International Civil Aviation Organization
NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE
First Meeting of the North Atlantic/Caribbean ATS Routes Working Group (NAT/CAR WG/1)
Miami, Florida, USA, 19-21 September 2006

Agenda Item 1: Background and Framework

SEAMLESS ATM SYSTEM

(Presented by the Secretariat)

SUMMARY

This Working Paper presents ICAO background information on CNS/ATM systems planning and implementation considering the global aspect of international civil aviation. It also addresses the key activities currently in progress in the CAR, NAM and NAT regions which will lead eventually to a seamless ATM system.

References:

- Second Amendment to the Global Air Navigation Plan for the CNS/ATM systems (Doc 9750).

1. Introduction

1.1 The Second Amendment to the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), or Global Plan, is under final review by ICAO and is anticipated to be approved and published shortly. The Global Plan provides the basis of a roadmap for a seamless global air traffic management system which is aimed at bringing near and medium term benefits to the ATM community, taking advantage of currently available aircraft capabilities and ATC infrastructure and technology.

2. Analysis

2.1 The Strategic Vision identified in the Global Plan is *"To foster implementation of a seamless, global air traffic management system that will enable aircraft operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints and without compromising agreed levels of safety."*

This vision is further refined in the Mission of Implementation:

To develop a seamless, globally coordinated system of air navigation services that will cope with worldwide growth in air traffic demand while:

- *Improving upon the present levels of safety;*
- *Improving upon the present levels of regularity;*
- *Improving upon the overall efficiency and capacity of airspace and airports;*
- *Improving operations allowing for capacity increase while minimizing fuel consumption and aircraft engine emissions;*
- *Increasing the availability of user-preferred flight schedules and profiles; and*
- *Minimizing differing equipment carriage requirements between regions.*

2.2 The Global Plan describes a strategy aimed at achieving near and medium term ATM benefits on the basis of available and foreseen aircraft capabilities and ATM infrastructure. It contains guidance on ATM improvements necessary to support a uniform transition to the ATM system envisioned in the global ATM operational concept (Doc 9854). The operational concept presents the ICAO vision of an integrated, harmonized and globally interoperable ATM system. A global ATM system can be described as a worldwide system that, on a global basis, achieves interoperability and seamlessness across regions for all users during all phases of flight; meets agreed levels of safety; provides for optimum economic operations; is environmentally sustainable; and meets national security requirements.

2.3 The basis for developing a global ATM system is an agreed-to structure of homogeneous ATM areas and major traffic flows/routing areas. These areas and flows tie together the various elements of the worldwide aviation infrastructure into a global system.

2.4 A homogeneous ATM area is an airspace with a common ATM interest, based on similar characteristics of traffic density, complexity, air navigation system infrastructure requirements or other specified considerations wherein a common detailed plan will foster the implementation of interoperable ATM systems. Homogeneous ATM areas may extend over States, specific portions of States, or groupings of States. They may also extend over large oceanic and continental areas. They are considered areas of shared interest and requirements. The Caribbean Region has been declared a homogenous area. Likewise, WATRS can be considered a homogeneous area.

2.5 A major traffic flow refers to a concentration of significant volumes of air traffic on the same or proximate flight trajectories. Major traffic flows may cross several homogeneous ATM areas with different characteristics. The north/south flow between the New York area and the Caribbean is a major traffic flow.

2.6 A routing area encompasses one or more major traffic flows, defined for the purpose of developing a detailed plan for the implementation of ATM systems and procedures. A routing area may cross several homogeneous ATM areas with different characteristics. A routing area specifies common interests and requirements among underlying homogeneous areas, for which a detailed plan for the implementation of ATM systems and procedures either for airspace or aircraft will be specified. The route networks of the Caribbean and WATRS, taken together, is an example of a routing area with distinct flows, north/south and east/west wherein traffic is common to both networks, yet the underlying homogeneous areas have very different infrastructures, procedures and requirements.

2.7 Now that the opportunity presents itself to improve traffic flows and operations within WATRS, it is essential to consider the larger aspects of this one airspace redesign from the near term view of seamless international operations and the longer view of a seamless global ATM system.

2.8 Traffic enters WATRS from all directions, coming from areas with radar surveillance and VHF communications, and coming from areas with neither. WATRS, itself has ADS-C surveillance and CPDLC only for those aircraft so equipped. Surrounding ATC facilities have varying levels of automation support tools. Ground-to-ground communications quality and reliability varies depending on

local infrastructures. ATC regulations are adopted nationally and are not always consistent. All of these characteristics are factors affecting air operations.

2.9 Several activities are currently underway in the CAR, NAM and NAT regions contributing to the near term goal of seamless international operations. These include implementation of performance-based navigation (RNAV and RNP); demand and capacity balancing or air traffic flow management (ATFM); interfacing and integration of ATM Automation systems including ATS Inter-Facility Data Communications (AIDC) and radar-data sharing; improvements to the telecommunications networks; civil/military coordination regarding Special use Airspace; and ATC contingency planning.

2.10 Performance-based navigation, both RNAV and RNP, are being addressed regionally for the en route environment and nationally for approach and terminal applications. The WATRS RNP 10 implementation is one of several such activities. As the routes are re-aligned or new routes added, ATC providers also need to develop RNAV or RNP routes connecting to airports.

2.11 It has been recognized for some time that there are periods during which demand for access to airspace and/or airports has exceeded the capacity therein. This translates into delays for aircraft and passengers, reduced predictability for airlines and airport operations, increased fuel expenses and aircraft gas emissions. The North American and European regions have both actively pursued solutions within their areas of jurisdiction for many years. During the last two years they have worked together to deal with issues affecting North Atlantic traffic and to share best practices. The Caribbean region, jointly with North America and with South America has recently become engaged in demand and capacity balancing activities. Some of the issues affecting the CAR region are traffic departing northbound into WATRS; excessive demand for access to airports during peak vacation periods, and soon, the 2007 Cricket World Cup which will be hosted primarily in the Eastern Caribbean.

2.12 The CAR/SAM ATM Automation Task Force held its first meeting August 29-31, 2006 in Mexico City. The primary purpose of the task force meeting was to complete the Interface Control Document for AIDC in the CAR/SAM regions. This document, once approved by the GREPECAS, will provide the guidance material for ATC units to exchange flight plan data and radar handovers using protocols harmonized with those in the NAM and NAT regions. This means that current flight plans (CPLs) will soon be passed flight data processor to flight data processor from New York Oceanic to Miami Center and on to Santo Domingo ACC, reducing controller workload and improving accuracy of the data being coordinated.

2.13 All inter-facility communications, whether data (e.g. AFTN, NADIN, radar-data, etc) or voice, are dependent on the telecommunications infrastructure. Improvements are being implemented within the Caribbean region. Reliability, quality and bandwidth are all improving with transition to the MEVA II satellite network for the Central Caribbean which includes stations located in San Juan and Miami connecting into the U.S. NADIN. The Eastern Caribbean is also investigating satellite options to replace its existing digital network which is subject to routine failures. These transitions provide opportunities to implement radar-data sharing to increase surveillance capabilities and reduce separation, AIDC for the exchange of flight plan data and eventually radar and/or ADS handovers, and to implement full demand and capacity balancing measures incorporating collaborative decision making with all ATM stakeholders.

2.14 Work is on-going between ATC providers and military organisations throughout the NAM and CAR regions to improve coordination of and access through Special Use Airspace. Airspace is a joint resource with demands placed on it by both military and civil users. Access should not be denied to either user group except as necessary to protect flight operations.

2.15 The Y2K event provided the global ATM community an opportunity to focus on contingency planning. The goal was to provide a safe, orderly operation during a potential crisis. Operators and ATC providers alike, needed to have confidence the system would continue to function with a certain level of predictability. While Y2K is far behind us now, the need to provide continuity and predictability of service has not abated. Whether a natural disaster or human event is the cause of a crisis, the global ATM community demands that service be provided, albeit at a lower capacity, without adversely affecting safety levels. ATC contingency plans are being developed bilaterally between facilities throughout the regions and should be filed with the appropriate ICAO regional office to facilitate regional coordination.

2.16 Each of the above activities contributes to enhanced ATM system performance. The ATM community places expectations on the performance of the system and measures that performance from several perspectives. These general expectations are relative to the effective operation of the ATM system and include *safety, security, environment, efficiency, cost-effectiveness, capacity, access and equity, flexibility, predictability, global interoperability and participation* by the entire ATM community.

2.17 Any change to the ATM system should be driven by the four operational expectations of Safety, Capacity, Efficiency and Predictability, with Cost Effectiveness and Environment as supporting expectations.

Safety: any change to the ATM system must not adversely affect acceptable levels of safety.

Capacity: any change to the ATM system should be aimed at providing optimum capacity that meets current and forecast demand while minimizing delays. The system should be designed collaboratively, in particular through demand and capacity balancing, to limit system disruption.

Efficiency: any change to the ATM system should be aimed at ensuring that user operating efficiency requirements are met;

Predictability: any change to the ATM system should be designed to improve predictability and therefore, user and service provider confidence.

3. Conclusion

Finally, the development of harmonized initiatives and operational procedures across States and regions will lead to the successful and cost effective implementation of a seamless global ATM system. The NAT/CAR ATS Routes review redesign and harmonization is a significant first step in this direction, providing more efficient routes and increasing capacity. While undertaking this project, keep in mind the related ATM activities mentioned in this paper. Taken separately, each enhancement benefits the system to an extent; if they are worked together, a seamless ATM system will be possible much sooner.

4. Suggested action

4.1 The NAT/CAR ATS Routes WG Meeting is invited to:

a) note the information contained in this Working Paper; and

b) consider ways to reach the goal of a seamless ATM system while evaluating the ATS route networks of the Caribbean and WATRS.

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