Organización de Aviación Civil Internacional
Proyecto Regional PNUD/OACI RLA/98/003
Transición a los Sistemas CNS/ATM en las Regiones CAR y SAM

Décima Reunión/Taller de Trabajo de Autoridades y Planificadores de Gestión del Tránsito Aéreo (ATM) para la Implantación en las Regiones CAR/SAM (AP/ATM/10)

(Lima, Perú, 10 al 14 de mayo de 2005)

Asunto 4: Automatización ATM en las Regiones CAR/SAM

Programa para la Interfaz de los Sistemas Automatizados entre Canadá, Estados Unidos y México

(Presentada por los Estados Unidos)

Resumen

Esta Nota de Estudio presenta información sobre el Programa para la Interfaz de los Sistemas Automatizados entre Canadá, Estados Unidos y México.

1. Introducción

1.1 La *Federal Administration Aviation* (FAA) de los Estados Unidos, NAV CANADA y SENEAM de México, identificaron la necesidad de establecer una interfaz continua de la ATM Automatizada a través de nuestras fronteras para gestionar el continuo incremento del volumen de tránsito en Norteamérica.

2. Análisis

2.1 La necesidad de automatizar el intercambio de datos de vuelo estuvo orientada por el continuo crecimiento del tránsito aéreo en y a través de Norteamérica. La carga de trabajo del controlador, la exactitud y oportunidad de la entrega de la información están sufriendo el impacto del crecimiento del volumen de tránsito. Para acomodar dicho volumen de tránsito, se acordó que sería necesario que las interfaces entre las dependencias de Canadá, Estados Unidos y México fueran similares a las interfaces existentes entre las dependencias de la FAA.

2.2 A través del Grupo de Trabajo CAN/MEX/USA (CAN/MEX/USA/WG), se creó el Grupo de Tarea sobre Interfaz de los Sistemas Automatizados (ASI/TF). Este Grupo de Tarea desarrolló el Documento para el Control de la Interfaz para la Coordinación Común de Norteamérica (NAMICD) que incluye mensajes que serían utilizados. Estos mensajes primero colocan la primera dirección de los datos del plan de vuelo, luego, las enmiendas de los datos, seguido eventualmente por la transferencia automatizada radar.

2.3 La presentación que aparece en el **Apéndice A** de esta Nota de Estudio, proporciona información sobre cómo los tres proveedores de Servicios ATS desarrollaron el programa, algunas de las dificultades encontradas y nuestros métodos para tratar con este complejo programa.

3. Acción sugerida

3.1 Se invita a la Reunión tomar nota de la información proporcionada en esta Nota de Estudio.

AP/ATM/10
WP/NE-15
Appendix/Apéndice A

ato
AIR TRAFFIC ORGANIZATION

CAN/MEX/USA

Automation Systems Interface

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Background

- At the Fifth North American Aviation Trilateral (NAAT/5) in June 1998, Canada, Mexico, and U.S. agreed to cooperate on development of a seamless interface between automation systems, focusing on automated exchange of flight data

- Trilateral Automation Systems Interface Task Force (ASI/TF) created to develop and implement interfaces to support:

  - Automated flight plan exchange
  - Automated radar hand-offs
  - Ultimately, seamless cross-border ATC operations that provide efficiencies similar to those achieved between FAA facilities

Need

- Largely manual method of exchanging flight data information with Canada and Mexico decreases ability to efficiently support increasing cross-border traffic

Operational Benefits

- Reduced controller manual coordination at border sectors
  - Less phone time = more time separating aircraft
  - Provides direct benefit to U.S. border Air Route Traffic Control Centers (ARTCC)
- Increased Safety
  - Coordination more reliable with standard terms in standard formats with reduced human factor errors
  - Flight data automation will reduce manual cross-border coordination and allow automation benefits currently associated with domestic US operations

Operational Benefits (Continued)

- Capability to utilize ICAO Flight Plan format benefits
  - More comprehensive description of aircraft equipment to support automation and decision making to include supporting RVSM, RNP and preferential route processing
  - Defines type of flight, e.g., GA, military, commercial, etc.
  - Provides airframe-unique 24-bit address (CPDLC/ADS requirement)

Harmonization

- ASI/TF has developed a North American Common Coordination Interface Control Document (NAM ICD) which defines the message formats for the interfaces between automation systems of the United States and Canada and of the United States and Mexico
  - NAM ICD based on ICAO 4444, North Atlantic Common Coordination ICD and Pacific Common Coordination ICD
  - ICD outlines current and long-term guidelines for harmonized development of automation systems
  - ICD is designed as a living document that will be updated to reflect the needs of the three ATS Providers

ICD Features

- ICD prescribes common message sets by which the three ATS Providers will exchange control information
- ICD provisions include: core messages to be used by ATC facilities, communications requirements, interface protocols
- The phased functionality of the core messages include :
  - Passing/receiving Current Flight Plan and Logical Acceptance messages
  - Passing/receiving Filed, Change, Modify, Estimate, Cancel and Reject messages needed for full automated exchange of flight plans
  - Messages needed to support automated radar handoff capability

Automation Systems

- FAA's Host En Route Automation Systems modified to process, store and forward ICAO flight plan information
- Mexican JADE system operational; Initial cross-border automation interfaces established
- Canadian Automated Air Traffic System (CAATS) to be fielded in 2005-2006. Testing is being conducted between U.S. and Canadian Technical Centers

Telecommunications

- Communications used to support the automation interface between U.S. – Mexico and U.S. - Canada is the Aeronautical Fixed Telecommunications Network (AFTN)

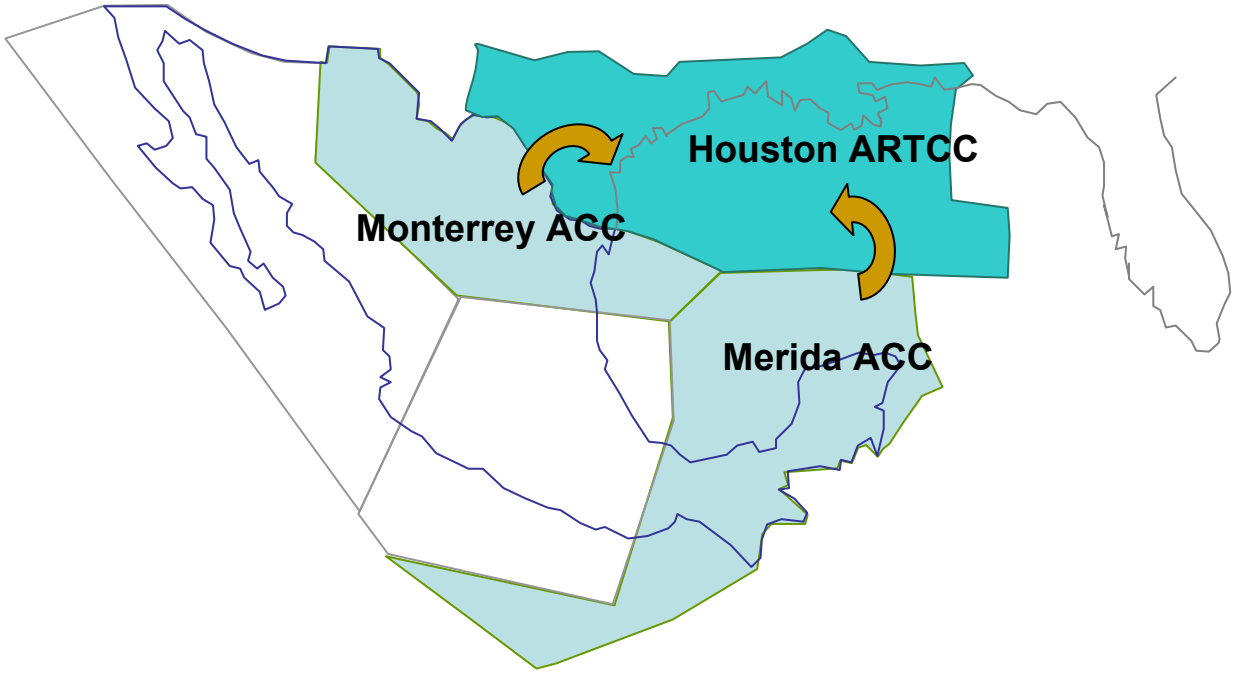
- Legacy communications systems such as AFTN may be the choice because of availability and cost but experience has shown they come with problems

  – Store and forward system not optimal for ATC data
  – Bandwidth had to be upgraded to support projected volume of traffic
  – Embedded characters in the message processing such as carriage return / line feed for teletype use has caused an inordinate amount of processing problems

Cross-border Collaboration

Current FAA - SENEAM Cooperation

- Interface between FAA Host and SENEAM JADE automation systems was implemented in November 2004



- Current Flight Plan and Logical Acceptance messages are being processed between Houston ARTCC and Merida and Monterrey ACCs

Current FAA - SENEAM Cooperation (Continued)

- Problems encountered with southbound continental flights, resolution being developed
  - RVSM Status (solved 20/01/05)
  - Direct routes / Reroutes
  - Time parameters
- FAA / SENEAM technical discussions continue with goal of extending interface to the other facilities across the border between U.S and Mexico
  - Albuquerque ARTCC – Monterrey and Mazatlan ACCs
  - Los Angeles ARTCC – Mazatlan ACC

FAA - SENEAM Interim Next Steps

- Extending flight data capabilities of interface to include ability to modify active data and support near-border departures

- Continuation of successful implementation of seamless interface between FAA Host and SENEAM JADE automation systems requires continued high-level support in terms of:
  - Resources and timelines for implementation and enhancements to FAA Host (e.g. Host software builds)
  - Compliance with NAM ICD standards
  - Controller impact and user concerns

Current FAA - NAV CANADA Cooperation

- The interim capability to interface between Anchorage ARTCC and the NAV CANADA Flight Data Processing Network (FDPN) has been successfully tested.
  - Current Flight Plan and Logical Acceptance messages were processed between Anchorage ARTCC and Vancouver ACC
  - Operational implementation of the cross-border flight data processing between Anchorage ARTCC and Vancouver ACC is to be determined
- Interface implementation between the FAA Host and Canadian flight data automation is based on NAM ICD
  - CAATS is the target automation system for Canada
  - Implementation scheduled for the 2005/2006 timeframe
  - FAA / NAV CANADA testing and technical discussions on-going
  - Preliminary Technical Center testing between FAA Host and NAV CANADA CAATS has been successful.
  - Additional testing in 2005 being scheduled

FAA - NAV CANADA – Interim/ Next Steps

- In an effort to derive cross-border automation benefits before the implementation of CAATS, the FAA and NAV CANADA are working to include border interfaces between FAA Host and the NAV CANADA FDPN

- Cooperative planning for automation interfaces, including investments in interim solutions are beneficial and useable in the interface with CAATS

  - Operational benefits are derived
  - Technical benefits are derived
  - Interim technical work is not throw-away, much can be applied to CAATS interface

Testing

- Technical Center to Technical Centre testing
  - Used in interface implementation with both Canada and Mexico
- Non-operational testing
  - Non-operational testing conducted onsite but offline for communications and flight data processing
- Operational Testing
  - Online tests employed verification of data
  - Operational Test Plans were customized for local use
  - Letters of Agreement were modified to incorporate new automation procedures
  - Analysis of test results was conducted, issues were identified and solutions implemented

Operational Testing - Mexico

- Houston ARTCC was used as the key site in development and testing of flight data exchange with Mexico
  - Knowledge base was built at initial site by personnel working the automation and operational issues
  - Developed expertise is being used to help other border sites implement their interfaces
- Non-operational testing conducted with interface sites
  - Functionality tested in offline environment
  - Non-operational testing conducted individually between Houston and each site, Merida and Monterrey prior to combined test
- Operational tests were conducted with live data. Post-test analysis of results coordinated between FAA and SENEAM

SENEAM - FAA - NAV CANADA

- Fostering cooperative work environment is imperative to success of project
  - Regularly scheduled discussions with operational and technical representatives from the other States are essential
  - Issues associated with flight data messaging, route adaptation, cross-border procedures and parameter interaction require cooperative solutions

Lessons Learned

- NAM ICD standards do not address all issues to the level of detail needed
  - Boundary Agreements provide method of addressing unique interface differences
  - Flexibility and innovation on both sides of the interface are needed to resolve the issues
- Resource Limitation Challenges
  - Funding
  - Technology
  - Implementation schedules
- Trilateral established as formal structure but many issues require bilateral solutions
  - Problem resolution requires mutual activity to achieve best solution
  - As the common denominator, the U.S. needs to be able to apply bilateral technical solutions to the other border as well

Lessons Learned (Continued)

- Strategies may need to be modified due to schedule, resource or funding changes to keep initiatives moving forward
  - Example: Canada FDPN to Anchorage FDP interface
- Issue coordination during development can result in fewer problems in implementation
  - Many but not all issues can be identified
  - Airspace and parameter adaptation is a continual process
  - Letters of Agreement address operational changes needed to support automation changes
  - Automation change will require educating users
  - Requires closer adherence to proper route filings, proper use of fields in flight plans

Lessons Learned (Continued)

- Operational Experience: Demonstrated reduction in Operational Deviations despite doubling of traffic in the Gulf of Mexico

Summary

- ASI/TF was created to develop and implement interfaces to support seamless cross-border ATC operations that provide efficiencies similar to those achieved between FAA facilities.
- ASI/TF developed a NAM ICD which defines the standard message formats for the interfaces between the automation systems while recognizing the differences within the ICD boundary agreements
- An incremental approach to implementing the flight data automation has been adopted by ASI/TF with the U.S. and Mexico achieving initial success with flight data exchange between Houston ARTCC and Monterrey and Merida ACCs
- A similar incremental approach is being used with the U.S. interface with Canada first exchanging data between the Host and the FDPN which will evolve to the Host to CAATS interface
- The cross-border automated flight plan exchange will evolve to include automated radar hand-offs and eventual seamless cross border ATC operations