

ELEVENTH AIR NAVIGATION CONFERENCE

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Agenda Item 1: Introduction and assessment of a global air traffic management (ATM) operational concept

1.2 Enabling concepts in support of the global ATM operational concept
:

ASAS PRE-OPERATIONAL TRIALS IN EUROPE: THE “MEDITERRANEAN FREE FLIGHT” PROGRAMME

(Presented by Italy)

SUMMARY

This paper reports to the Eleventh Air Navigation Conference ENAV ASAS pre-operational implementation programme for the Mediterranean Area, its objectives and the technology used for the ADS-B equipage of aircraft.

1. INTRODUCTION

1.1 The future air traffic management (ATM) system will have to maintain or improve safety levels, increase system capacity and fully utilize capacity resources. This last objective will include better accommodation of users requested flight trajectories, avionics capabilities and increased users involvement in decision-making.

1.2 The geographic location of the Mediterranean Area between the European Core Area and the States of North Africa and the Near East is a critical factor for the provision of future air navigation services in the Mediterranean Coastal States. The European Core Area has already a high-density of air traffic while the other areas have low/very low density and poor technological infrastructures.

1.3 This boundary situation along with the Mediterranean peculiarity of the low air traffic complexity scenario was an attractive motivation to initiate studies and validation trials concerning the latest communications, navigation, and surveillance (CNS) technologies and the most recent operational concepts identified in the EUROCONTROL OCD and ECAC “ATM 2000+ Strategy” to accomplish the European ATM Programme (EATMP).

1.4 In September 2000, the Italian Agency for Air Navigation Services (ENAV SpA) launched the “Mediterranean Free Flight” Programme which focuses on real-time simulations and flight operational trials on free routing and airborne separation assistance systems (ASAS) applications in the Mediterranean Area, starting from already mature or maturing CNS/ATM technology, and building the appropriate operational procedures for pilots and controllers. The Mediterranean Free Flight Programme (MFF) is a pre-implementation programme co-funded by the EC DG TREN.

1.5 The purpose of this paper is to inform the conference on the programme objectives, guidelines and recommendations for the ASAS operations implementation in the Mediterranean Area and in other areas with similar characteristics.

2. **MEDITERRANEAN FREE FLIGHT PRE-OPERATIONAL ACTIVITIES**

2.1 The Mediterranean Free Flight Programme aims to address and validate operational requirements and procedures to improve the capacity and the ATM system efficiency through the definition of ASAS applications in the Mediterranean Area, as well as to evaluate the operational impact of ASAS in the future air traffic management system. The goal is to define and validate the operational and technological framework, which leads to an effective implementation of new operational procedures rising from the newest ATM operational concepts and increasing flight safety and economic efficiency.

2.2 The programme is coordinated by ENAV SpA (Italy) and the Consortium partners are EUROCONTROL, AENA (Spain), DNA (France), HCAA (Greece), MATS (Malta), NERL (UK) and SCAA-LFV (Sweden).

2.3 The programme is focused on the following objectives:

- a) to provide technical and operational evaluation of integration, interoperability and safe use of mature CNS/ATM technologies and applications suitable for the future Mediterranean ATM scenario (e.g. enabling the introduction of ASAS operations in the Mediterranean area);
- b) to define and verify appropriate new operational procedures for ATM staff and flight-crew in free routing and ASAS scenarios (e.g. the delegation of separation responsibility from ATC to aircraft and vice versa, through simulations and flight trials using a flexible, adaptable and scalable simulation environment integrated with specially equipped cockpit simulators and experimental aircraft);
- c) to take advantage of the inherent results to address standardisation and further maturation of relevant CNS/ATM technologies and applications both in ground systems and avionics; and
- d) to define guidelines to implement ASAS operations in suitable parts of the airspace.

2.4 In order to achieve these overall objectives, a complete technical and operational evaluation of integration, interoperability and safe use of new CNS/ATM technologies and applications suitable for the

future Mediterranean ATM scenario have been performed. Appropriate new operational procedures for ATM staff and flight-crew have been investigated in different scenarios.

2.5 MFF has defined five applications that are being assessed in depth:

- a) Free routing: Free route (FR) airspace is defined as a specific airspace “within which users freely plan their routes between an entry point and an exit point without reference to a route network.”.
- b) Air traffic situation awareness (ATSAW): An enhancement of air traffic situation awareness can be obtained by displaying the traffic situation around the aircraft on adequate onboard systems, permitting the flight crew to identify aircraft that are relevant or even critical with regard to the own trajectory.
- c) ASAS spacing: Airborne separation assistance systems (ASAS) spacing applications concern the delegation of spacing tasks to the flight crew. The delegation is limited in time and space.
- d) ASAS separation: Whereas ASAS spacing procedures concern the implementation of spacing specified by ATM, ASAS separation procedures go one step further. Within certain boundaries, the delegated aircraft executes the most appropriate manoeuvre in order to avoid a separation violation with the target aircraft.
- e) Airborne self separation: Airborne self separation corresponds to the full delegation of responsibility for separation assurance to the flight crews of aircraft operating in specifically designated airspace – the free flight airspace (FFAS). Compared to the managed airspace (MAS) which comprises both fixed route airspace and free routing airspace, the roles and responsibilities of air traffic control services in FFAS limited to supporting aircraft in distress (‘control by exception’); the provision of information; airspace density monitoring; and assistance during the transition between FFAS and MAS.

2.6 En-route airspace ranging from low to medium air traffic density is the operational location for MFF flight trials. Several real-time simulations have been carried out and flight trials will be executed.

2.7 Further, technological, operational aspects, economic and safety issues related to ASAS applications were assessed and during the development of the programme, ranging over about five years, business and safety case analysis were conducted.

2.8 The analysis of the data obtained during the simulations and airborne tests have already provided indications on:

- a) how to apply flexible airspace management;
- b) operational procedures for transferring separation responsibilities from ATCOs to pilots and vice versa;

- c) air safety implications;
- d) improvements in flight efficiency; and
- e) HF issues and training for controllers and pilots in an ASAS environment.

2.9 The results of MFF indicate that with appropriate procedures and appropriate tools ASAS can provide benefits in terms of ATCO s workload and flight efficiency. The implementation of different concepts in MFF is expected to have an impact also on the application of the flexible use of airspace (FUA). In this respect procedures have to be developed to ensure free access to any part of the airspace and to ensure identification of flights subject to autonomous operations.

2.10 These initial results have been derived from model-based and real-time simulations conducted within the programme using the ad hoc operational procedures defined. These initial results will be better investigated also through some flight trials activities starting in October 2003.

2.11 The flight trials activities are the most significant stage of the programme that will test and verify the most promising operational procedures/applications identified, for both pilots and controllers, supported by ADS-B/MEDUP network, in order to validate the simulation results.

2.12 EUROCONTROL, through its ADS programme, is responsible for defining the master plan to implement ASAS Package 1 applications by 2008.

2.13 The MFF programme assumed that the automatic dependent surveillance — broadcast (ADS-B) benefits would convince airlines to make the required avionics investment to support ASAS implementation.

2.14 It is widely accepted that the full benefits of ASAS will only become a reality when a large majority of flights is equipped. To cope with the difficult situation of the last two years, the European Commission is taking into consideration the possibility to encourage the ADS-B equipage of aircraft.

3. CONCLUSIONS

3.1 The Mediterranean Free Flight Programme, coordinated by ENAV SpA and cofunded by the consortium partners and the European Commission, is validating the implementation of ASAS applications in the Mediterranean Area. ASAS has the potential to reduce ATCOs workload and increase flight efficiency with related benefits.

3.2 Full benefits of ASAS will become a reality only when the majority of flights will be ADS-B equipped.