ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 7 : Aeronautical air-ground and air-to-air communications

GUIDELINES ON STANDARDIZATION OF NEW AERONAUTICAL COMMUNICATION TECHNOLOGIES

(Presented by the Secretariat)

SUMMARY

This paper reviews some of the issues associated with the proposed introduction of new aeronautical communication technologies and presents a recommended approach to their standardization by ICAO.

Action by the conference is in paragraph 3.

1. INTRODUCTION

1.1 Over the last decade, acting on recommendations by the Tenth Air Navigation Conference, ICAO has successfully standardized a number of air-ground data links.[1] Each of the standardized links has specific performance characteristics and features and is thus suitable for specific applications and scenarios[2] within the framework of the global air traffic management (ATM) operational concept.

1.2 As technology evolves, new aeronautical communication technologies continue to be proposed for ICAO standardization. General guidelines on the planning and implementation of a new global communication infrastructure are provided in the *Global Air Navigation Plan for CNS/ATM Systems*

[1] A review of ICAO activities conducted since the Tenth Air Navigation Conference on the development of new aeronautical communication technologies is provided in AN-Conf/11-WP/12. Additional background information is provided in AN-Conf/11-IP/1.

[2] Future aeronautical communications scenarios as may develop over the next two decades and associated issues are discussed in AN-Conf/11-WP/11.

(Doc 9750). The present paper reviews some of the potential issues related to the variety of available ICAO Standards for aeronautical communication systems, and recommends measures to prevent or mitigate any related difficulties that could otherwise ultimately affect the implementation process.

2. DISCUSSION

2.1 General

2.1.1 The global ATM operational concept aims to be independent of technology (AN-Conf/11-WP/4 refers) and in principle enables the use of a variety of air-ground communication systems. With the availability of new ICAO Standards for such systems, the range of the potential implementation options faced by States has therefore increased.

2.1.2 New and evolving ICAO Standards reflect the pace of evolution of technology and support enhanced communication performance and reliability. While no single communication system can meet all existing and emerging communication requirements for all air traffic scenarios, phases of flight and planning time frames, those requirements can be met by an appropriate combination of systems. The resulting integrated architecture can optimally exploit the characteristic of the available aeronautical radio frequency spectrum bands, avoid the creation of a single point of failure with the related safety implications, and limit the technical and operational complexity of the global infrastructure.

2.1.3 However, for these potential benefits to be fully realized, the available options need to be managed in a way consistent with the objective set out in Article 37 of the ICAO Convention, namely the objective of "securing the highest practicable degree of uniformity . . . in all matters in which such uniformity will facilitate and improve air navigation". In other words, the variety of available CNS technologies and related ICAO Standards should not become a hurdle to ICAO efforts towards the development of interoperable global air traffic management systems and should not have a negative impact on the overall level of implementation of ICAO Standards.

2.2 Conditions for standardization of new systems by ICAO

2.2.1 The need identified by the Tenth Air Navigation Conference for timely development of new communication standards has driven a relatively fast pace of standardization, leading to the availability of a family of new ICAO Standards. This phase of expansion is now being followed by a phase of consolidation, characterized by an increased focus on implementation, maintenance and enhancement of the available standards.

2.2.2 Under these circumstances, there is general agreement that any additional ICAO standardization activities in this field should in principle be kept to a minimum, with a view to maintaining a stable and mature technology environment and thus facilitating the ongoing implementation process.

2.2.3 Notwithstanding this general principle, it is accepted that the development of standards for new communication technologies could be justifiable in some cases — but only if certain conditions are met. The new technology should be shown to meet current and emerging ATM requirements; to be technically proven and offer proven operational benefits; to be consistent with the requirements for safety; to be cost

beneficial; not to cause prejudice to the global harmonization of the CNS/ATM systems; and to be consistent with the ICAO *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750).

2.2.4 Standardization of a technology meeting the set of conditions outlined above would be most likely to bring clear net benefits to civil aviation and should in principle be considered by ICAO. Standardization of a technology that does not meet the conditions, on the other hand, would unnecessarily increase the number of implementation options and therefore should not be pursued.

2.3 Availability of information in support of implementation decisions

2.3.1 Decisions to implement new aeronautical communication technologies need to be based on adequate information on the characteristics and relative advantages of the available standardized technologies. However, such information may not be widely available outside the few States directly involved in the development of those technologies. This situation could make implementation decisions more difficult for other States, and thus affect the pace and success of implementation.

2.3.2 In this respect, it should be noted that some of the relevant information is available today within some ICAO expert bodies. For example, as a part of the development of ICAO technical provisions for communication systems, the Aeronautical Communications Panel (ACP) (formerly Aeronautical Mobile Communications Panel (AMCP)) typically develops comparative analyses of candidate systems that may be of assistance to States. ICAO should therefore disseminate this information through appropriate channels to assist States that are undertaking implementation decisions.[3]

2.4 Harmonization at the regional and global level

2.4.1 With the availability of a wider range of technology choices, it is essential that special care be taken for implementation to be harmonized within and across regions, in order to maintain the necessary degree of uniformity called for by Article 37 of the Convention. To this end, full use should be made of the existing ICAO regional and global planning methodology, as laid out in the Global Plan.

2.4.2 In particular, the introduction of requirements for mandatory aircraft carriage of equipment in a certain airspace or area should be based on regional agreements depending on specific requirements and/or operational scenarios, and should be appropriately coordinated through the relevant ICAO regional and inter-regional fora.

2.5 Streamlining of the standardization process

2.5.1 The application of the successful ongoing process of streamlining the standardization of complex technical systems (Assembly Resolution A33-14, Appendix A refers) is particularly relevant to the treatment of potential new aeronautical communication standards. The provisions of A33-14 shift the emphasis of the standardization process away from detailed technical aspects towards broader considerations and stress the need for maturity and stability of the ICAO Standards for complex technical systems. They

[3] A recommendation to this effect is contained in AN-Conf/11-WP/14, which presents a comparative analysis of potential ADS-B links conducted by ACP.

also encourage, under appropriate conditions, the use of material developed by other standardization bodies, thereby potentially relieving ICAO from some of the burden of the standardization process. Thus, application of A33-14 offers an efficient tool to manage the increasing complexity of technical standards and should be continued and further extended as required.

3. ACTION BY THE CONFERENCE

3.1 Noting the points addressed above, the conference is invited to agree to the following recommendation:

Recommendation 7/xx — Standardization of aeronautical communication systems

That for new aeronautical communication systems, ICAO should:

a) continue to monitor emerging communication systems technologies but undertake standardization work only when the systems:

1) can meet current and emerging ATM requirements;

2) are technically proven and offer proven operational benefits;

3) are consistent with the requirements for safety;

4) are cost-beneficial;

5) can be implemented without prejudice to global harmonization of the CNS/ATM systems; and

6) are consistent with the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750)

b) include in Annex 10 provisions ensuring that the introduction of mandatory carriage of new equipment be based on appropriate ICAO regional and inter-regional coordination; and

c) further limit SARPs for complex aeronautical systems to broad, system-level, functional and performance requirements and better capitalize on the work of other standard-making organizations so as to reduce the complexity/size of technical provisions.

— END —