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Tegucigalpa, Honduras, 11 – 14 October 2005

Agenda Item 3: **Air Navigation Systems**
3.1 CNS/ATM

PLANNING AND IMPLEMENTATION OF THE CNS/ATM SYSTEMS IN THE NAM/CAR REGIONS

(Presented by the Secretariat)

SUMMARY

This working paper is based on the status of the CNS/ATM systems development in the NAM/CAR Regions and on the follow-up of the Industry Roadmap, and proposes appropriate follow-up actions to the second amendment to the Global Air Navigation Plan for the CNS/ATM systems as well as an executive plan to continue the CNS/ATM systems implementation in the NAM/CAR regions.

References:

- Global Air Navigation Plan for the CNS/ATM systems. Second edition 2002. (Doc 9750 – AN/963).
- Air Navigation Plan – CAR/SAM Regions (Doc 8733).
- AN/Conf/11 Report. (Montreal, 22 Sept. – 3 Oct. 2003).
- Reports of the GREPECAS/11 and GREPECAS/12 Meetings.
- State Letter Ref.: AN 13/54-05/65, (27 June 2005).

1. Introduction

1.1 As stipulated in the Global Air Navigation Plan for the CNS/ATM systems, (Doc 9750 – AN/963), to advance in the planning and implementation of the CNS/ATM systems, taking advantage of the technological developments evolution in order to satisfy the civil aviation requirements by improving its efficiency, safety and regularity, the preparation and execution of coordinated action plans would be required.

1.2 As a follow-up to the (AN-Conf/11, Montreal 22 September to 3 October 2003, the Air Navigation Commission in consultation with the industry, among the topics discussed was the *"ATM Global – From Concept to Reality"*, which resulted in a conclusion that encourages the industry partners to work together toward an ATM implementation Route (implementation route/global action plan) aimed at achieving operational benefits in a short and medium terms to be included in the Global Plan.

1.3 Subsequent to the above, an Industry Group was formed comprising representatives from Airbus, ARINC, Boeing, EUROCONTROL, the United States Federal Aviation Administration, Honeywell, Rockwell Collins, Société Internationale de Télécommunications Aéronautiques (SITA), INMARSAT and Thales. The group developed an ATM Implementation Roadmap which was presented to the President of the Council on 15 October 2004. On 24 November 2004, the Roadmap was presented to the Commission during an informal briefing and on 18 January 2005, the Commission (168-2) reviewed the Secretariat's assessment of the Roadmap and requested the Secretariat to develop a proposal for amendment of the Global Plan to incorporate relevant material from the Roadmap.

1.4 The Industry Roadmap addresses short and medium-term implementation activities associated with CNS/ATM systems, while the longer-term objectives are addressed in the operational concept. Therefore, the Commission is of the view that the Roadmap integrates very well with the operational concept and, if implemented successfully, would lead to a convergence with the ATM system envisaged by the operational concept and, together with the Global Plan and operational concept, forms a comprehensive planning structure. An extract from the Industry Roadmap amended by ICAO is shown in the **Appendix A** to this working paper.

1.5 Recently, ICAO issued a State Letter Ref.: AN 13/54-05/65, dated 27 June 2005, in which the Contracting States are informed of the progress to the second proposal of amendment of the *Global Air navigation Plan for the CNS/AT/M systems*, which will include a new approach to planning with the purpose to avoid a further proliferation of systems and planning activities, which will help as an integral planning tool in a near and medium terms to both, the States and the planning and implementation regional groups (PIRGs), and at the same time would offer a transition scheme for the evolution towards a new global ATM system.

1.6 The second amendment to the Global Plan is being developed on the basis of the recommendations of AN-Conf/11 and the logical groupings of operational initiatives excerpted from the Industry Roadmap, taking into account the need to ensure a smooth integration with the current planning framework of the PIRGs as well as with the current version of the Global Plan. The amendment will also take into account the global ATM operational concept and the long-term transition strategies. It is intended to finalize the amendment to the Global Plan for formal presentation to the Commission in the last quarter of 2005. Then the Commission will review the Global Plan and the results will be reported to the Council for its final determination and acceptance.

2. Discusión

2.1 Bearing in mind the background expressed in this paper and based on information available to the Secretariat and the Industry Roadmap, the information contained in the table shown as **Appendix B** to this note represents the current status of the CNS/ATM systems development in the NAM/CAR regions, as well as its goals. A proposal is made to the meeting to consider the CNS/ATM Matrix presented in the Appendix B, in order to provide a significant contribution to the regional systems and air navigation developments, contribuiting to an adequate CNS/ATM systems infrastructure establishment in the NAM/CAR regions in a harmonious manner with other regions development, aimed at achieving the objective for a better global air navigation system implementation.

2.2 Likewise, with the purpose to continue with a coordinated development of the CNS/ATM systems implementation in the NAM/CAR regions, the Meeting may propose actions to the States/Territories/International Organizations with the purpose of following-up the executive plan presented in Appendix B, as well as the second amendment of the Air Navigation Global Plan for the CNS/ATM systems expected to be approved in 2006.

3. **Suggested Action**

3.1 The Meeting is invited to:

a) take note of the information contained in this working paper;

b) review, update and approve the summary of the current situation and the targets for the CNS/ATM systems implementation in the NAM and CAR Regions as presented in the Appendix B to this note, aimed at adopting actions to continue this development;

c) provide timely follow-up to the second amendment of the air navigation global Plan CNS/ATM systems, expected to be published next year; and

d) evaluate and agree on other appropriate actions on this matter.

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APPENDIX A

DESCRIPTION OF OPERATIONAL INITIATIVES EXTRACTED FROM THE INDUSTRY ROADMAP AND AMENDED BY ICAO

1. Flexible Use of Airspace

Overview Statement: The optimization and equitable balance in the use of airspace between civil and military users, facilitated through both strategic coordination and dynamic interaction.

Goal: The aim is for all States to evolve toward complete dynamic integration of civil and military air traffic services including real-time civil/military controller-to-controller co-ordination to the required level through adequate system support, improved operational procedures and enhanced information on civilian traffic position and intentions.

2. Alignment of Upper Airspace Classifications

Overview Statement: The harmonization of Upper Airspace and associated traffic handling in each State to ensure application of a common ICAO ATS Airspace Class above a globally agreed division level.

Goal: The aim is to achieve a continuum of airspace, free from operational discontinuities, inconsistencies and disparate rules and procedures, so that transition from one segment to another is seamless to both airspace users and ATM providers. Over the long term, the ICAO classification scheme should be simplified to accommodate implementation of the Global ATM Operational Concept.

3. Collaborative Airspace Design

Overview Statement: The organization of airspace, in cooperation and coordination with the ATM service provider and airspace users, so that the airspace can be flexibly and dynamically managed to accommodate the preferred trajectories of the users.

Goal: The aim is for uniform airspace organization and management principles applicable on a global basis, leading to a more flexible airspace design to accommodate traffic flows dynamically, initially on a sub-regional basis leading to harmonized management and allocation of airspace and route structures regionally rather than on a national basis.

4. Capability Based Horizontal Navigation

Overview Statement: The implementation of the concept of required navigation performance (RNP) so that horizontal separation can be reduced and benefits achieved by aircraft operators that equip to meet RNP requirements.

Goal: Incorporate advanced aircraft navigation capabilities as part of the air navigation system infrastructure, bringing additional efficiency benefits to the airspace users.

5. Dynamic and Flexible Route Management

Overview Statement: The establishment of structured but flexible route systems, on the basis of RNAV and RNP capability, aimed at accommodating preferred flight trajectories.

Goal: Implementation of ATS route structures that avoid concentrations of aircraft over congested points and, eventually, implementation of a free routing environment that meets the needs of the airspace users to operate along preferred and dynamic flight trajectories.

6. Enhance Terminal Operations

Overview Statement: The implementation of optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), instrument flight procedures, holding, approach and associated procedures, taking into account improved aircraft capabilities, along with ATM decision support systems.

Goal: The aim is to optimize TMA capacity and efficiency and provide for more fuel efficient aircraft operations. Aircraft will gradually take on traffic synchronization activities.

7. Enhance Traffic and Capacity Management

Overview Statement: The implementation of air traffic flow management (ATFM) measures on a strategic and regional basis, along with reduced vertical separation minimum (RVSM) and RNP, to enhance airspace capacity and improve in operating efficiency.

Goal: The overall objective is implementation of the strategic aspects of the global ATM operational concept (i.e., airspace organization and management, demand/capacity balancing, conflict management) including collaborative decision-making techniques, making use of decision support tools. Restrictions would then be largely centred on entry/exit times while tactical separation will revert to the aircraft.

8. Enhance Aerodrome Capacity

Overview Statement: The ATM system should know the position and intent of all vehicles and aircraft operating on the maneuvering area so that capacity can be maintained in all weather conditions. Over the long term, aircraft design should allow enhanced ability to slow and vacate the runway.

Goal: The reduction of runway occupancy times through improved runway geometry, lighting, markings and procedures, including the application of reduced runway separation minima, and improvement the ability of aircraft to maneuver on the aerodrome surface in all weather conditions.

9. Implement Reduced Vertical Separation

Overview Statement: Increase capacity through optimized use of airspace.

Goal: Implement RVSM in all airspace. Over the long term, develop and implement new vertical separation minima.

10. Harmonize Level Systems

Overview Statement: Increase capacity and improve safety through implementation of a globally harmonized and seamless airspace.

Goal: Make a sustained political effort to encourage all States to adopt the ICAO Flight Level Scheme based on feet as contained in Appendix 3 to Annex 2 — *Rules of the Air*.

11. Implement Decision Support Systems

Overview Statement: Make optimum use of currently available automation functions (e.g., automated FDPS, MSAW, STCA, URET, CTAS, MAESTRO and on-line data interchange systems) in the near and medium terms.

Goal: To implement decision support tools to assist the air traffic controller and pilot with conflict detection and resolution and traffic smoothing, making optimum use of aircraft derived data.

12. Implement Data Link Applications

Overview Statement: Make maximum use of data link capabilities (VDL2, FANS, HF).

Goal: To implement ACARS and VDL-Mode 2 based data link services for pre-departure clearance, oceanic clearance, D-ATIS and other flight information and routine messages in the near term, as well as automatic position reporting on the part of the aircraft. Over the medium term, more complex safety related information can be exchanged, including ATC clearances. The long term use of data link will include down linking of aircraft flight parameters for use by the ATM system, and uplink of traffic data for improved situational awareness in the cockpit. Implement Data links (VDL2, FANS, HF).

13. Improve Surveillance Capabilities

Overview Statement: To improve surveillance in the terminal and en route environment through the implementation of ADS-A or ADS-B wherever there is presently no ATC surveillance system.

Goal: Implementation of elementary and enhanced Mode S/ADS/ADS-B on a region-wide basis. Implement available surveillance systems for surface movement at airports where weather conditions and capacity warrant.

14. Improve Information Exchange

Overview Statement: Standardize aeronautical information data exchange format and implement distributed electronic data services. Ultimately, aeronautical information management should provide quality assured information to users in real-time.

Goal: In the near and medium terms, States should strive to deliver aeronautical information in conformance with the Integrated Aeronautical Information Package. Over the long term, ICAO should develop and implement an international aeronautical information exchange data model that supports a global collaborative decision-making environment, facilitating the implementation of a global, seamless ATM system. A global database of quality assured aeronautical information should also be an ICAO long-term objective.

15. Implement WGS-84

Overview Statement: The geographical coordinates used across various States in the world to determine the position of runways, obstacles, airports, navigation aids and ATS routes are based on a wide variety of local geodetic reference systems. With the introduction of area navigation (RNAV), the problem of having geographical coordinates referenced to local geodetic datums is more evident and has clearly shown the need for a universal geodetic reference system. ICAO, to address this issue, adopted in 1994 the World Geodetic System – 1984 (WGS-84) as a common horizontal geodetic reference system for air navigation with an applicability date of 1 January 1998.

Goal: To work toward implementation of WGS-84 by all States.

16. GNSS Implementation

Overview Statement: The global navigation satellite systems (GNSS), comprising satellite constellations in conjunction with appropriate augmentation systems should evolve into sole means of navigation for oceanic/remote areas, en-route continental, non-precision approach and for precision approach and landing operations.

Goal: To migrate from terrestrial navigation to satellite navigation through a cooperative and cost-effective approach.

17. Enhancement of Meteorological Systems (WAFS, IAVW and Automatic Air-Reporting) to support ATM

Overview: To improve the availability of meteorological information in support of a seamless global ATM system.

Goal: Enhancement of WAFS in view of producing automated turbulence, icing and thunderstorm forecasts in the grid-point format, and wind and temperature forecasts with improved spatial and temporal resolution to assist ATM in tactical decision-making for aircraft surveillance, air traffic flow management and updating flight plans for flexible/dynamic aircraft routing. Enhancement of the IAVW to improve the forecast accuracy in view of the optimization of the use of airspace and to reduce the time needed for volcanic ash advisories and SIGMET to reach area control centres and aircraft-in-flight. Enhancement of automatic downlink of MET information included in ADS messages to provide accurate upper wind fields and real-time wind profiles to assist in the automatic sequencing of aircraft on approach to maximize runway capacity.

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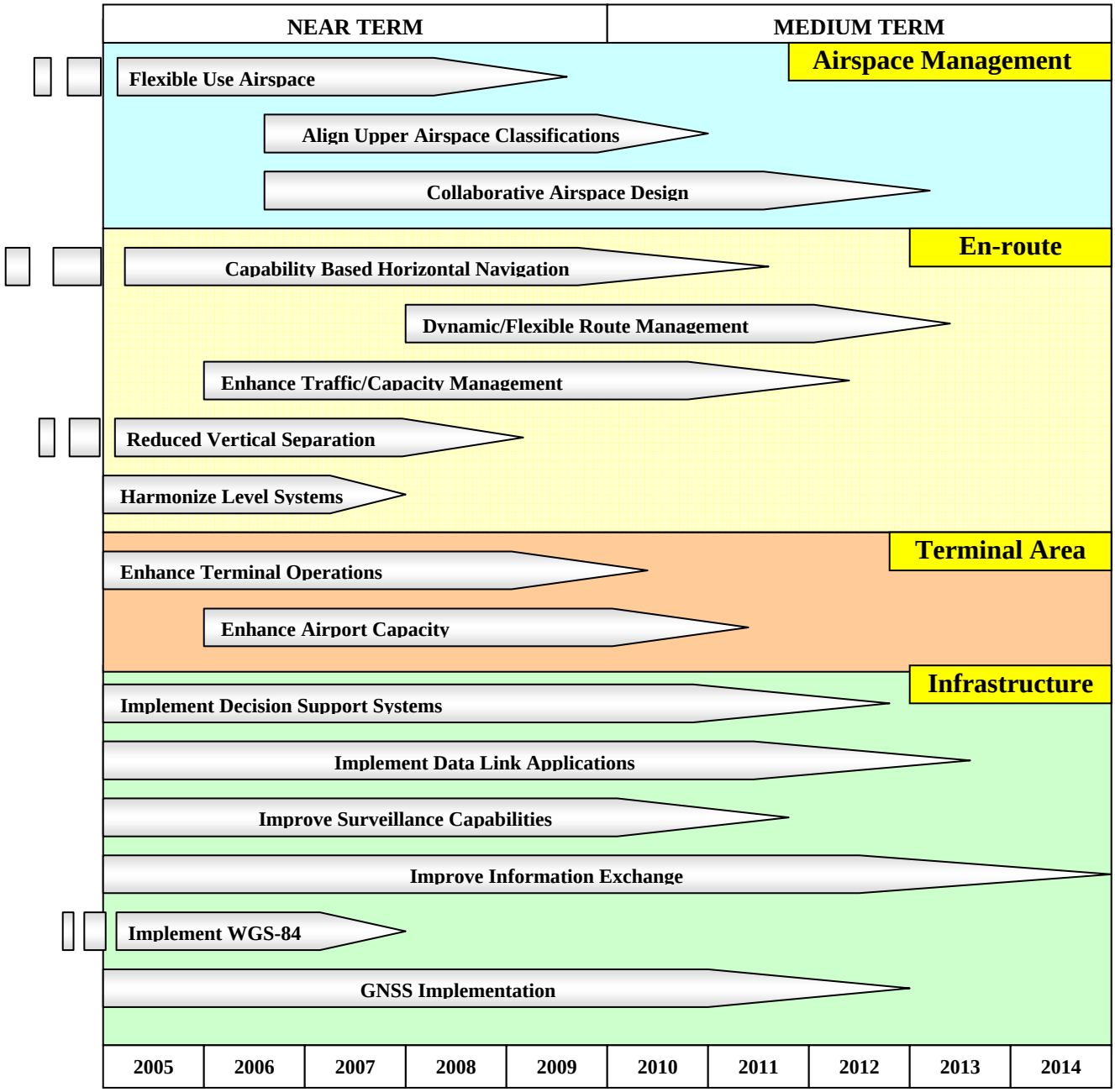
NEAR TERM
MEDIUM TERM
Airspace Management
Flexible Use Airspace
Align Upper Airspace Classifications
Collaborative Airspace Design
En-route
Capability Based Horizontal Navigation
Dynamic/Flexible Route Management
Enhance Traffic/Capacity Management
Reduced Vertical Separation
Harmonize Level Systems
Terminal Area
Enhance Terminal Operations
Enhance Airport Capacity
Infrastructure
Implement Decision Support Systems
Implement Data Link Applications
Improve Surveillance Capabilities
Improve Information Exchange
Implement WGS-84
GNSS Implementation
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

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APPENDIX B

STATUS AND DEVELOPMENT GOALS OF THE CNS/ATM SYSTEMS IN THE NAM/CAR REGION REFERRED TO THE ICAO/INDUSTRY ROADMAP

AIR TRAFFIC MANAGEMENT					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
1	**Revision of ATS route structure / Dynamic and flexible route management.** The establishment of structured but flexible route systems, on the basis of RNAV and RNP capability, aimed at accommodating preferred flight trajectories.	The ATS route structure of NAM Region – Under review. To be included in updated version of the NAM ANP.	Phase II a) Implemented Phase II b) Implementation of ATS RNAV route network in CAR/SAM Regions planned by December 2005.	Implementation of ATS route structures on the basis of RNAV and RNP capability that avoid concentrations of aircraft over congested points and, eventually, implementation of a free routing environment that meets the needs of the airspace users to operate along preferred and dynamic flight trajectories.	2013
2	**RVSM /** **Implement reduced vertical separation** Increase capacity through optimized use of airspace.	RVSM was implemented 20 Jan. 2005.		Implement RVSM in all airspace. Over the long term, develop and implement new vertical separation minima.	2008
3	**Establishment of Regional airspace safety system performance monitoring structure**	NAARMO was designated for NAM Region Agreement between Mexico, Canada and United States to carry out safety and security coordination meetings.	CARSAMMA (CAR/SAM Monitoring Agency) Implemented December 2002.	To carry out safety assessment for any ATM implementation, as required.	- - -
4	**ACAS II Implementation** Airborne collision avoidance system (ACAS) to detect and avoid on flight conflict situations.	Implemented	Mandatory from 1 Jan,. 2003.	To achieve the goal of using ACAS II, and thus increasing flight safety.	
5	**RNAV/RNP /** **Capability performance based horizontal navigation.** The implementation of the concept of required navigation performance (RNP) so that horizontal separation can be reduced and benefits achieved by aircraft operators that equip to meet RNP requirements.	United States implemented RNP in domestic and oceanic airspace since 1998. Canada, Mexico and United States agreed on RNP implementation strategy. New RNAV and RNP harmonized implementation should be made in accordance with new ICAO provisions – (On going).	RNP 10 UL 302 and UL 780 – Implemented 22 Jan. 2004. Studies ongoing for RNAV/RNP implementation strategy for enroute, terminal and approach procedures. Interregional RNP implementation strategy for the upper airspace *a*greed Studies for interregional RNP implementation strategy in the lower airspace being carried out by other States of the CAR/SAM Regions. New RNAV and RNP harmonized implementation should be made in	Incorporate advanced aircraft navigation capabilities as part of the air navigation system infrastructure, bringing additional efficiency benefits to the airspace users.	2011

AIR TRAFFIC MANAGEMENT					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
			accordance with new ICAO provisions – (On going).		
6	**Flexible use of airspace** The optimization and equitable balance in the use of airspace between civil and military users, facilitated through both strategic coordination and dynamic interaction.	Scheduled strategic coordination meetings for flexible use of airspace and other related improvements.	Scheduled coordination meetings for flexible use of airspace and enhancements carried out in CAR Region. Improvements are required.	The aim is for all States to evolve toward complete dynamic integration of civil and military air traffic services including real-time civil/military controller-to-controller co-ordination to the required level through adequate system support, improved operational procedures and enhanced information on civilian traffic position and intentions.	2009
7	**Alignment of upper airspace classifications**. The harmonization of Upper Airspace and associated traffic handling in each State to ensure application of a common ICAO ATS Airspace Class above a globally agreed division level.	Regional studies ongoing.	Regional studies on going.	The aim is to achieve a continuum of airspace, free from operational discontinuities, inconsistencies and disparate rules and procedures, so that transition from one segment to another is seamless to both airspace users and ATM providers. Over the long term, the ICAO classification scheme should be simplified to accommodate implementation of the Global ATM Operational Concept.	2010
8	**Enhancement of terminal operations through SIDs/STARs/IFP, etc.** The implementation of optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), instrument flight procedures, holding, approach and associated procedures, taking into account improved aircraft capabilities, along with ATM decision support systems.	Interregional work between Mexico, Canada and United States ongoing.	Interregional work is ongoing. RNAV/RNP/TF (GREPECAS).	The aim is to optimize TMA capacity and efficiency and provide for more fuel efficient aircraft operations. Aircraft will gradually take on traffic synchronization activities.	2010
9	**Enhancement of traffic and capacity management through ATFM.** The implementation of air traffic flow management (ATFM) measures on a strategic and regional basis, along with reduced vertical separation minimum (RVSM) and RNP, to enhance airspace capacity and improve in operating efficiency.	Interregional work between Mexico, Canada and United States ongoing to implement strategic, pre-tactical and tactical measures and other improvements for traffic flows, and airspace capacity.	Some States have implemented strategic, pretactical and tactical measures to enhance traffic flows, and increase airspace capacity Planned to implement FMUs in ACCs 2008. Studies for Regional Centralized ATFM being carried out. Scheduled 2010 ATFM/TF (GREPECAS). Work to develop regional strategy implementation on going.	The overall objective is implementation of the strategic aspects of the global ATM operational concept (i.e., airspace organization and management, demand/capacity balancing, conflict management) including collaborative decision-making techniques, making use of decision support tools. Restrictions would then be largely centred on entry/exit times while tactical separation will revert to the aircraft.	2012
10	**Enhancement of aerodrome capacity.**	Interregional work between Mexico, Canada and United States ongoing.	Some States have implemented procedures to increase aerodrome	The reduction of runway occupancy times through improved runway geometry, lighting, markings and procedures, including	2011

AIR TRAFFIC MANAGEMENT					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
	The ATM system should know the position and intent of all vehicles and aircraft operating on the maneuvering area so that capacity can be maintained in all weather conditions. Over the long term, aircraft design should allow enhanced ability to slow and vacate the runway.	Implemented procedures and improvements to increase aerodrome capacity in a*ll* weather conditions.	capacity in all weather conditions. Runway incursion programs, ongoing. There is a Task force on Aerodrome Capacity in the AGA/AOP/SG, which is expecting comments from States having aerodrome capacity problems. Work on regional improvements on going.	the application of reduced runway separation minima, and improvement the ability of aircraft to maneuver on the aerodrome surface in all weather conditions.	
11	**Adoption of ICAO flight-level scheme to harmonize level systems.**	Implemented, 20 Jan. 2005.			
12	**Implementation of decision support systems.** **Overview Statement:** Make optimum use of currently available automation functions (e.g., automated FDPS, MSAW, STCA, URET, CTAS, MAESTRO and on-line data interchange systems) in the near and medium terms.	Interregional work between Mexico, Canada and United States ongoing for the inter*face* of ATS Automated Systems.	Several States have implemented advanced ATS automated systems. Interregional interface strategy for ATS Automated Systems ongoing Automation/TF (GREPECAS).	To implement decision support tools to assist the air traffic controller and pilot with conflict detection and resolution and traffic smoothing, making optimum use of aircraft derived data.	2012
13	**Collaborative Airspace Design** The organization of airspace, in cooperation and coordination with the ATM service provider and airspace users, so that the airspace can be flexibly and dynamically managed to accommodate the preferred trajectories of the users.	Regional improvements on going.	Work on regional improvements on going.	The aim is to standardize airspace organization and management principles applicable on a global basis, leading to a more flexible airspace design to accommodate traffic flows dynamically, initially on a sub-regional basis leading to harmonized management and allocation of airspace and route structures regionally rather than on a national basis.	2012
14	**Harmonize Level Systems** Increase capacity and improve safety through implementation of a globally harmonized and seamless airspace.	Completed		Make a sustained political effort to encourage all States to adopt the ICAO Tables of Cruising Levels based on feet as contained in Appendix 3 to Annex 2 — *Rules of the Air*.	2007

COMMUNICATION					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
1	**ATN Implementation** (subnetworks, end-systems and intermediate systems and applications such as AMHS, AIDC and CPDLC).	ATN transition plan developed with focus on ground-ground applications. Test, development and validation phases completed. Operational implementation – Under review.	ATN transition plan – Under review– Considering in the short term deployment of ATN routers to implement ground-ground applications (AMHS and AIDC). The upgrade of CAR digital networks is being implement– Studies are being carried out to achieve the interoperability of CAR and SAM networks as a regional digital platform to facilitate the ATN backbone. A target date term and strategy for the deployment of ATN in the CAR/SAM regions was developed.	To implement ATN and its sub-networks ground-ground and air-ground to provide the final user an end-to-end communications system supporting air traffic services, as well as for other type of aeronautical services.	2014
2	**Air-ground communication infrastructure/ Implement Data Link Applications** Make maximum use of data link capabilities (VDL2, FANS, HF).	VHF voice provided in continental and terminal areas. HF voice provided in oceanic areas. States are implementing ACARS/FANS-1A and planning VDL Mode 2 to support CPDLC, D-ATIS and other applications. SSR Mode S data link in some airspace being planned.	VHF voice provided in continental and terminal areas. HF voice provided in oceanic areas. VHF/AMS have been improved. Several States are implementing ACARS/FANS-1A and planning VDL Mode 2 to support CPDLC and D-ATIS. SSR Mode S data link in some airspace being planned. An activities plan and the respective programme was implemented for the CAR/SAM regional strategy for the air ground data link implementation.	To implement ACARS and VDL-Mode 2 based data link services for pre-departure clearance, oceanic clearance, D-ATIS and other flight information and routine messages in the near term, as well as automatic position reporting on the part of the aircraft. Over the medium term, more complex safety related information can be exchanged, including ATC clearances. The long term use of data link will include down linking of aircraft flight parameters for use by the ATM system, and uplink of traffic data for improved situational awareness in the cockpit. Implement Data links (VDL2, FANS, HF).	2013
3	**Ground-ground digital communication infrastructure** Digital communication platforms development would allow the establishment and implementation of the inter/intra regional ATN backbone.	States have implemented digital ground-ground networks.	Number of digital networks implemented in the Regions. Additional interconnectivity points for regional and interregional digital networks being implemented with aim of achieving interoperability of digital platform.	To achieve fully interoperability of regional/sub-regional digital networks.	2007

NAVIGATION					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
1	**GNSS Implementation** The global navigation satellite systems (GNSS), comprising satellite constellations in conjunction with appropriate augmentation systems should evolve into sole means of navigation for oceanic/remote areas, en-route continental, non-precision approach and for precision approach and landing operations.	GNSS/GPS strategy adopted for NPA and APV. SBAS based on United States-wide area augmentation system (WAAS) commissioned 10 July 2003 for initial operating capability. GNSS approach implementation programme initiated by all 3 States; GNSS augmentation system agreements completed for future expansion of GNSS concept. GNSS being used for oceanic and continental en-route operations.	Strategy for implementation of GNSS adopted. SBAS test bed in cooperation with EGNOS and WAAS are being developed. Preoperational model of SBAS – Under study as a basis for the future operational system. Ionospheric model – Under study in order to apply the NPA Operation with SBAS test bed. Several CAR States have implemented GNSS/GPS NPA. GNSS being used for oceanic and continental en-route operations.	To migrate from terrestrial navigation to satellite navigation through a cooperative and cost-effective approach.	2012

SURVEILLANCE					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
1	**SSR Modes A/C and SSR Mode S**	Substantial improvements achieved in en-route area with upgrading of radar systems. In areas of Gulf of Mexico & Northern Canada, surveillance restricted to position reports sent by pilots via air-ground communications. Agreement reached between Canada, Mexico and United States to implement SSR Mode S.	Currently, SSR Modes A/C employed. Some States are introducing the Mode S. Oriented use of ASTERIX protocol for SSR data sharing. Implementation of SSR Mode S in some terminal areas and high-density en-route areas – Ongoing.	Improvements to the surveillance radar systems by implementing SSR data sharing and enhance SSR Mode S on a region-wide basis.	2011
2	**ADS Implementation**	ADS will be used in oceanic or remote areas; however, further review needed for continental domestic airspace areas.	ADS will be used initially for oceanic airspace and, later, in remote areas.		
3	**ADS-B Implementation** To improve surveillance in the terminal and en route environment through the implementation of ADS-A or ADS-B wherever there is presently no ATC surveillance system.	Agreement reached between Canada, Mexico and United States to implement ADS-B from Jan. 2007. Mode S extended squitter as the data link for near-term ADS-B implementation was selected by States.	ADS-B deployment in Mexico. Trinidad and Tobago and United States planned. Trials in some other Caribbean States in progress. Implementation plan of ADS-B in CAR/SAM Regions –Under study. Mode S extended squitter as the data link for near-term ADS-B implementation was recommended by GREPECAS.	Implementation of ADS/ADS-B on a region-wide basis. Implement available surveillance systems for surface movement at airports where weather conditions and capacity warrant.	2011

RELATED ISSUES					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
1	**WGS-84 Implementation** The geographical coordinates used across various States in the world to determine the position of runways, obstacles, airports, navigation aids and ATS routes are based on a wide variety of local geodetic reference systems. With the introduction of area navigation (RNAV), the problem of having geographical coordinates referenced to local geodetic datums is more evident and has clearly shown the need for a universal geodetic reference system. ICAO, to address this issue, adopted in 1994 the World Geodetic System – 1984 (WGS-84) as a common horizontal geodetic reference system for air navigation with an applicability date of 1 January 1998.	Transition to WGS-84 completed in Canada and United States.	Considerable progress achieved for WGS-84 implementation.	Total implementation of WGS-84 by all States.	2007
2	**Improvement of information exchange through Integrated AIS.** Standardize aeronautical information data exchange format and implement distributed electronic data services. Ultimately, aeronautical information management should provide quality assured information to users in real-time.	Canada and United States are providing QA aeronautical information, but United States need to adopt the ICAO Integrated AI package. The aeronautical information is processed automatically being ready for the future information exchange data model for CDM environment..	Steps to implement an automated Integrated AIS system – In progress. Regionally important steps have been taken in preparation for the data model.	To implement the global data model for the aeronautical information exchange.	2014
3	**Enhancement of Meteorological Systems (WAFS, IAVW and Automatic Air-Reporting) to support ATM** To improve the availability of meteorological information in support of a seamless global ATM system.	Migration from T4 charts to WAFS forecasts in GRIB code forms fully implemented by 31 July 2005 and in BUFR code forms~~)~~ to be fully implemented by 30 November 2006		Enhancement of WAFS in view of producing automated turbulence, icing and thunderstorm forecasts in the grid-point format, and wind and temperature forecasts with improved spatial and temporal resolution to assist ATM in tactical decision-making for aircraft surveillance, air traffic flow management and updating flight plans for flexible/dynamic aircraft routing. Enhancement of the IAVW to improve the forecast accuracy in view of the optimization of the use of airspace and to reduce the time needed for volcanic ash advisories and SIGMET to reach area control centres and aircraft-in-flight. Enhancement of automatic downlink of MET information included in ADS messages to provide accurate upper wind fields and real-time wind profiles to assist in the automatic sequencing of aircraft on approach to maximize runway capacity.	30 Nov. 2006

RELATED ISSUES					
No.	**System / Overview Statement**	**Current Status**		**Goal**	**Target Date**
		NAM Region	**CAR Region**		
		A workshop on use of GRIB & BUFR-coded WAFS data was organized by WAFC Provider States, in coordination with ICAO and WMO in 2004.	A workshop on use of GRIB & BUFR-coded WAFS data for Spanish speaking States was organized by WAFC Provider States, in coordination with ICAO and WMO in 2004.		
		Two world area forecast centres (WAFC London and Washington), nine volcanic ash advisory centres (VAAC Anchorage, Buenos Aires, Darwin, London, Montreal, Tokyo, Toulouse, Washington and Wellington) and seven tropical cyclone advisory centres (TCAC Darwin, Honolulu, Miami, La Reunion, Nadi, New Delhi and Tokyo) to serve all ICAO Regions – Fully implemented.			

- END -