

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 6: Aeronautical navigation issues

- 6.3 Amendments on aeronautical navigation subjects in relevant ICAO documents including the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), Annex 10 — *Aeronautical Telecommunications* and other documents as necessary**

PROPOSAL TO EXTEND THE TRANSITIONAL PERIOD OF THE GLOBAL AIR NAVIGATION PLAN FOR CNS/ATM SYSTEMS IN THE AFI REGION (ICAO DOC 9750)

(Presented by African States*)

SUMMARY

¹ French version provided by African States.

* Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cap Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Tunisia, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

This paper contains proposals for extending the transitional period of the Global Air Navigation Plan for CNS/ATM systems. These proposals are based on the experience of the AFI region as reflected in the AFI CNS/ATM implementation plan (Doc 003).

The amendments put forward are limited to the sole aspects relating especially to the implementation and the operational use; they are established on the basis of the current state of furtherance of the implementation of the different stages of the various systems and concepts. They propose new limits closer to the realities of the region and adjacent regions, in order to ensure a coordinated and progressive implementation and to carry out the objectives aimed at in the Global Plan (Doc 9750).

Action by the conference is in paragraph 6.

1. INTRODUCTION

1.1 The Plan of implementation of ICAO systems for the AFI region regarding communications, navigation, surveillance and air traffic management (CNS/ATM) was conceived to cover the period 1995 - 2005. As the end of the period of the scope of the plan is fast approaching, there is a need to think of extending the planning period to beyond 2005.

1.2 Although the planning process of the ICAO air navigation plan is established on a world basis, the implementation of the various systems and concepts is not following the same pace in the different parts of the world. There are specific aspects to each area and for which a regional solution is essential.

1.3 Many years of experience suggest that many objectives were set with unrealistic target dates. The pace of CNS/ATM implementation worldwide has not been achieved as initially intended. Most of required technologies have not become available.

1.4 The CNS/ATM implementation schedule in the AFI region encounters the same world-wide difficulties like global navigation satellite system (GNSS) delays, normalisation delays, delays in avionics equipment, lack of funding.

1.5 Arising from the above, the AFI States have extended their timeframe up to 2015. Based on that, they are now proposing that the global plan be amended similarly.

2. OBJECTIVES OF AFI REGION PLAN 1995-2015

2.1 These objectives are those identified in the AFI region CNS/ATM implementation plan (Document 003).

Communications

2.2 The objective of the region is full deployment of an aeronautical telecommunication network (ATN) environment with the possibility to accommodate FANS1/A and the highest degree of functionality possible.

Navigation

2.3 The ultimate objective of the region is a navigation system based on satellite for all phases of flight. As far as augmentation is concerned, any deployment should be in line with the regional policy as defined and approved by AFI Planning and Implementation Regional Group (APIRG).

Surveillance

2.4 Even if the region is recognized as a valid candidate for automatic dependent surveillance (ADS), enough caution is necessary at all levels in order to avoid ground equipage with prototypes and/or systems without operational benefits. The region decided to limit the investment on secondary radar and elected ADS as the right tool to get position of the air traffic.

Airspace and traffic management (ATM)

2.5 Although the ideal objective of airspace management should be to maximise the utilisation of available airspace, by dynamic accommodation of all short-term requirements within a single system, this single system will not be available in AFI region in short and medium terms.

2.6 At the exception of few States with numerous military flights, most of the military flights do not penalise civil aviation and coordination between civil and military users is limited.

2.7 Air traffic management in AFI is evolving progressively from the present route system to a system of area navigation (RNAV) routes with random RNAV areas established whenever feasible.

2.8 The RNP5 and RNP10 will be progressively used in the AFI Region.

2.9 Optimum longitudinal separation minimum of 10 minute — longitudinal separation is progressively in the Region.

2.10 In order to increase airspace capacity, implementation of reduced vertical separation minima (RVSM 1 000 ft) for subsonic aircraft between FL 290 and FL 410 inclusive, is progressively implemented and should be available by 2005.

2.11 Introduction of automated flight data processing systems (FDPS) by Air Traffic Control Units is planned or implemented in most flight information regions (FIRs) of the AFI region.

3. **AFI IMPLEMENTATION STRATEGY**

Surveillance

3.1 In accordance with Annex 6 — *Operation of Aircraft*, Part I, paragraph 6.1.19, carriage and operation of pressure-altitude reporting transponders is mandatory throughout the AFI Region.

Terminal areas (TMAs)

3.2 Secondary surveillance radar (SSR) should be used to provide surveillance within busy TMAs meeting criteria to be defined by APIRG.

3.3 Where available and when necessary in the interest of safety, existing primary radars may continue to be used in those TMA environments where there still exists a mix of transponder-equipped and non transponder-equipped aircraft until there is sufficient equipage in pressure altitude reporting transponders.

3.4 ADS may be introduced, progressively and eventually in broadcast mode (ADS-B). The AFI Region recognizes the advantages to be derived from ADS-B in terms of reduced costs and operational benefits.

En-route

3.5 En-route surveillance will mostly continue to be based on present procedural methods, but with improved pilot-controller communications in terms of reliability and transit times. This improvement will come about mostly as a result of enhanced mobile communications and of fixed communications between adjacent area control centres (ACCs).

3.6 Where a requirement for en-route surveillance has been identified, this shall rely essentially on SSR, and on ADS, including ADS-B, particularly for low density, remote and oceanic airspaces outside SSR coverage.

Navigation

Approach and landing

3.7 The AFI strategy for transition from instrument landing system (ILS) to new precision approach and landing systems is based on the worldwide strategy developed by the Special Communications/Operations Divisional Meeting (1995) (SP COM/OPS/95) for the introduction and application of non-visual aids to approach and landing which enables each region to develop an implementation plan for future systems. The AFI strategy, which will be kept under constant review states as follows:

- a) continue ILS operations to the highest level of service as long as operationally acceptable and economically beneficial;

- b) Authorize the use of global positioning system (GPS) and develop procedures in order to get early benefits from GPS;
- c) promote the use of multimode receiver (MMR) or equivalent airborne capability to maintain aircraft interoperability;
- d) validate the use of GNSS, with satellite-based augmentation system (SBAS) implementation support approach and departure operations, including APV I operations; and
- e) study the potential uses and benefits of the new navigation satellite constellations (Galileo) or upgrades of existing one in order to switch to GNSS sensors and withdraw terrestrials nav aids.

3.8 The AFI GNSS implementation strategy details an evolutionary path from existing constellations through a minimal SBAS providing over the whole AFI Region a non-precision approach capability with vertical guidance at 20 m accuracy (APV-I).

Terminal areas (TMAs)

3.9 As a general principle, navigation facilities in TMAs must allow for navigation during departure, holding and approach with the required degree of accuracy. For the time-frame encompassed by this first stage, the standard navigation aid in TMAs is envisaged to remain the VHF omnidirectional radio range (VOR)/distance measuring equipment (DME). Whenever feasible, VORs must be so located as to serve both terminal and en-route requirements. Installation of new non-directional radio beacons (NDBs) is discouraged.

3.10 Global navigation satellite systems may be progressively used in the TMAs.

En-route

3.11 Area navigation (RNAV) will progressively be extended throughout the AFI Region, based on the criteria contained in the ICAO *Manual on Required Navigation Performance (RNP)* (Doc 9613 - AN/937) and within the terms and conditions defined by the AFI Planning and Implementation Regional Group (APIRG).

3.12 VOR/DME will continue to be the agreed en-route navigation aid in the AFI Region along conventional ATS routes. In case a requirement exists for a new route or for a higher level of navigation performance along an existing route, primary consideration should be given to meet the requirement by the implementation of an RNAV route. NDBs will not normally be provided for en-route navigation unless there is an operational requirement which cannot be satisfied by any other means, this will be confirmed through APIRG.

3.13 Global navigation satellite systems will be used as en-route navigation means.

Communications

Mobile voice communications

3.14 Aeronautical mobile voice communications should provide for static-free, direct pilot-controller communications throughout the region, at least at operationally significant altitudes.

3.15 Voice, will remain the main form of pilot-controller communications throughout the region within the time-frame encompassed by this plan. Meanwhile, the early introduction of data links is supported and encouraged with the initial main objective of reducing R/T workload.

3.16 In view of the remoteness of large areas of the AFI region, aeronautical mobile satellite service (AMSS) voice offers one of the best methods of achieving the above objectives. However, the number of users equipped for this type of communications may not be significant for several years, and therefore efforts should continue on the implementation of remote and extended range VHF. HF voice stations could be phased out as VHF and AMSS voice communications become available in a given FIR or in a given portion of the airspace; for the time being, however, increased traffic on HF will have to be accommodated and it will be necessary to ensure the integrity, reliability and availability of the ground HF facilities.

Fixed communications

3.17 The aeronautical fixed service must provide for the exchange of messages between end-users with a very high degree of reliability within the specified transit times; in case this cannot be achieved within the current configuration of the AFTN Plan or the ATS/DS network plan, these must be re-planned as necessary and without delay in order to meet those objectives.

3.18 As a step towards the ATN the mutual support between aeronautical networks should be reinforced by the automatic interchange of messages, at least at the level of AFTN main centers, and ideally at the level of all tributary centers. An important AFI decision was to move all fixed communications on the same satellite (Intelsat 10 02).

Data communications

3.19 There is a limited introduction of gate data links at the busiest airports in the region with DFIS (DFIS function). Except on some busy airports (mainly receiving equipped aircraft from Europe), it is too costly (both on ground and airborne sides) to implement PDC function on most of the airports.

3.20 The goal of the AFI Region is the implementation of the ATN for ground-to-ground and air-to-ground data communications. It is anticipated that the mobile element of the integrated ATN may be developed at a slower pace than the end-user requirements for fixed communications; it is essential to ensure that the implementation of the necessary improvements to the ground network does not suffer delays as it is a pre-requisite for the development of the air-ground network as well.

Data link communication services

3.21 In oceanic and low/medium air traffic density areas where ground-based communication infrastructure cannot be deployed, AMSS and HF data links will be progressively introduced. Where a ground-based infrastructure can be deployed, VHF data link to be specified by regional agreement, will be introduced to support air-ground ATN-compatible applications.

Data link surveillance services

3.22 Surveillance data link services will be progressively introduced, using either the SSR Mode S extended squitter, or the universal access transceiver (UAT) or the VDL Mode 4, based on regional agreement.

4. AMENDMENT PROPOSALS

4.1 The amendment proposals are limited to the implementation and operational use of the global plan, not SARPs development and aircraft equipage.

4.2 The main amendments proposed are in the tables attached as appendices. (Transition period for any CNS/ATM components).

5. CONCLUSIONS

5.1 Some States and airlines have made valuable efforts to implement the required equipments and services, whose benefits might be jeopardized by a non homogenous implementation. Implementation should first focus on identified important routing areas rather than trying to get a synchronized implementation at regional level.

5.2 Many States or AFI airlines cannot afford or have difficulties to implement the required equipment or functionality.

6. ACTION BY THE CONFERENCE

6.1 The conference is invited to:

- a) take note of the information contained in this working paper and particularly the efforts in progress in the AFI Region;
- b) to consider the attached tables as a basis for updated, extended global plan implementation target dates; and
- c) approve the recommendation below.

Recommendation 6/XX —

That:

- a) the period of transition for the Global Air Navigation Plan for CNS/ATM systems (Doc 9750) be extended until at least 2015.
- b) the Global Air Navigation Plan for CNS/ATM systems (Doc 9750) be amended on the basis of ICAO regional plans.

— — — — —