Crossing FIR Boundaries (FIRBX) History

- Launched during Global ATM; March 2014
- Task Force formed; March-April 2014
- Composed list of FIRBX issues; March-May 2014
- Categorized/prioritized list assigning designations of High, Medium, Low; May-June 2014
- Determined what FIRBX issue to pursue for mitigation; June 2014
FIRBX Mitigation Targets

Annex A

Identified FIR Boundary Crossing Discrepancies

Below is the list of boundary crossing discrepancies identified by CANSO Members and the FIRBX Task Force. They are categorised by technical and equipment, operational, and procedural issues, and as high (H), medium (M), or low (L) priority depending on the impact to safe and efficient boundary crossings. This list was initiated by Members during workshops conducted during the 5th CANSO Global ATM Operations Conference, March 2014, and the CANSO Latin Caribbean Regional Conference, December 2014. The FIRBX TF added to the initial list.

— Technical and Equipment:
    — Automation platform incompatibility (H)
    — Automation interface protocol (H)
    — FIR weather sharing with adjacent ANSPs (L)
    — ANSP communication transfers: voice and data-link (M–H)

— Operational:
    — Incompatible procedures: requirements of neighbouring ANSPs do not coincide (M)
    — Strategic and tactical ATFM (M)
    — Lack of regional implementation
    — Lack of coordination of ATFM restrictions with adjacent ANSPs
    — Incompatible ATFM plans
    — Language proficiency impacting coordination (L)
    — Global separation standards (L)
    — Time-based (standardise the minima)
    — Reduced longitudinal dependency upon aircraft (L-M)
    — Incompatible airspace design (L-M)
    — Stratum of adjacent FIR

— Procedural:
    — Metric versus imperial measurement of altitude (L)
    — Sharing of situational awareness (e.g., weather, temporary flight restrictions, ATFM restrictions) (L–M)
    — Altimeter Setting: QNE versus QNH (M)
    — Transition altitude: Flight level and altitude (L)
    — RVSM to non-RVSM coordination (L)
    — Coordination procedures: Manual versus automated (H)
    — Pilot/aircraft certification and capability (H)
    — Appropriately entered in CPL
    — ANSP: Appropriately preserved in CPL
    — Pilot/controller human error issues (H)
    — Read-back/lead-back errors
    — Manual coordination
    — Uplink and downlink messages and computer inputs, etc.
Crossing FIR Boundaries (FIRBX) History

- Drafted Best Practice Guide; June 2014-March 2015
  - Flight Planning Quality
  - Surveillance vs Non Surveillance
- Delivered document March 31, 2015
- CANSO published; June 2015

Best Practice Guide to Crossing Flight Information Region Boundaries
Current FIRBX Activities

• Task Force began preliminary work on mitigation for another HIGH priority boundary crossing discrepancy; August 2015
  – Automation Interface
• Began drafting best practice document; October 2015
• Delivery Date: March 31, 2016
FAA Automation Interface Implementations

- Successful FAA Cross-Boundary Automation Interface Implementations
United States Cross Boundary Automation Update
Dan Eaves
ATCS
FAA ATO Operational Concepts, 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 procedural or Automatic Dependent Surveillance (ADS) separation, such as the oceanic operations environments of New York, Oakland and Anchorage Centers.

• Internally, the United States has been automated between all of its Air Route Traffic Control Centers, and Terminal Radar Approach Controls for over thirty years.
Automation Harmonization is the Goal

- Support for bilateral solutions and user collaboration needed to ensure automation compatibility as interface systems evolve
- Solutions must provide extensible compatibility with our neighbors
- Goal is to extend operational efficiencies through the contiguous interface of automation platforms across FIR boundaries
- Direct benefit on our collective ability to integrate new technologies by providing ‘automation buyback’ for new controller tasks
United States ICAO Regional Operations

- Asia Pacific Region
- North American, Central American and Caribbean Region
- North Atlantic Region
Automated International Boundaries
Within North American Aviation Trilateral (NAAT/5) Canada, Mexico and U.S. agreed to cooperate on development of **seamless** interface between member countries and automation systems
- Focus on automated exchange of ICAO flight data with goal being ‘voiceless’ handoff between countries

NAM ICD defines message formats for implementation of interfaces between automation systems:
- U.S. & Canada 2009
- U.S. & Mexico 2008
- Cuba added 2011

Same standard used as guide for Caribbean flight data automation compatibility
- International neighbors installing new systems look to maximize benefits of their automation investment
- Cuba interfaced with Merida Mexico Jan 2012
- COCESNA interfaced with Merida, Mexico and Havana, Cuba in 2015
The increasing demand of international traffic between Flight Information Regions (FIR) drives the need to improve efficiency and maintain the data accuracy for the Air Traffic Control (ATC) providers.

Developing a harmonized process and using standardized protocols for exchanging data between multiple States/Territories/International Organizations within and across regions is critical to achieving efficiency through automation.

Infrastructure needs and wants is a critical factor as projects compete for the same funding.
# US NACC Regional Border Crossings

## US International Border Crossings

<table>
<thead>
<tr>
<th>Neighboring FIR</th>
<th>CY 2012 Number of crossings</th>
<th>CY 2013 Number of crossings</th>
<th>CY 2014 Number of crossings</th>
<th>CY 2015 Number of crossings</th>
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</thead>
<tbody>
<tr>
<td>Canada FIRs</td>
<td>2,489,122</td>
<td>2,513,329</td>
<td>2,556,999</td>
<td>2,409,602</td>
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<tr>
<td>Mexico FIRs</td>
<td>390,280</td>
<td>402,499</td>
<td>413,821</td>
<td>407,738</td>
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<td>Habana</td>
<td>230,212</td>
<td>233,922</td>
<td>241,641</td>
<td>242,794</td>
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<tr>
<td>Japan</td>
<td>125,961</td>
<td>130,513</td>
<td>133,490</td>
<td>131,709</td>
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<tr>
<td>SantoDomingo</td>
<td>88,751</td>
<td>92,715</td>
<td>101,822</td>
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<td>Piaro</td>
<td>79,640</td>
<td>81,027</td>
<td>85,000</td>
<td>81,567</td>
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<td>SantaMaria</td>
<td>72,281</td>
<td>73,459</td>
<td>76,726</td>
<td>75,750</td>
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<td>PortAuPrince</td>
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<td>47,978</td>
<td>49,886</td>
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<tr>
<td>Russia FIRs</td>
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<td>39,894</td>
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<td>Maiquetia</td>
<td>11,948</td>
<td>13,536</td>
<td>13,338</td>
<td>13,082</td>
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<td>Port Moresby</td>
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<td>10,672</td>
<td>10,770</td>
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<td>Auckland Oceanic</td>
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<td>Curacao</td>
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<td>5,565</td>
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<td>6,550</td>
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<td>2,839</td>
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<td>Tahiti</td>
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<td>2,571</td>
<td>2,791</td>
<td>2,630</td>
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<tr>
<td>Nauru</td>
<td>552</td>
<td>609</td>
<td>618</td>
<td>711</td>
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<tr>
<td>Ujung Pandang</td>
<td>255</td>
<td>224</td>
<td>235</td>
<td>219</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>3,609,476</strong></td>
<td><strong>3,664,647</strong></td>
<td><strong>3,750,889</strong></td>
<td><strong>3,585,071</strong></td>
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### US Automated NACC Interfaces

#### 20 NAM – 2 AIDC

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<thead>
<tr>
<th>Neighboring FIR(s)</th>
<th>Operational Interfaces</th>
<th>NAM</th>
<th>AIDC</th>
<th>Pending</th>
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<td>Japan FIR</td>
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<td>Piarco FIR</td>
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<tr>
<td>SantaMaria FIR</td>
<td>1</td>
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<tr>
<td>PortAuPrince FIR</td>
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<td>Russia FIR</td>
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<td>Maiquetia FIR</td>
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<td>Port_Moresby FIR</td>
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<td>Manila FIR</td>
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<td>Nadi FIR</td>
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<td>Tahiti FIR</td>
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<tr>
<td>Nauru FIR</td>
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<td>1</td>
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<tr>
<td>Ujung_Pandang FIR</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Note Alaska and Oakland</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>have an AIDC connection</td>
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<td></td>
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</tr>
<tr>
<td><strong>Grand Total</strong></td>
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<td><strong>20</strong></td>
<td><strong>10</strong></td>
<td><strong>4</strong></td>
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</tbody>
</table>

*Organised by canso*
North American Common Interface Control Document (NAM ICD) Operational Interfaces

• NAM Cross Border Automation implemented between 23 NACC FIR pairs
  – Canada – US – 14
    • Domestic 11
    • Alaska 2
    • Oakland Oceanic (ATOP) - Vancouver ACC
  – Mexico - 7
    • US 5
    • Cuba
    • COCESNA
  – Cuba – 3
    • US -Miami
    • Mexico (Merida)
    • COCESNA
  – COCESNA - 2
    • Mexico (Merida)
    • Cuba (Havana)
North America Automation Infrastructure

- Air Traffic Service (ATS) Interfacility Data Communications (AIDC), NAM ICD and the custom NAS protocols provide the means for automated data exchange both domestically and internationally.
  - AIDC
  - NAM
  - NAS
- These three protocol sets utilize the contiguous automation infrastructure for ATS automated data exchange between adjacent FIRs.
- A communications and data interchange infrastructure significantly reduces the need for verbal coordination between Air Traffic Service Units (ATSUs) delivering more efficient and streamlined services to the customer.
• 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 Mazatlán ACC Topsky system using the AIDC protocol.
• The US and Canada are also working the interface of New York Oceanic’s ATOP with Moncton ACC CAATS using the NAM ICD protocol.
• New York Oceanic is working towards implementing an AIDC interface with Trinidad and Tobago’s Piarco ACC. The United States shares operational boundaries with Piarco FIR via New York and San Juan FIRs.
North American Interface Environment

• In most NAM environments, radar/surveillance is the operational norm and non-radar the exception … where in many traditional AIDC interfaces non-radar is more the norm and radar is the exception.
• The NAM messaging is used throughout North America, Central America and the Caribbean and may be likened to the domestic protocol such as European Online Data Interface (OLDI).
• The NAM protocol provides the advantage of extensibility to radar handoff and point-out functionality, enhancing a positive controlled radar environment.
• The NAM ICD has defined automated radar handoff messaging within the document as a goal of cross-border interoperability evolution.
• Full AIDC capability also supports extended equipment capabilities in time, altitude and distance based operations where different separation minima are being used in adjacent airspace.
New Caribbean NAM ICD Interfaces
Extending the Automation Standard

- Compatibility management between existing/emerging international automation systems is essential to optimize capabilities and meet user needs.

- U.S. centralized geographic position requires active participation to assure automation compatibility is maintained.

- The FAA is an active participant in the NACC Region.

- Countries interested in extending interfaces capabilities with the U.S. to include automated radar handoff:
  - Dominican Republic
  - Bahamas
  - Cuba
  - Canada
Using AIDC and NAM in Automated Data Exchange

• AIDC functionality described Asia Pacific and North Atlantic ICDs; now PAN ICD
  – Provides the needed guidance for messaging, coordination and transfer to support non-radar/procedural environments such as oceanic operations.
  – It can be confusing when these primarily domestic environments such are referred to as AIDC.
• The NAM ICD is currently used in North American FIR boundary operations, in domestic/oceanic transition areas and in surveillance environments.
  – Many times operations do not fit neatly into one category or the other
  – Many systems today will allow interface protocols to be tailored to a particular interface; NAM or AIDC, systems also support both.
• A full set of messages may not be needed to achieve automated flight data exchange for a particular interface.
  – Protocols which can support incremental levels of functionality provides tremendous implementation flexibility; AIDC and NAM are used in US International interfaces
  – Supports a reduced set of interface messages
Lessons Learned

• The operational environment should always be examined when formulating the strategy for the project. In analysing a proposed interface, the following factors should be considered:
  – A determination is needed of which system protocols are already being used in bordering FIR interfaces or what protocols adjacent systems are capable of supporting. If a significant systems investment is required by a potential interface partner in support of a unique adjacent interface, the effort may never happen
  – Analysis of FIR operations is needed; radar to radar interface, a non-radar to non-radar interface or radar to non-radar is requisite to requirements definition
  – To provide the most effective automation between FIRs, operational environment matching with the proper automation protocol is needed to field a successful interface.
  – System needs coupled with current and new system capabilities/limitations should also be factored into the interface protocol decision.

• Additionally, the FAA believes that partnering with an adjacent facility who already has operational interfaces can result in a successful, timely implementation. In the absence of FIR–FIR interface experience, regional expertise may be an option.
• 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.

• 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.
FIRBX: NEXT TASK?

• During March 2014 Global ATM Operations Conference, attendees provided subject matter expertise during a workshop to identify boundary crossing discrepancies
• TF assigned them a priority of High, Medium, or Low
• What has changed in 2 years?
• Is their need to change the discrepancy priority designation?
FIRBX: NEXT TASK?

- Worksheet/Survey
  - Designate the priority for each identified boundary crossing discrepancy (L, M, H)
  - Make comments
    - Outside FIRBX scope
    - Methodology for mitigation
  - List discrepancy not originally listed in space provided
FIR Boundary Crossing Task Force – Mitigation Targets Survey

<table>
<thead>
<tr>
<th>Issue</th>
<th>Priority March/2016</th>
<th>Priority Current</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRB Crossing Discrepancy Prioritized High (H), Medium (M), or Low (L)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIRBX Worksheet/Survey

- Place completed surveys on rear publication table
- Electronic version of survey can be requested by email:

jorge.a.chades@faa.gov
QUESTIONS?