAA NAS Enterprise Security Gateway (NESG) and the FAA Telecommunications Infrastructure (FTI)**

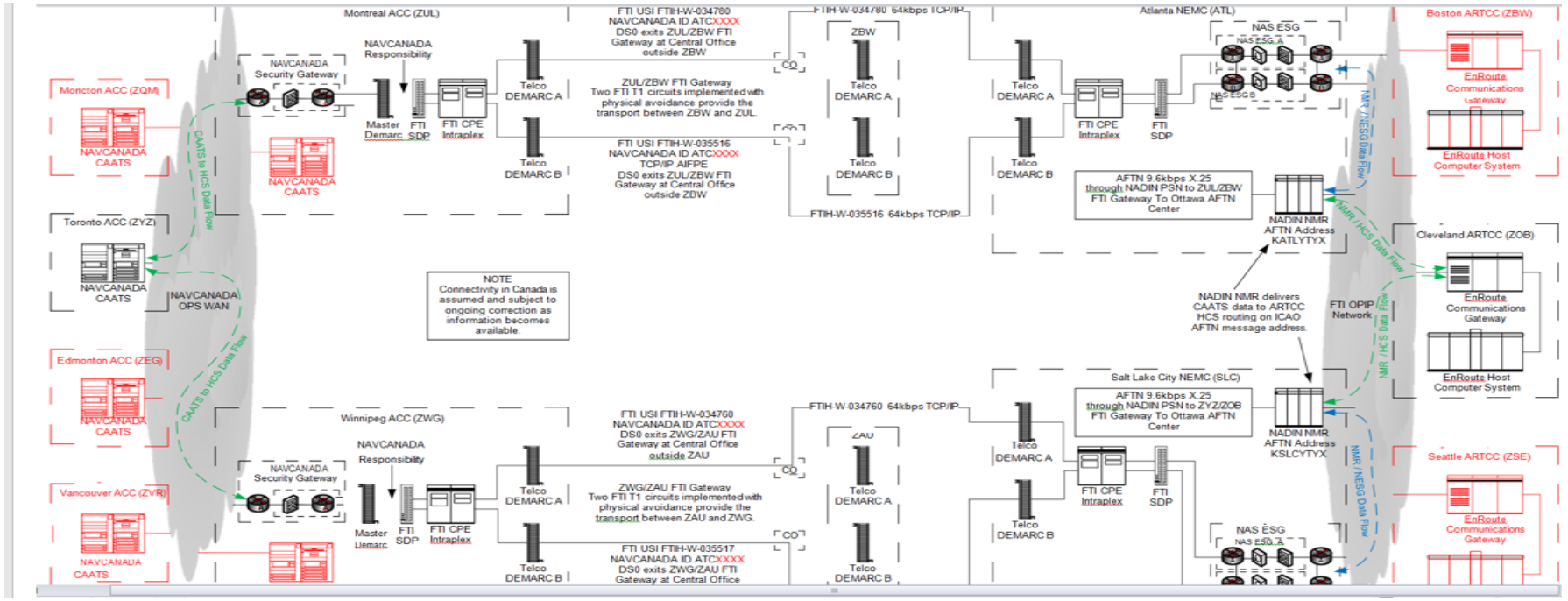
Current Telecommunication Infrastructure (Cont.)



Current Telecommunication Infrastructure (Cont.)

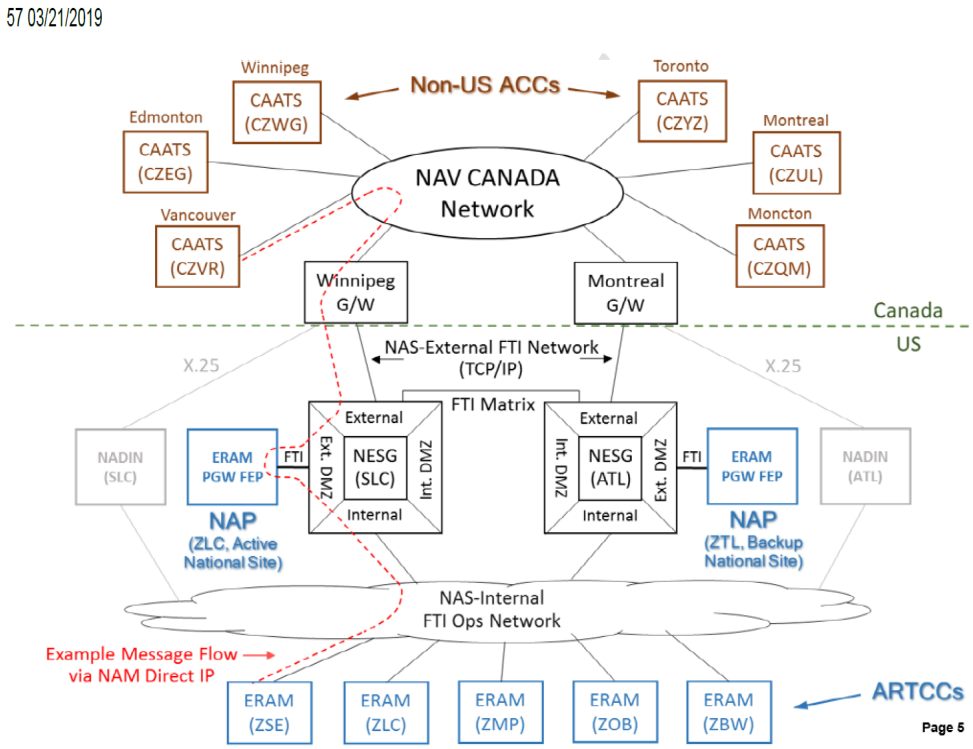
Automated Radar handoff FAA/Canada

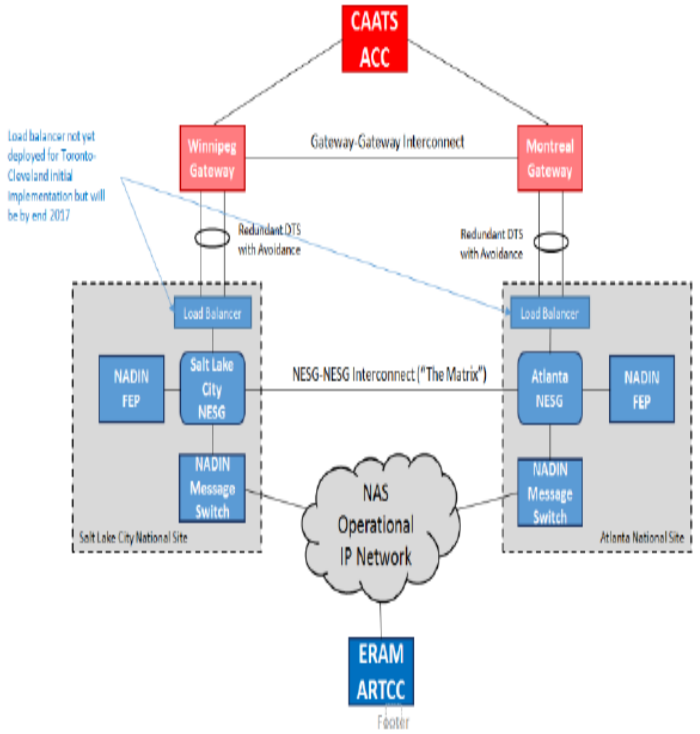
Uses a secure Internet Protocol Network connection on a private Data gateway between United States and Canada



Current Telecommunication Infrastructure (Cont.)

Gateway Canada/CAATS/ FAA/ERAM



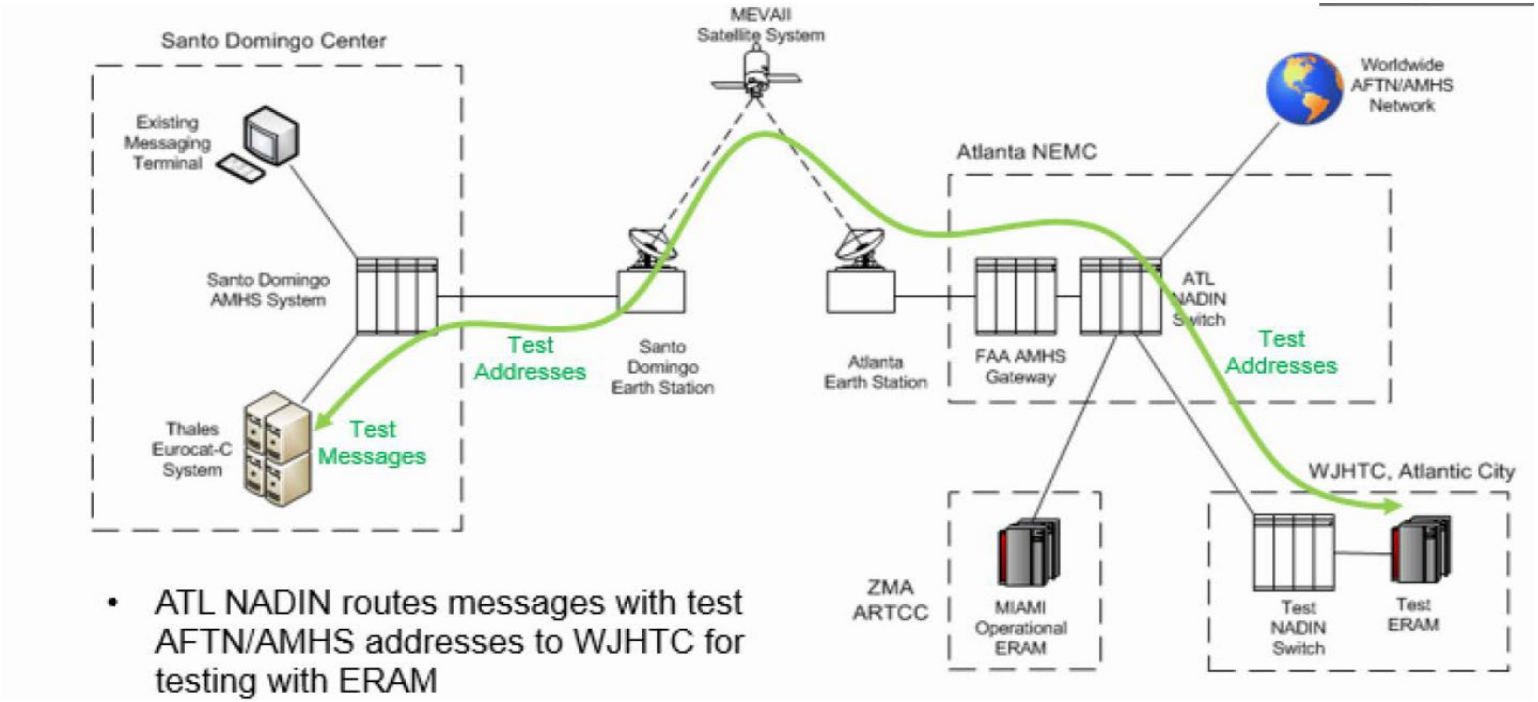


Federal Aviation Administration (FAA) Technical Center cross systems Testing Capabilities

- **FAA Technical Center in Atlantic City has the testing capabilities to perform functional, integration and system certification prior to field deployment.**
- **FAA Technical testing includes running simulated scenarios to verify functional behavior to identify system issues. Verification includes data analyzes and reports generation.**
- **FAA Technical Testing usually relies on two types of communication protocols:**
- **Direct FAA Tech Center access via the Internet protocol gateway. Canada only.**
- **Re direct FAA Tech Center access using the FAA telecommunication operational networks in Atlanta and Salt Lake. Mexico, Cuba and Dominican Republic.**

Federal Aviation Administration (FAA) Technical Center cross systems Testing Capabilities (Cont.)

Sample Gateway Test Sample IDAC
Dominican Republic Test Facility – ERAM
Technical Center



- ATL NADIN routes messages with test AFTN/AMHS addresses to WJHTC for testing with ERAM

Federal Aviation Administration (FAA) Technical Center cross systems Testing Capabilities (Cont.)

- Challenges for implementation includes:
  - Adaptation data sharing and coordination.
  - Air Traffic procedures and international coordination.
  - Design and software modifications.
  - Testing schedules and priorities across multiple programs.
  - Controller training.
  - Telecommunication Network compatibilities for Data sharing.
  - Cross automation system adapted routing and non adapted routing capabilities fields 14a and 15c.

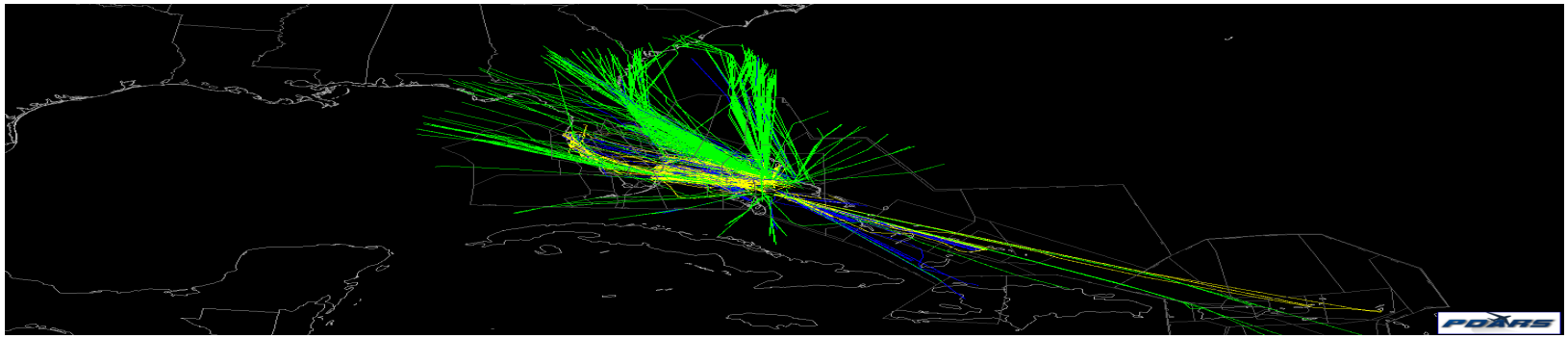
Future/current NAM/ICD Regional Automation projects

Compatibility management between existing/emerging international automation systems is essential to optimize capabilities & meet user needs.
U.S. centralized geographic position requires taking the lead to assure compatibility is maintained.
Post COVID 19 recovery.
Countries wanting to interface/ enhance interface with the U.S.

Piarco
Curacao
Bahamas – Providenciales – Turks and Caicos.
St Maarten / Juliana Approach.

Future/current NAM/ICD Regional Automation projects (Cont.)

- Enroute Airspace versus Approach Control/Terminal
- NAM/ICD message set protocol is not easy transferable to Terminate Interfaces automation systems.
- Traffic growth for Terminals in increasing through Caribbean Region



FPLs/ CPLs - Key Fields/Filing/issues/automation impacts

- FPL / CPL Field 18 importance accuracy and size limitation
- ERAM FPL/CPL is not merged.
- Field 18 NAV/ -DAT/ -SUR/ usage.
- Field 18 in combination with field 10a is used to applied ICAO 2012 mandates. In addition Field 18 data is used in the ERAM National Airspace to applied preferential routing as well CPDLC controller pilot communication.
- Lack of Field 18 data or truncated data leads to controller intervention and automation limitation.
- Field 18 implementation continue to be evolving.

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

FPL/CPL - Field 18 DAT/

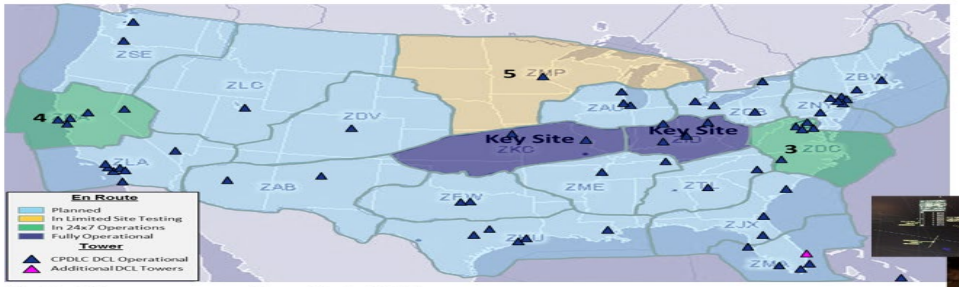
DAT/ Field continue to evolve

FAA continues the waterfall for CPDLC automation across the United States 20 ARTCCs Air Traffic Control Centers.

In addition Canada and the US have agreed to link Data Comm transfer of voice communications across the border using the NAM ICD automated handoff combines “voiceless transfer of control “ in the automation transaction

As a result of this implementation and additional systems integration the need for Field 18 data in CPLs becomes very important for the operations and the Airlines.

Data Comm Operational Status



Data Comm operational at 64 Towers

PBI planned for Summer 2022

Data Comm operational at 2 En Route Centers

COVID has impacted the initial and full services deployment

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

- **CPDLC eligibility for flights that filed for US CPDLC after processing of CPL message**
  - FPL's are being filed correctly by the airlines
    - E.g. Field 18 DAT/: 1FANSER2PDC
    - Enroute CPDLC eligibility filed in Field 18 DAT/ – 1FANSE or 1FANSER
      - 1FANS is approved for TDLS CPDLC Services
      - "E" specifies both the airframe and crew are approved for US Enroute CPDLC service
  - CPLs received at first ERAM only contain 4 characters in the DAT/ field
    - Update in ERAM overwrites filed CPDLC eligibility
      - FPL-UAL258 -IS -B738/M -SADE3GHIJ4RWXYZ/LB1 -MGGT0700 -N0452F350 RIDEM2 RIDEM UG765 TIKIS/N0453F370 UG765 CZM UB881 CUN UM219 MYDIA M219 KNOST Q109 CAMJO Q99 POLYY DCT TUBAS DCT FOZZY DCT FAK PHLBO3 -KEWR0357 KBWI -PBN/A1L1B1C1D1O1S2T1 NAV/RNP2 DAT/1FANSE2PDC SUR/260B
      - CPLMMID/KZHU147 -UAL258/A4742 -IS -B738/M -SWYADE3GHIJ4RXZ/B1L -MGGT-MYDIA/0821F360 -N0480F360 MYDIA M219 KNOST Q109 CAMJO Q99 POLYY DCT TUBAS DCT FOZZY DCT FAK PHLBO3 –KEWR -PBN/A1B1C1D1L1O1S2T1 NAV/RNP2 DAT/1FAN SUR/260B DOF/210104 REG/N76526 EET/MMFR0037 KZHU0123 SEL/BKFP CODE/AA56D8 OPR/UAL PER/C

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts

- **Datacomm capability,**
- **in addition to filed data Comm Capability in 10a ICAO equipment (Jx),**
- **filer needs to include:**
- **(1) Aircraft Address (ICAO field 18 element CODE/) is the twenty-four bit aircraft address.**
- **(2) Registration markings (ICAO field 18 element REG/) of the aircraft.**
- **(3) Data Comm Capability Indicator (ICAO field 18 element DAT/).**

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

- **FPL/CPL - Field 18 NAV/**

NAV/ Field continue to evolve

A. New capability descriptors

- **A scheme has been developed to describe capabilities that do not have Item 10 or PBN/ descriptors**
  - Each capability will be represented by a 2-character letter-digit code
  - Codes can be filed as a single string or space separated
- **ANSPs will publish descriptors as needed, trying to avoid:**
  - ANSPs using different descriptors for the same capabilities
  - ANSPs using different syntax rules
  - Length of fields exceeding limits on some service providers automation
- **Work is ongoing in the ICAO ATMRPP to publish the scheme and agreed codes**
  - Work is coordinated between ICAO panels and in working papers

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

Capability	Des.	Description
Radius to Fix (RF) capability	Z1	Flight is capable for RNP SIDs, STARs, and Approaches that require RF.
Advanced RNP (A-RNP)	P1	Flight is capable of flying routes that require A-RNP.
Helicopter RNP 0.3	R1	Flight is capable of flying routes requiring RNP 0.3 for helicopters.
RNP 2 Continental	M1	Flight is capable of RNP 2 but lacks high continuity and/or oceanic remote operational authorization.
RNP 2 Oceanic/Remote	M2	Flight is capable of RNP 2 globally, in oceanic and remote continental areas.

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

Filing new descriptors in Item 18

- **New advanced capability descriptors, each of the form letter-digit (e.g. Z1) have been defined**
  - These will be introduced as appropriate in NAV/, DAT/, SUR/, and COM/
- **These descriptors should be filed:**
  - Separated from any other required text by a space;
  - Preferably without intervening spaces (but not required);
  - In any order, with respect to the descriptors and other text.
- **Examples:**
  - `NAV/GBAS Z1P1M1` *or* `NAV/P1M1Z1 GBAS` *or* `NAV/P1 M1 GBAS Z1`
    - *Z1, P1, and M1 are advanced capability codes*
    - *Prefer descriptors filed sequentially and without intervening spaces*

Not preferred

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

- **FPL/CPL - Field 18 SUR/**

SUR/ Field continue to evolve

- **ADS-B 1090ES Capability and ADS-B UAT Capability define a certified ADS-B transponder on board the aircraft. The values for these capabilities are either InOut, Out, or None. In order to be certified a flight must have an ADS-B Surveillance Equipment code in Item 10b and a matching ADS-B Certification Qualifier is required to be found in Item 18 SUR/.**

  SAMPLE

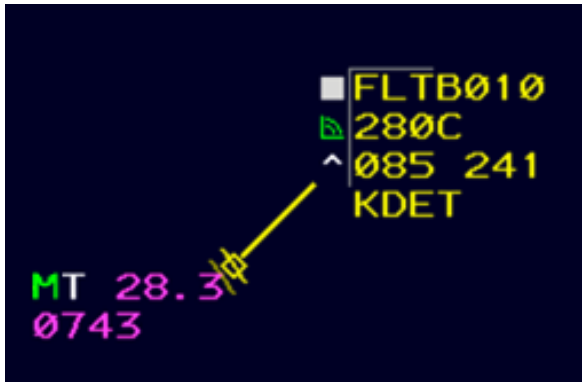
- **SUR/SURVEILLANCE DATA I0C2**
- **SUR/ ADB 282BA2 I0C2 SURDATA RSP180**

FPLs/ CPLs - Key Fields/Filing/issues/automation impacts (Cont.)

New ADS-B In Qualifiers define the types of ADS-B In Operations an aircraft is eligible for. The expected ADS-B In Qualifiers are:

- C2 – Aircraft is qualified to perform Cockpit Display of Traffic Information [CDTI] Assisted Separation (CAS) operations and the flight crew is trained/certified to execute the operation
- I0 – Aircraft is qualified to perform Interval Management (IM) operations that are supported by SafeRoute+® and the flight crew is trained/certified to perform the operation
- I2 – Aircraft is qualified to perform IM operations with the exception of Paired Approaches and the flight crew is trained/certified to execute the operation
- P1 – Aircraft is qualified to perform Paired Approach operations and the flight crew is trained/certified to execute the operation

ADS-B_CertificationQualifier	DescriptiveText
260B	1090ES
282B	UAT
A2	1090ES and UAT
ADS-B_InQualifier	DescriptiveText
C1	CAVS
C2	CAS
I0	Initial IM
I2	IM
P1	Paired Approach
S1	AIRB
S3	SURF



Open Forum Conclusion/Questions

- Safety and efficiency interests extend beyond the borders of our airspace and systems. Operational efficiencies gained in our airspace should be continuous to the extent possible as aircraft travel into other regions and service providers.
- Taking a harmonized approach ATC automated systems extends our capabilities
- As our aircraft operators invest in aircraft technology, they expect it to be compatible with systems and procedures used by other air navigation service providers.
- 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.
- Harmonization supports safety objectives through standardization and promotes economic efficiencies. A harmonized system cannot be built without developing partnerships with our international counterparts.

Open Forum Conclusion/Questions (Cont.)

Web Resources & Guidance-

- **FAA ICAO 2012 website (updated)**

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/flight_plan_filing/

- **ICAO FITS website:**
- http://www2.icao.int/en/FITS/Pages/home.aspx

- **Asia Pacific Region website:**
- http://www.bangkok.icao.int/

- **EuroControl website**
- http://www.eurocontrol.int/articles/icao-flight-planning-modifications-2012

- **NavCanada website**
- www.navcanada.ca/onboard

- **http://gis.icao.int/Flexviewer/**

Open Forum Conclusion/Questions (Cont.)

https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/flight_plan_filing