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North American, Central American and Caribbean Office

INFORMATION PAPER

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Ottawa, Canada, 24 to 28 March 2014

Agenda Item 3: Follow-up on the NAM/CAR Regional Performance-Based Air Navigation Implementation Plan (NAM/CAR RPBANIP) Progress
3.3 ANI/WG and other regional group progress reports

IMPLEMENTING AUTOMATED DATA EXCHANGE WITHIN THE NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN (NACC) REGION

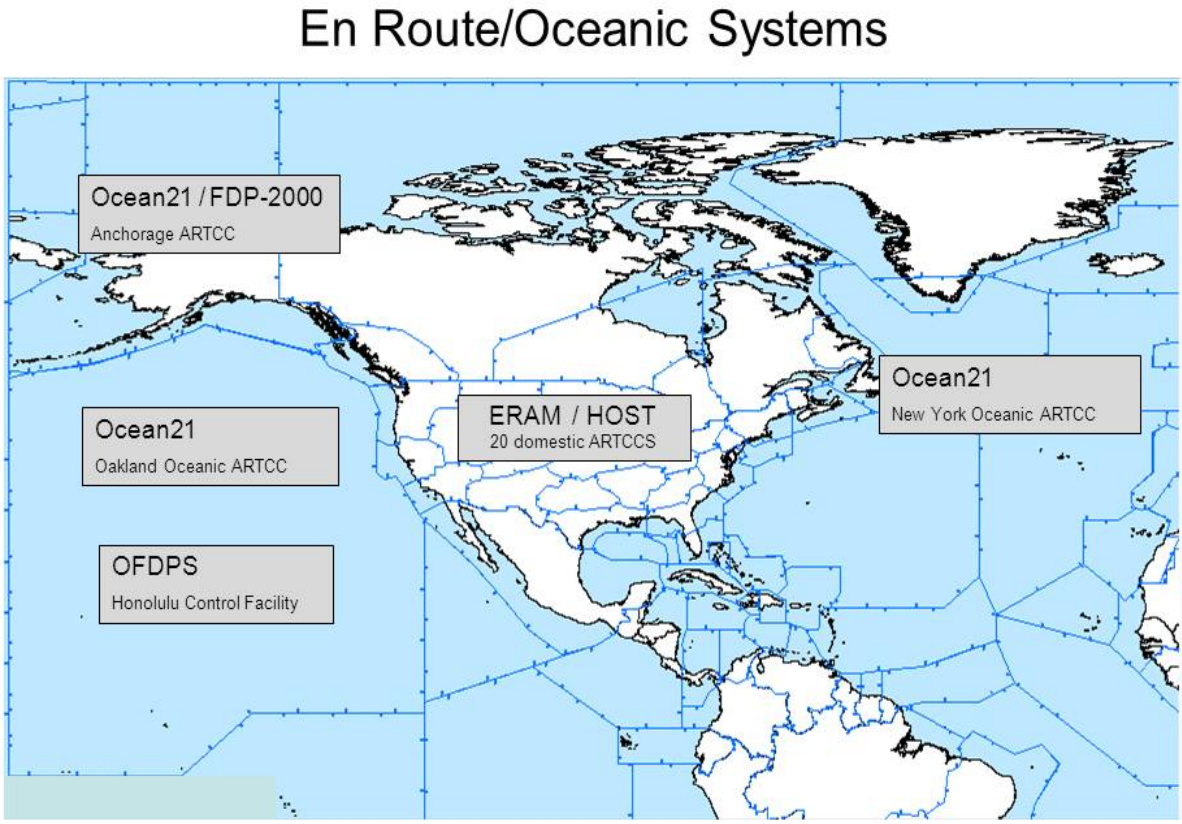
(Presented by the United States)

EXECUTIVE SUMMARY	
This paper presents activities of historical and current Automated Data Exchange as examples to help states formulate individual planning strategies for integrating automated data exchange between ATS systems. **Action:** Utilize the information and examples within this working paper to aid in developing individual state Automated Data Exchange strategies and to support successful implementation	
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency • Environmental Protection
References:	• ICAO 4444, NAM Common Interface Control Document (ICD), CAR/SAM ICD, Asia-Pacific ICD,North Atlantic ICD

1. Introduction

1.1 The FAA provides air navigation services to over approximately 29 million miles of domestic and international airspace with approximately 43 million aircraft handled annually. FAA figures show that the National Airspace System (NAS) includes more than 18,000 airports, 21 US Air Route Traffic Control Centers (ARTCC) , nearly 200 Terminal Radar Control (TRACON) facilities, over 450 air traffic control towers (ATCTs), flight service stations and automated flight service stations (FSSs/AFSSs), and approximately 4,500 air navigation facilities.. 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 and Mexico. Operations across international boundaries also can be based on non-radar procedural or Automatic Dependent Surveillance (ADS) separation, such as the oceanic operations at New York, Oakland, Houston and Anchorage Centers. There are also international boundaries where ATO oceanic air traffic services abut terminal operations belonging to another country or provider, such as with the Bahamas, Bermuda and several island nations in the South Pacific.

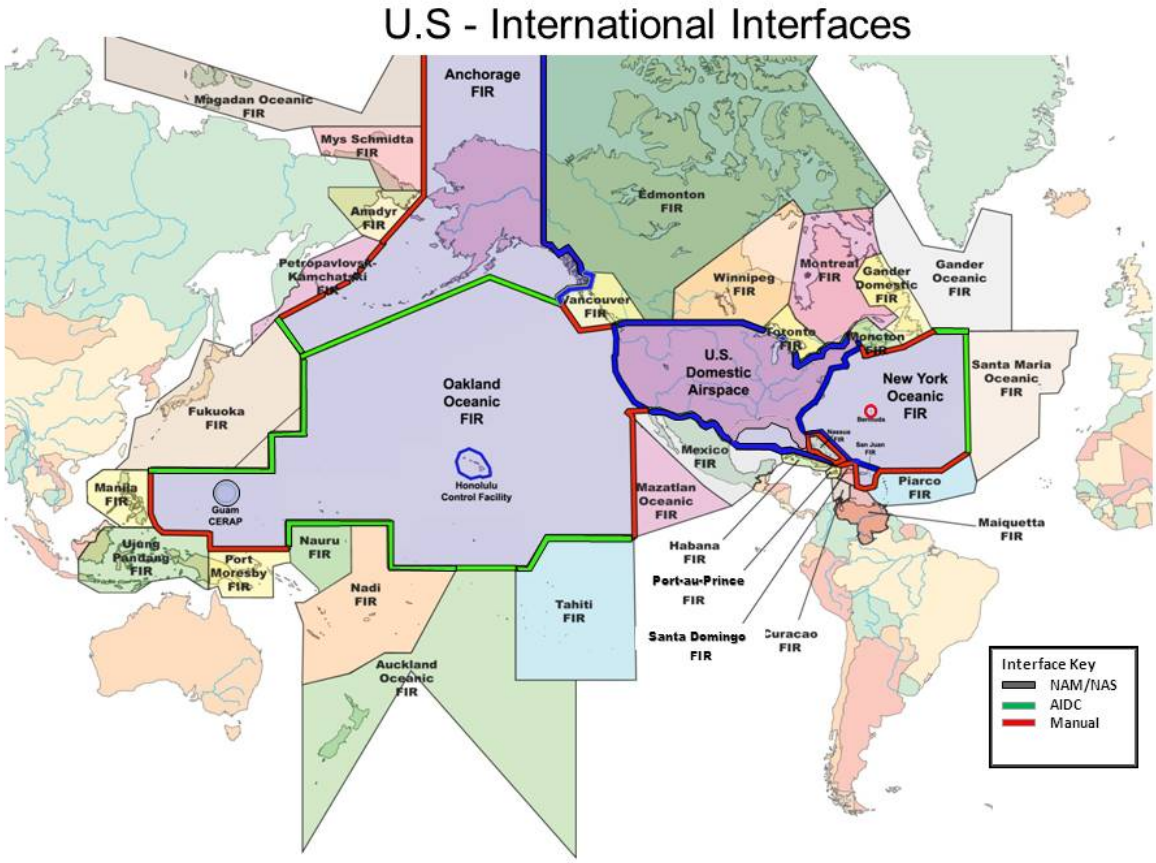
1.2 The increasing traffic demand between Flight Information Regions (FIR) drives the need to improve efficiency and maintain the accuracy for the Air Traffic Control (ATC) providers. Developing a harmonized process and defining protocols for exchanging data between multiple States/Territories/International Organizations within and across regions is critical to achieving efficiency through automation.



1.3 ATS Interfacility Data Communications (AIDC), North American Common Coordination Interface Control Document (NAM ICD) or similar automation, can provide the means by which automated data exchange can be harmonized between Air Traffic Service Units (ATSU).

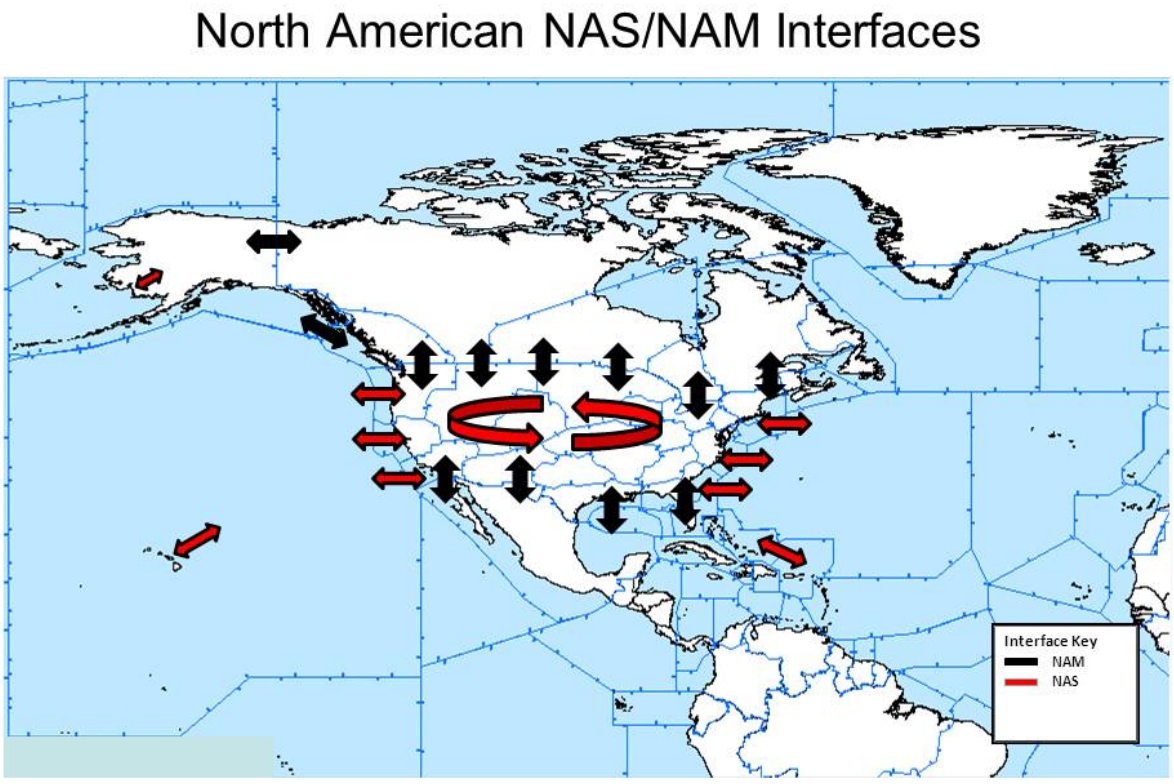
1.4 This can provide the contiguous infrastructure for air traffic service within and between adjacent FIRs. The Interface Control Document for Data Communications between ATS Units in the Caribbean and South American Regions (CAR/SAM ICD) was modelled from the NAM ICD which was originally developed for operational interfaces with the United States, Canada and Mexico. The NAM ICD has since been modified to include interfaces between US's Miami ARTCC and Cuba's Havana ACC and between Mexico's Merida Area Control (ACC) and Cuba's Havana ACC. 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. The impetus of the automation requirement stems from the increasing traffic levels transiting between FIRs in many regions upgrading Air Traffic Control (ATC) automation systems. The United States employs two categories of automated data exchange between ATC facilities; these categories could be termed Internal and External.

1.5 The Internal automation category which supports flight data exchange, voiceless handoffs and point outs is termed National Airspace (NAS) interfaces. They are used between the 20 domestic ARTCCs providing connectivity and automation interoperability between all the continental US ARTCCs as well as between over two hundred Terminal Radar Approach Controls and adjacent ARTCCs. Anchorage ARTCC's ATC automation systems also support NAS interoperability with Terminal facilities. This custom/proprietary interconnectivity being referred to as NAS has been in use for over thirty years and has evolved dramatically in support of flight data exchange and real-time positive ATC control. External interfaces support two distinct ICAO-based protocols. The first protocol, AIDC is used primarily in Oceanic areas and the second protocol is NAM ICD which bridges interfacility data transfer between U.S. domestic areas in North America and adjacent country FIRs. The Ocean21 or ATOP system is built around providing non-radar separation and integrating the technologies which support trans-Atlantic and trans-Pacific flight.



2. Discussion

2.1 The flight plan data interface provides interoperability among automated systems allowing data exchange between ATSUs that is harmonized to a common standard. The United States, Canada and Mexico created the NAM ICD based on a 1998 Tri-lateral agreement using ICAO 4444 and AIDC messaging protocol. The NAM functionality is more adept at supporting radar and mixed domestic/ocean transition environments. The traditional AIDC message set is well suited for oceanic operations where more controller interaction is required and the need to integrate different separation standards is needed. In most NAM environments, radar 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 and may be likened to the domestic protocol such as European Online Data Interface (OLDI). The NAM protocol provides the advantage of extensibility to handoff and point-out functionality enhancing a positive controlled radar environment. Both the NAM and traditional AIDC protocols support the notification, coordination and the transfer of communications and control functions to different degrees between Air Traffic Service Units (ATSU). Full AIDC capability also supports extended equipment capabilities in time and distance based operations where different separation minima are being used in adjacent airspace. The NAM ICD has included automated radar handoff messaging definitions within the document as a future goal of cross-border interoperability evolution.



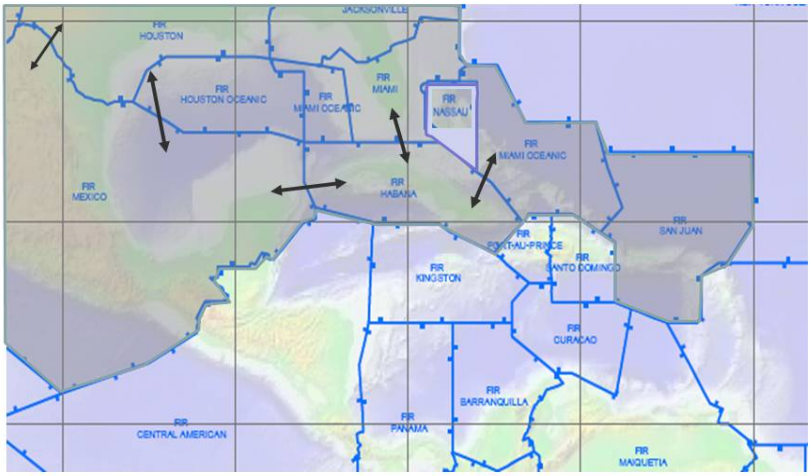
2.2 **Benefits.** Our customers' safety and efficiency interests extend beyond the borders of our airspace system. Operational efficiencies gained in our airspace should be continuous to the extent possible as aircraft travel into other regions and service providers. Traditional benefits noted in their respective environments from automation include:

- Reduced workload for controllers;
- Reduction of readback/hearback errors during coordination;
- Reduced "controller to controller" coordination errors; and language barrier issues; and
- Increased in support for performance based navigation initiatives and emerging technologies with automation.

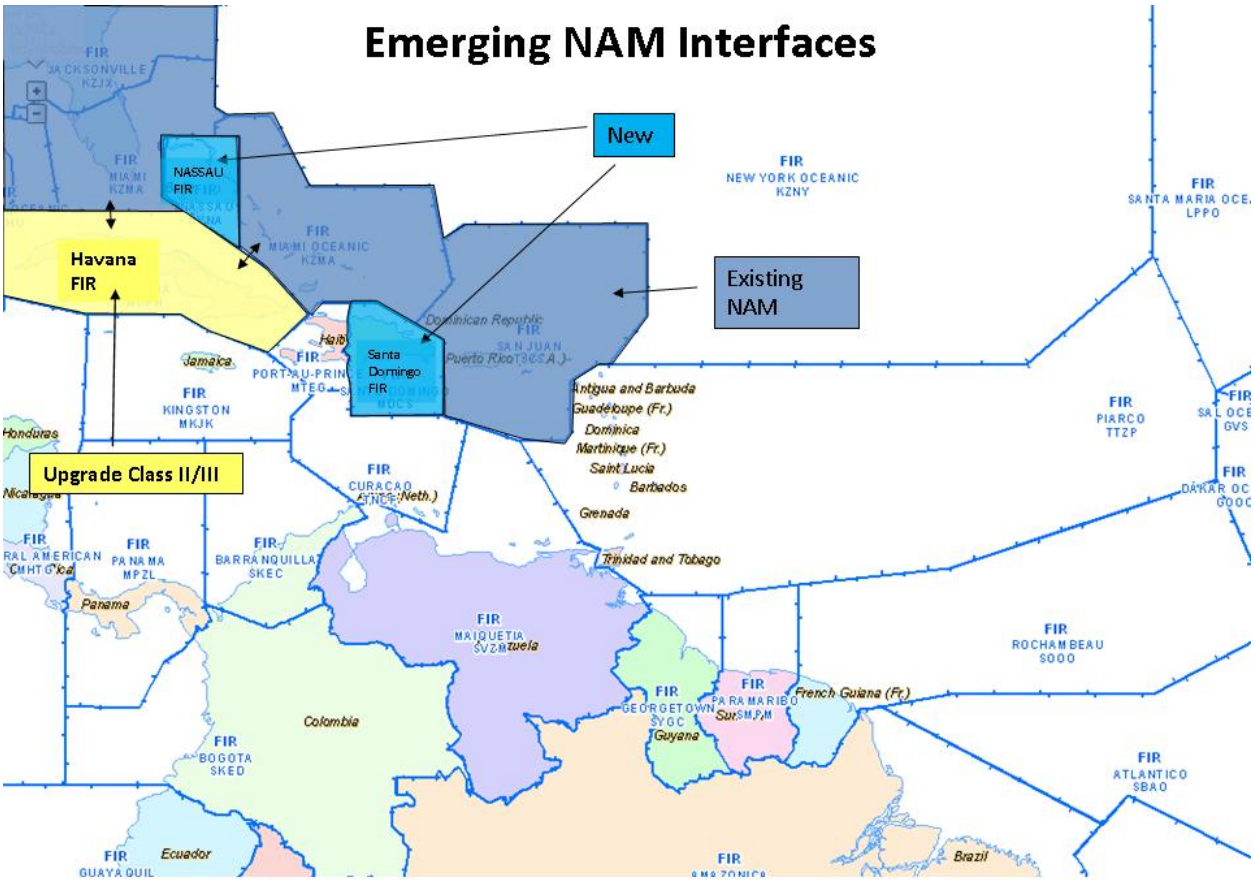
2.2.1 As our aircraft operators invest in aircraft technology, they expect it to be compatible with systems and procedures used by other air navigation service providers (ANSP). Ideally, they would prefer to use the technology for the same safety and efficiency gains achieved here in the United States. Standardization of CNS/ATM 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. Such technical and operational alignment can take many forms, depending on the target technology or procedure. The U.S. and NAM ICD member States have realized automation gains that provide significant safety and efficiency benefits. A recent example of extending automation capability in the North American region is the Miami ARTCC 2011 automation interface with the Havana ACC. It has been estimated that a fifty per cent (50%) reduction in workload has been achieved for controllers working the border sectors at the Miami Center with the operational implementation of NAM ICD Class 1.

2.3 **Recent Success.** In 2010 Havana ACC (MUFH) and Miami ARTCC (KZMA) agreed to pursue the NAM interface between their facilities. The interface decision process took into consideration; (1) the USA – Mexico interfaces could be used as a model for their own effort. (2) adjacent airspace was radar to radar operations and the NAM ICD protocol effectively supported that choice, (3) the selected NAM protocol message sets were a scalable solution allowing the implementation of a basic Class I CPL-LAM interface initially with the ability to grow the capabilities to Class II and eventually Class III handoff. Additionally, the US had the expertise to assist in the implementation of a NAM ICD based CPL – LAM interface which was already operational with Canada and Mexico. Cuba was internally developing the software in accordance with the NAM ICD and was committed to providing the requisite effort and technical proficiency. The interface was implemented in December 2011. By virtue of making the proper planning decisions in the KZMA – MUFH interface, Mexico and Cuba were able to connect with a like interface between Merida – MUFH only one month later, a significant accomplishment.

North America – Caribbean
NAM ICD

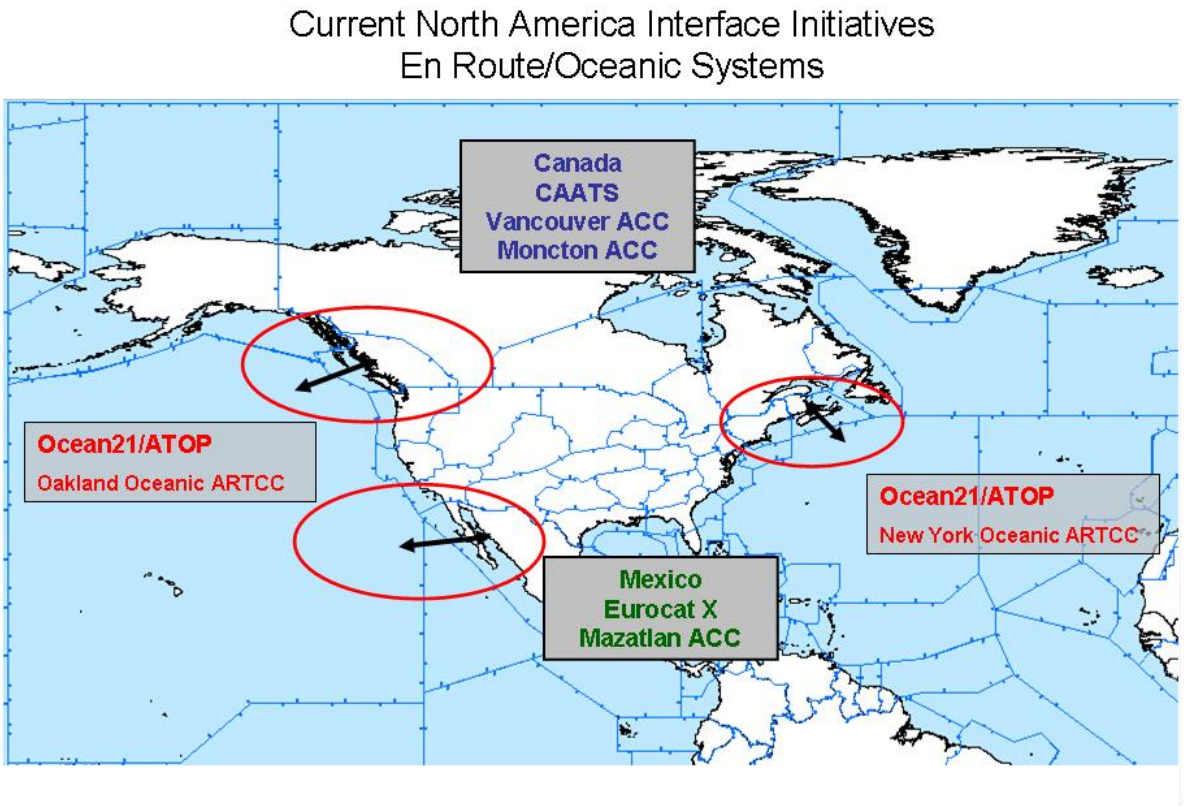


2.4 **Planning Automation Interconnectivity**: The FAA believes the NAM ICD to be the primary standard for radar to radar operations and mixed radar non-radar environments like those found in North America, Caribbean and Central America.



2.4.1 The AIDC functionality described in the Asia Pacific AIDC ICD or the North Atlantic ICD * provides the needed guidance for non-radar messaging coordination and system non-radar functionality as is used in oceanic operations. It can be confusing when these primarily domestic environments such as the CAR/SAM ICD are referred to as AIDC. The NAM ICD is currently used in mostly domestic operations and domestic/oceanic transition areas. Many times operations do not fit neatly into one or the other category. Many systems today will allow interface protocols to be tailored to a particular interface; NAM or AIDC. A full set of messages may not be needed to achieve automated flight data exchange for a particular interface. Scalable interfaces which can support incremental levels of capabilities using a reduced set of interface messages provides for tremendous implementation flexibility. A strategy which allows achieving benefits of the interface while keeping the amount of ATC and technical training to a manageable size can be a project saviour. A training regimen which could be overwhelming with a full interface implementation can be integrated into even a new system schedule. Additionally, the incremental approach provides the opportunity to learn the system after implementation making subsequent informed decisions based on operational need. Within the U.S. interfaces both NAM and AIDC have been used in reduced message set implementations. Improper interface selection during the interface planning phase can cause issues which may prevent an interface from being implemented.

* Note: NAT/APAC ICDs are currently being combined into PAN ICD via Inter-regional AIDC Task Force (IRAIDCTF) activity.



2.5 **Lessons Learned.** When analysing the proposed interface, the operational environment should always be examined when formulating the strategy for the project. The following factors are among those which should be considered:

1. A determination 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. It is very important that achievable automation decisions be made.

2. Analysis of whether the adjacent FIR connectivity would be supported by a radar to radar interface, a non-radar to non-radar interface or radar to non-radar should be examined. In order to provide the most effective automation between FIRs, operational environment matching with the proper automation protocol is needed to field a successful interface.

3. System needs coupled with current and new system capabilities/limitations should also be factored into the interface protocol decision. In a mixed environment of radar and non-radar the NAM ICD protocol can be used effectively. Additionally, the FAA believes that partnering with an adjacent facility who already has operational interfaces using the same protocol NAM or AIDC can also lead to a successful, timely implementation. In the absence of FIR – FIR interface experience, regional expertise may be an option.

4. If the adjacent FIR automation partners planning includes evolving to positive control in automated radar transfer the NAM ICD message set provides for evolution of Class I, Class II and culminating with Class III handoff. It also provides incremental functionality steps to achieve interface goals.

3 Conclusion

3.1 Our customers' safety and efficiency interests extend beyond the borders of our airspace system. Operational efficiencies gained in our airspace should be continuous to the extent possible as aircraft travel into other regions and service providers. 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 (ANSP). Ideally, they would prefer to use the technology for the same safety and efficiency gains achieved here in North America and adjacent regions, serving as stepping stones to greater automation productivity. Standardization of automated data exchange technologies and procedures are critical to cross-border, regional and multi-regional interoperability. This, in turn, drives the seamless operation of regional and global systems. Such technical and operational alignment can take many forms, depending on the target technology or procedure. The overarching international goal of future automation interface activities is to achieve harmonization of systems and procedures to ensure interoperability across international boundaries. Such harmonization supports safety objectives through standardization and promotes economic efficiencies. A harmonized system cannot be built without partnerships with our international counterparts.

4. Action by the meeting

4.1 The meeting is invited to:

a) request individual NACC States to utilize the historical and current interface information within this working paper to gather the necessary information;

b) evaluate the operational/technical requirements; and

c) formulate the interface strategies for successful implementation of Automated Data Exchange.

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