

INTERNATIONAL CIVIL AVIATION ORGANIZATION
EIGHTH MEETING OF CIVIL AVIATION AUTHORITIES OF THE SAM
REGION
(RAAC/8)

(Buenos Aires, Argentina, 23 – 25 April 2003)

Agenda Item 4: Regional Air Navigation Plan – Transition to the CNS/ATM Systems

(prepared by the Secretariat)

Summary

This working paper describes the items to be addressed in preparation for the Eleventh Air Navigation Conference, the regional action to be taken for the development of common coordinated positions on CNS matters, and a proposal for the drafting of papers that reflect common actions in the ATM field.

References:

- Document 9750-AN/963;
- State Letter ST/1 –02/58 dated 28 June 2002;
- Report of the ATM/CNS/SG2 Meeting (Rio de Janeiro, Brazil, 16-20 September 2002); and
- Report of the GREPECAS 11 Meeting (Manaus, Brazil, 3-7 December 2002).

1. Introduction

1.1 The Tenth Air Navigation Conference held in September 1991, in Montreal, with the participation of 450 delegates from 85 countries and 13 international organisations, examined the future air navigation system concept developed by the FANS group. The meeting agreed that this concept would meet the requirements of the civil aeronautical community well into the 21st century. The FANS concept changed its name to CNS/ATM system (communications, navigation, surveillance and air traffic management).

1.2 The ICAO CNS/ATM systems represent the vision developed by ICAO, with the cooperation of all the sectors of the aeronautical community, to serve the future needs of international air transportation.

1.3 The global air navigation plan for CNS/ATM systems has been published by ICAO in Document 9750-AN963. In the SAM Region, all CNS/ATM planning is contained in the Regional Air Navigation Plan (Doc 8733).

1.4 Twelve years have elapsed since the Tenth Conference, and the CNS/ATM concept is now widely known in all the States. Also, many trials/demonstrations and implementations have been carried out worldwide.

1.5 World air navigation meetings are an important function for ICAO and the States, since they serve to define the means for solving CNS/ATM system implementation problems worldwide, including the development of amendments to the Annexes and other basic air navigation documents.

1.6 In view of the above, the ICAO Council approved on 7 June 2002 the proposal of the Air Navigation Commission to hold the eleventh air navigation conference in Montreal, from 22 September to 3 October 2003.

1.7 This world conference will focus on ATM and CNS. In the ATM area, the global ATM operational concept will be presented, encouraging States and regional planning groups (PIRGs) to implement this concept under a master plan and to reach a consensus on the need to establish a global air navigation plan and a

database, so as to expedite the development of a global air navigation infrastructure and an integrated air traffic management system.

2. Eleventh air navigation conference

2.1 The decision to summon an air navigation conference came from the need to address, on a worldwide basis, issues related to a substantial number of interrelated global elements from many air navigation fields.

2.2 In order to further the implementation of communication, navigation, surveillance and air traffic management (CNS/ATM) systems, the conference will encourage the participants to define a line of action for all of the civil aeronautical community, so as to move forward towards the objective of creating a consistent and integrated air traffic control management system that meets the appropriate safety and performance requirements.

2.3 The conference will mainly address the field of air traffic management, as well as communication, navigation and surveillance systems, the radio electric spectrum and other related elements.

2.4 Seven items will be discussed at the conference, namely:

- Introduction and evaluation of a global air traffic management operational concept;
- Air traffic management safety;
- Air traffic management performance objectives in terms of safety, efficiency, regularity and the required total system performance concept (RTSP);
- Review of the conclusions of the ITU World Radio Communications Conference (2003) (WRC-2003) and their repercussions on the use of the electromagnetic spectrum in the aeronautical field; and
- Issues related to air-ground aeronautical communications.

Introduction and evaluation of a global air traffic management operational concept

2.5 To date, no comprehensive description has been made of the way in which the new communication, navigation and surveillance/air traffic management (CNS/ATM) techniques should develop to become part of a more efficient global ATM system. Consequently, to some extent, there has been an *ad hoc* implementation of available techniques. To fill this gap, the Air Navigation Commission, with the support of the air traffic management operational concept panel (ATMCP), is working on a global ATM operational concept. The operational concept will describe the way in which a global integrated ATM system should operate, and will provide the States and the industry with more clear objectives for the design and implementation of ATM and its ancillary systems.

2.6 It is expected that, by the time the AN-Conf/11 is held, the work on the operational concept and on the technical means for its implementation, including the formulation of concepts for the use of applicable sub-elements and technologies, will be quite advanced. The review and evaluation of the operational concept that will be carried out at the AN-Conf/11 will facilitate the acceptance and subsequent implementation of the concept within the planning framework of States and regional planning and implementation groups (PIRGs). It is foreseen that the aforementioned items will result in recommendations that will guide and further the transition and implementation.

2.7 In addition to the formulation of an ATM operational concept and the supplementary operational and technical requirements, the implementation of a global ATM system requires a plan for the infrastructure foreseen for air navigation facilities and services. It is expected that the analysis of current air navigation planning processes by the Conference will help determine the most appropriate methods for meeting the future planning needs for their implementation.

2.8 Airborne collision avoidance systems will play an important role in the safety of the global ATM system, although they are not used for assessing system safety. In view of the introduction of an ATM operational concept and the modifications to the separation services to be provided in the future ATM system, it is important to clearly understand the future function of airborne collision avoidance systems.

Air traffic management safety

2.9 Safety management and regulation in ATM systems will be an increasingly critical and complex task, especially considering the evolution towards a greater autonomy of ATM service providers. A global approach, using uniform procedures and methods, needs to be adopted. Most States have not yet implemented safety management programmes nor have established the official means to regulate ATM safety. Considering the imminent need to review safety management in ATM systems, as well as the foreseen expansion of the safety oversight programme to include air traffic services, it is essential to address all safety aspects of ATM on a global basis. Likewise, it would be advisable for States to take advantage of the conference to review the new SARPs and procedures concerning safety management systems, their means of application, together with all of the corresponding regulatory aspects of ATM safety.

2.10 Following the events of 11 September 2001, the security of aircraft and of the auxiliary air navigation infrastructure has become an important concern for civil aviation. The ATM system could enhance security through the provision of assistance and appropriate information to the corresponding authorities. On the other hand, the ATM system, as well as ATM-related information, should be protected from security threats. The conference will also offer the opportunity to discuss global activities aimed at enhancing the security of ATM systems and information.

2.11 Recognising the need to reduce the accident rate worldwide, the Air Navigation Commission put forward in 1997 the (ICAO) global aeronautical security plan (GASP). In 1998, the 32^o session of the Assembly supported the concept. The GASP has helped focus the attention of the aeronautical community, both within and outside ICAO, on current and future aeronautical security issues. The review and analysis of the GASP during the conference will provide a better understanding of what is to be attained with the concept and the methods to achieve it. The recommendations of the conference will facilitate the acceptance of the GASP by a broader sector of the aeronautical community.

Air traffic management performance objectives in terms of safety, efficiency, regularity and the required total system performance concept (RTSP)

2.12 The current ATM infrastructure has evolved without following globally-agreed criteria concerning, among other things, safety, efficiency and regularity. Consequently, there is no way of guaranteeing that infant and future ATM systems will reach the minimum performance levels. Furthermore, non-ICAO bodies have done little in terms of measuring ATM performance. The RTSP is expected to serve as a means to measure the safety, efficiency and regularity of the infant and future global ATM system.

2.13 Although work on the RTSP is still in its initial stages, it is expected that considerable progress will have been made by the time the conference is held. The Air Navigation Commission, with the assistance of the ATMCP, has started to define the RTSP and to analyse its role in measuring ATM system performance. The recommendations of the conference are expected to facilitate support to the RTSP concept.

Measures to increase capacity

2.14 States are increasingly studying the possibility of applying measures to increase the capacity around aerodromes. These measures are frequently adopted in response to the growing demand and related political and industrial pressure. At the same time, the civil aviation community is increasingly aware of the need to improve safety because of increased traffic, especially around aerodromes. The use of procedures and separation minima that are incompatible with ICAO provisions is an obvious safety hazard.

2.15 Likewise, the incorporation of regional capacity expansion requirements through amendments to the ICAO regional supplementary procedures (SUPP), will also lead to divergencies with respect to the ICAO procedures. Based on the above, a global approach to capacity expansion measures should be developed. Conference discussions on issues related to growing demand will facilitate a common understanding of the most appropriate methods to improve the situation and prepare for the future environment.

2.16 The international civil aviation community is reaching a new stage in its evolution, with the introduction of higher levels of automation and other technologies, changes in the functions of users and system operators, and growing pressure to increase capacity and accommodate more aircraft in the available airspace. These matters should be thoroughly discussed at a global level. Furthermore, the issues are interconnected inasmuch as they are all safety-related. A new global ATM operational concept, together with the development work of the Air Navigation Commission panels, offers a unique opportunity to examine safety, capacity and performance issues in the new millennium.

Review of the conclusions of the ITU World Radio Communications Conference (2003) (WRC-2003) and their repercussions on the use of the electromagnetic spectrum in the aeronautical field

2.17 The agenda for the ITU WRC-2003 contains more than 15 items which could have repercussions on radio navigation and aeronautical communication services. The conclusions of the WRC-2003 on these topics will be submitted to the conference for consideration. Issues of special importance include the compatibility of radio navigation satellite services/aeronautical radio navigation services (RNSS/ARNS), the future use of the 5 GHz band in keeping with the spectrum requirements for the microwave landing system (MLS), regulatory provisions allowing the application of new ICAO standard systems to support navigation and surveillance functions in the 108-117,975 MHz band, and possible new ARNS or aeronautical mobile-R [AMSS(R)] services. The permanent availability of the spectrum for aeronautical communications and navigation will also be analysed. The conference will also examine the draft agenda for the WRC-2006, in order to identify all possible items of interest to aviation that would need to be addressed when preparing for this conference.

Issues related to aeronautical navigation

2.18 The *Global air navigation plan for the CNS/ATM systems* (Global plan, Doc 9750) states that the satisfactory implementation of the global navigation satellite system (GNSS) will provide uniform global navigation for all flight stages, thus offering many States the possibility of dismantling some or all of their ground-based navigation aids. The Special Communications/Operations Divisional Meeting (1995) (SP COM/OPS/95, Doc 9650) recommended (Recommendation 3/1) the development of procedures and criteria in the SARPs to support the gradual introduction of the GNSS. The meeting also formulated Recommendation 5/1, proposing an amendment to Annex 10 in order to include the ICAO strategy for the introduction and application of non-visual approach and landing aids (Annex 10, Volume I, Attachment B) promoted by the GNSS as standard ICAO aids, in addition to the instrument landing system (ILS) and the MLS.

2.19 When evaluating the GNSS, the SP COM/OPS/95 raised several questions regarding system capacity and identified issues to be addressed during validation activities and feasibility studies. Next, additional questions were raised on the capacity of the GNSS to become a navigation system with a “single means”. These questions were partially addressed in Amendment 1 to the Global plan. However, the GNSS capability of becoming the only navigation system for all flight stages continues to be questioned; consequently, various reservation options have been proposed.

2.20 Initiatives in recent years have shown that the attainment of the objectives set forth in the Global plan was slower than initially foreseen. It has also been suggested that some of the issues related to the GNSS might remain unsolved until additional civil signals or basic satellite constellations are introduced. It is expected that the respective States or service providers will advise the conference about their plans to modernise the global positioning system (GPS) and the global navigation satellite system (GLONASS), and to install the Galileo system. The feasibility studies on GNSS-based Category II/III approaches and aerodrome surface operations will also be available to show the capacity of the GNSS to support all flight stages. Thus, the future GNSS architecture (starting in 2010) will be presented to the conference, together with the SARPs of Annex 10, Volume I, Chapters 2 and 3, which define the present and short-term GNSS with its augmentations.

2.21 After eight years of GNSS development and implementation activities (since the SP COM/OPS/95), the conference will review updated information on the status of the GNSS, its future architecture and the service levels that could be provided in the various evolution stages of the system. Other matters include the monitoring of system and NOTAM status, GNSS vulnerability to deliberate and non-deliberate interference, interference attenuation, and database-related issues. Based on this information, the conference will examine the function of ground radio navigation aids and area navigation capabilities. In particular, discussions are expected to include the need for a reservation system or systems and the completion of updated guidelines for the transition to satellite navigation. Consequently, it is foreseen that the conference will recommend a review of the navigation section of the Global plan, draft amendments to the SARPs of Annex 10, and the updating of the ICAO strategy for the introduction and application of non-visual approach and landing aids.

Issues related to air-ground aeronautical communications

2.22 As a result of increasing air-ground communication requirements and the possible shortage of spectrum due to a demand for the aeronautical spectrum by non-aeronautical sectors, the effective use of the aeronautical spectrum by communication systems is becoming a critical aspect of air navigation planning. During the last decade, ICAO has introduced in Annex 10 several new air-ground communication technologies, both digital (HF data link, VHF digital link, SSR Mode S and AMSS) and analogue (8,33 kHz separation between channels for DSB-AM VHF). At present, these technologies are being implemented and this helps to increase total aeronautical spectrum requirements, while conventional air-ground speech communication systems continue to operate, still representing the main means of operational communications.

2.23 The conference is expected to review the results of the most recent work of ICAO on the optimum use of ground- and satellite-based air-ground communication bands (HF, VHF and band L), including the development of new air-ground communication systems that meet evolving requirements. Discussions will be held on the planned evolution of existing systems and the possible development of future systems, as well as on any related proposal for the introduction of changes to ICAO documents.

3. Analysis

3.1 The contribution of the States and the Region to the conference on all the issues mentioned in the previous section is extremely important. The second meeting of the ATM/CNS/SG, held in Rio de Janeiro, Brazil, on 16-20 September 2002, agreed to request GREPECAS, through the established mechanisms, to formulate actions urging CAR/SAM States to participate in the review of the conclusions of the ITU world radio communications conference (2003) and their repercussions on the use of the electromagnetic spectrum in the aeronautical field, issues which are related to aeronautical navigation and air-ground communications.

3.2 The presentation of coordinated working papers on each of the items mentioned in the previous paragraph would greatly contribute to the development of coordinated common positions for the CAR/SAM States. Through these common positions, a uniform position in support of ICAO would be achieved with respect to the WRC-2006, the GNSS status of implementation and development outlook in the CAR/SAM Regions, and the CAR/SAM regional considerations on the optimum use of the VHF, HF and band L aeronautical frequency bands, based on current and future estimates.

3.3 Regarding these regional actions for the development of coordinated common positions for the CAR/SAM States, Brazil, Colombia and COCESNA offered to take on the responsibility of centralising and coordinating the common positions of the CAR/SAM States and international organisations. All this was reflected in Conclusion 11/54 of the GREPECAS/11 meeting (Manaos, Brazil, 3-7 December 2002). In this respect, it should be noted that, at the present time, the coordinated common positions refer to CNS issues, where Colombia will be responsible for Item 6, Brazil for Item 5 and COCESNA for Item 7 of the corresponding agenda of the conference.

3.4 For ease of reference of the meeting, the aforementioned Conclusion 11/54 of GREPECAS is shown in **Appendix A** to this working paper. In this respect, the meeting will note that, by virtue of sub-paragraph b) of said conclusion, the ICAO NACC and SAM Regional Offices will assist in the development of said common positions. To that end, ICAO is preparing a programme and a strategy. In this respect, the meeting could consider approving the following conclusion:

Conclusion 8/X - Assistance by States in the development of the coordinated common position for the AN-CONF/11

That, in order to attain a coordinated common position for the AN-CONF/11 on Agenda Items 5, 6 and 7, the States fully cooperate in the development of the programme and strategy activities that the Regional Offices are preparing in coordination with Brazil, Colombia and COCESNA.

4. Suggested action

- a) The meeting is invited to take note of the information presented in this working paper and to consider the formulation of the conclusion proposed in paragraph 3.4 above.

APPENDIX A

GREPECAS/11 MEETING (Manaus, Brazil, 3-7 December 2002)

CONCLUSION 11/54 REGIONAL ACTION TO PREPARE THE COORDINATED COMMON POSITIONS ON CNS MATTERS AT THE AN-CONF/11

That:

- a) Brazil, Colombia and COCESNA be urged to take on the responsibility of centralising the drafting and coordination of the coordinated common positions of the CAR/SAM States/International organisations on agenda items 5 (Brasil), 6 (Colombia) and 7 (COCESNA) of the AN-Conf/11;
- b) through the GREPECAS mechanisms and the ICAO NACC and SAM Regional Offices, coordinations be started with the States designated pursuant to sub-paragraph a) above, in order to assist in the development of the aforementioned coordinated common positions for CAR/SAM States; and
- c) the States designated pursuant to sub-paragraph a) be urged to circulate the draft papers on regional positions for the AN-Conf/11 among the rest of the CAR/SAM States/international organisations through the Regional Offices, with a view to drafting papers with the common national positions to be submitted nacionales comunes que puedan ser presentadas a nombre de los Estados/Organismos Internacionales CAR/SAM.

- END -