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INFORMATION PAPER

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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

MIAMI AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC) – SANTA DOMINGO AREA CONTROL CENTRE (ACC) - ATS AUTOMATED DATA EXCHANGE IMPLEMENTATION IN THE NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN REGION

(Presented by United States)

EXECUTIVE SUMMARY

This paper presents information to outline Automated Data Exchange activities required to implement the interoperability of an North American Common Interface Control Document (NAM ICD) interface such as is being planned between the Santa Domingo ACC (MDCS) and the Miami ARTCC (KZMA).

Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency • Environmental Protection
References:	• NAM ICD, North Atlantic ICD, ICAO 4444

1. Introduction

1.1 A communications and data interchange infrastructure significantly reduces the need for verbal coordination between Air Traffic Service Units (ATSUs). Air Traffic Service (ATS) Automated Data Exchange (ADE) encompasses North American Common Interface Control Document (NAM ICD) and can include ATS Interfacility Data Communications (AIDC), or similar automation. ADE can provide the means by which data exchange can be harmonized between ATSUs providing air traffic service in, and adjacent to, the North American, Central American and Caribbean region. ATS providers in several regions have identified the requirement to exchange flight plan and radar data information between adjacent ATC facilities utilizing automated data exchange. The increasing traffic demands between FIRs prompt the need to improve efficiency, safety and accuracy for the ATC providers. Developing a harmonized process and defining protocols for exchange of data between multiple States/Territories/International Organizations within and across regions is critical to achieving this derived objective. As ATS providers develop their automation systems, consideration should be given to meeting the capabilities identified within an Interface Control Document (ICD) which serves to meet the requirements of the region. The interface control document for ATS Interfacility Data Communications in the Caribbean and South American Regions (CAR/SAM AIDC ICD) was modelled from an ICD which currently supports operational member and adjacent member interfaces; the NAM ICD.

2. Discussion

2.1 The flight plan data system interface provides interoperability among automated systems allowing data exchange between ATSUs that are harmonized to a common standard. The United States, Canada and Mexico drafted the NAM ICD, based on a 1998 agreement of the Trilateral derived from the ICAO 4444 and AIDC messaging. The described functionality is adept at supporting radar and mixed domestic transition environments. The traditional AIDC message set is more attuned to oceanic operations where more controller interaction is required to maintain the time, distance and altitude separation standards. In most NAM interoperability environments, radar is the operational norm and non-radar the exception where in traditional AIDC non-radar is more the norm and radar is the exception. The NAM messaging may be likened to other domestic environment protocols such as in European Online Data Interface (OLDI) but they are not compatible. Both NAM and traditional AIDC protocols support the defined notification, coordination and the transfer of communications and control functions to different degrees between ATSUs. Full AIDC capability also supports extended equipment capabilities in time and distance based operations where different separation minima are being used. The NAM ICD has included automated radar handoff messaging within the document as a future goal of cross border functionality.

2.2 Both NAM and traditional AIDC implementation has proven highly successful. Automation gains have been realized, providing significant safety and efficiency gains. A recent estimation of a fifty per cent workload reduction for controllers working the sectors recently converted to automation at Miami Air Route Traffic Control Center. Benefits noted in their respective environments include:

a) Reduced workload for controllers;
b) Reduction of readback/hearback errors during coordination;
c) Reduced “controller to controller” coordination errors; and language barrier issues
d) Increased support for performance based navigation initiatives and emerging technologies with automation

2.3 Although the CAR/SAM AIDC ICD refers to AIDC as the supported protocol within the document it is not the AIDC message set used in Asia/Pacific and North Atlantic ICDs but a version which replicates the messaging contained in the NAM ICD. The North American automated flight data message set found messages in the NAM ICD currently operationally between the United States and Canada, the United States and Mexico, the United States and Cuba and Cuba and Mexico. One of the strengths of the NAM message set is the scalability of the functionality. The NAM ICD allows an automated interface to be constructed with a minimum of two messages known as Class 1. Class 1 consists of the current flight plan message; the CPL and the acknowledgement message; the LAM. More capabilities are available in Class II, building on the Class 1 foundation.

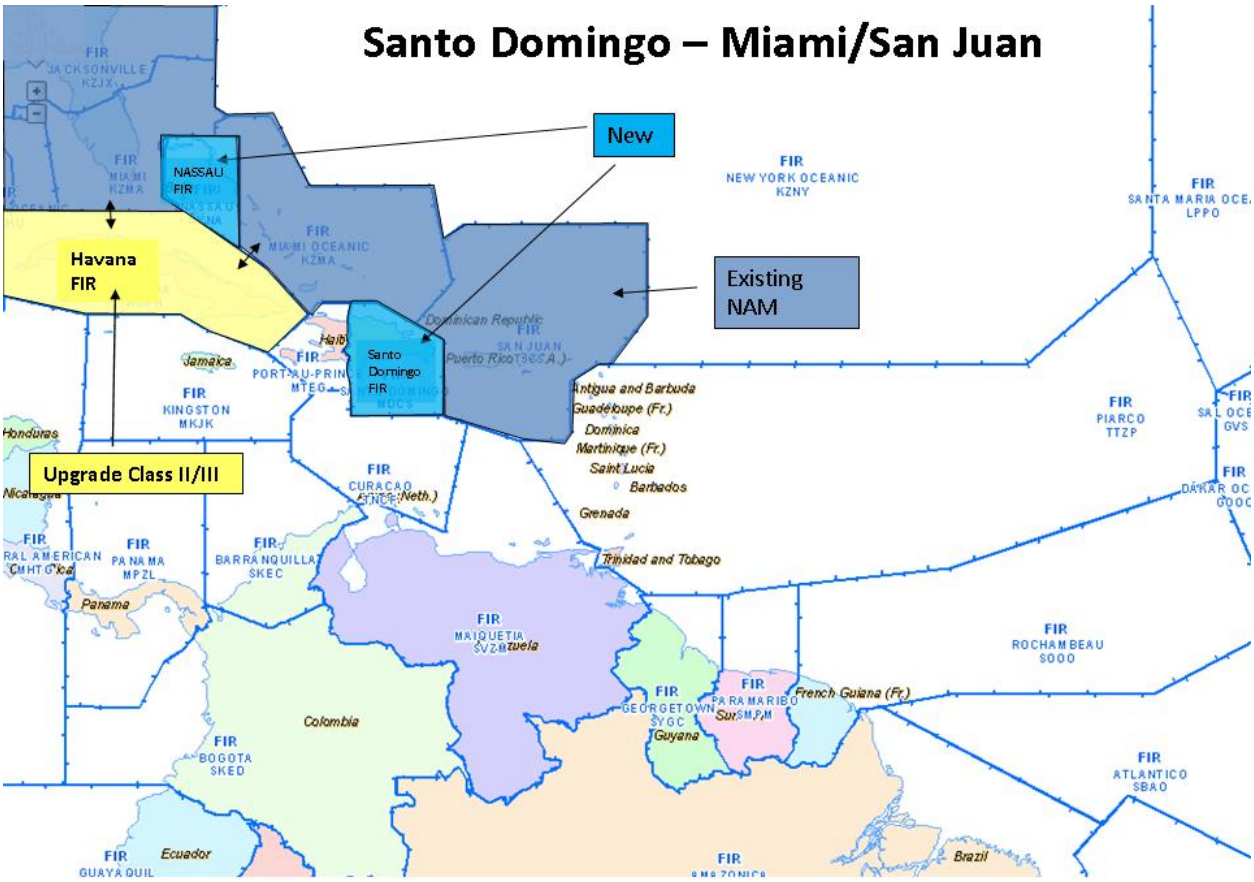
2.3.1 The most recent NAM ICD Class 1 interfaces which have become operational in the last few years are:

a) Miami ARTCC and Havana ACC– December 2011
b) Havana ACC and Merida ACC– January 2012

2.3.2 NAM ICD interfaces being evaluated for implementation in 2014 are:

a) Oakland Oceanic and Vancouver ACC
b) New York Oceanic and Moncton ACC

2.4 During Miami ARTCC and Santo Domingo Area Control Center (ACC) Operational Letter of Agreement (LOA) Meetings held in July 2011, automated flight data sharing was identified as a proposed solution for reducing the complexities of a congested border between Miami ARTCC and Santo Domingo ACC. Existing operational problems are compounded by the ever-growing number of flights per day, multiplied by two or more coordination calls between facilities required for each flight. Projected benefits were identified in replacing the existing manual flight data interface between the two facilities with an automated interface. Derived benefits are gained via: the reduction of the verbal coordination errors which are known to exist in manually translating precise flight data and control information between Miami and Santo Domingo controllers.With the Dominican Republic's acquisition of the Thales EURCAT C ATC system comes an opportunity to enhance the Caribbean region's automation infrastructure. In an initiative not unlike the Miami ARTCC and Havana ACC ADE effort, an automation activity between Santo Domingo ACC and Miami ARTCC is being planned. Automation interfaces vastly improve the capabilities of the facilities and extend the capabilities within the Caribbean and Gulf of Mexico regions.



2.5 The most pervasive issue is that both facilities are transitioning to new ATC systems. Miami ARTCC is in the final phase of implementing the Next Generation (NEXTGEN) En Route Automated Modernization (ERAM) which replaces the HOST En Route Computer System. Santa Domingo ACC is integrating the Thales EUROCAT 'C' ATC automation system. To add to the complexity of the effort the San Juan Combined Center Radar Approach Control (CERAP) along with Miami ARTCC combines to make up half of the adjacent boundary of Santa Domingo ACC. The Miami ARTCC Host and soon ERAM provides the flight data processing for San Juan CERAP (KZSU). Extensive work was done in an eighteen- month system implementation effort during the Miami – Havana ADE effort which consisted of airspace and system parameter adaptation, ATC procedure coordination, Letter of Agreement tailoring, communications interoperability and protocol testing and troubleshooting, and training. Both non-operational and operational testing was extensively conducted. The Miami – Havana project can serve as a model for the Miami – Santa Domingo interface.

2.5.1 Planning the Project. As previously mentioned the Santa Domingo interface will vastly improve the capabilities of the interfaced facilities and extend of the automation capabilities within the Caribbean. As with the Havana – Miami interface, extensive work will be required and will consist of airspace and system parameter adaptation, ATC procedure development/coordination, Letter of Agreement tailoring, communications interoperability, protocol testing and required troubleshooting activities. The training to be conducted for Santa Domingo will consist of not only new system activities but the automation activities required in a new interface. Both non-operational and operational testing will require extensive planning and execution. The telecommunication infrastructure the automated data exchange utilizes consists of a combination of NADIN and MEVA II interconnections. The telecommunication network will be needed to support the automated data exchange messages as well as existing AFTN messaging in capacity sizing. With these factors in mind Project Planning should include as a minimum the following activities:

- ADE Project Planning /Step
  - New ATC System Implementation for both facilities – ERAM and EUROCAT C
    - Planning ADE; builds on the infrastructure of the new systems
    - Equipment and personnel required
    - Absence of resources may require waiting until systems are operational
  - Technical Strategy - target Class I (CPL-LAM) / II NAM functionality;
    - Taking advantage of scalability
  - Telecommunications analysis/testing
  - Schedule/Managing issues
  - Workforce coordination
- Adaptation/Non-operational testing
  - NAM ICD requirements and compatibility
  - Reconciling System to System issues
  - Integrating ADE routes, fixes, airspace, times
- Operational preparation/testing
  - Training
  - New/revised flight data environment tasks
- Plan cutover strategy

2.5.2 Several critical planning activities must be addressed during the Project Planning phase of ADE. During project planning analysis must provide a realistic look at the required/ available resources for preparing for ADE is essential. If the adaptation/ Non-operational testing can be run in parallel with system implementation then significant time can be saved in the project. An FAA Technical Center and a EUROCAT C test configuration will need to be explored for this strategy. If the bilateral resources are not available to perform the work in parallel then the project must wait until the ERAM and/or EUROCAT systems are operational. Additionally, to optimize ADE implementation a full set of messages may not be needed to achieve automated flight data exchange. Scalable interfaces which can support incremental levels of capabilities using a reduced set of interface messages provides for tremendous implementation flexibility. In a Class I interface between KZMA and MDCS, where both workforces will be gaining experience with new ATC systems, wise planning may dictate beginning with a less complicated version of the new interface. The Class I interface will also require less training for both facilities. 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 savior. A training regimen could be overwhelming with a full interface implementation. Another benefit of the incremental approach provides the opportunity to gain familiarity with the system after implementation. Migration to the full featured version can be delayed until after expertise with the system is attained. Within the U.S. both NAM and AIDC interfaces have been used in reduced message set configurations. Attempting implementation of overly complex functionality can cause issues which may delay the project or prevent an interface from being implemented.

2.5.3 The telecommunication infrastructure for the KZMA and MDCS automated data exchange interface is expected to approximate the KZMA – MUFH configuration. The current telecommunication support network consists of a combination of the NADIN and MEVA II systems. The network will need to process the automated data exchange messaging as well as any existing AMHS messaging. Analysis of the current telecommunication capabilities and those added by ADE requirements will need to be evaluated. It was necessary to increase the MEVA II bandwidth for fielding the KZMA – MUFH ADE capability.

2.6 Other Lessons Learned. One known transitional issue which can be an ADE implementation ‘show stopper’ involves the quality of flight plans and filing practices. Flight plans received before an interface was automated could be processed manually but with automation, the data are received by systems which are less forgiving of errors in format and data integrity. These errors can lead to manual intervention and result in an overwhelming amount of additional work for controllers. Many errors in filed flight plans which may have been absorbed for years within a manual system are now problematic to the automation when filed information is not in accordance with defined ICAO guidelines. Additionally, multiple flight plans received for the same flight must be manually parsed to ensure the correct data is being entered into the computer and forwarded by the computer system to downstream facilities. Conflicting information between those filed at the departure airports and those filed by the airlines are often seen. Miami ARTCC has been dealing with these types of flight plan issues for years but they were new to the Havana ACC automation in their new automated configuration. Havana’s automation had to deal with conflicting data, which included identifying and correcting flight plan errors. The solution for this large problem must include quality control initiatives for filers and filing services to improve the transmitted data. The solution must be a collaborative effort aimed at reducing the number of flight plans in error and reducing instances of multiple flight plans for the same flight. This transition issue is an indicator of a quality control problem that already existed within the manual system but now is now apparent because automation demands greater adherence to standards. The quality issue is a significant one and will require engaging the help of ICAO, the filers and automated system users in seeking collaborative solutions. Potentially this flight data issue will impact all automated NACC interfaces. The solution will not be easy but the result will be a better and safer product for the automated systems which support the worldwide flying environment.

2.6.1 Development of a strategy for the integration of automated Air Traffic Control systems will require an evolutionary approach, grounded in safety concepts, yet able to evolve into an interoperable system infrastructure. A vision which supports ATC information exchange between ATS facilities must embrace realistic requirements definition and solutions which can be scaled to meet the level of need of interface partners within the region. The lessons learned from the interface initiatives such as listed in this information paper should be used to supplement the requirements definition process of member ATM systems. A goal of integrating a system which creates a seamless, flexible, optimal and dynamic management of airspace may be an unrealized goal unless it is teamed with a realistic implementation methodology capable of achieving benefits that can grow based on needs of the member states.

3. Recommendation

3.1 The Meeting is invited to:

- Note the information in this information paper;
- Support measures and build on lessons learned by member states to reach the goal of a seamless, globalized air traffic system enabled by ADE ; One step at a time
- Encourage the development of action plans that are based on achievable automation results in defining automation within air navigation work plans;
- Support is needed for regionally harmonized interface goals
- Support an initiative to improve the quality of flight plan data; and
- Look at the recent automated data exchange successes; they really are working

— END —