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AIR TRAFFIC MANAGEMENT

Freeing Europe's airspace

WHITE PAPER

(presented by the Commission)

TABLE OF CONTENTS

I. BACKGROUND	3
(a) Definitions	3
(b) The basic ATM functions	3
(c) The participants	4
II. AIRSPACE CONGESTION	5
(a) The problem	5
(b) The initial response	6
(c) The present state of play	8
III. THE SHORTCOMINGS	10
A fragmented picture	10
Lack of decision-making mechanisms	11
Lack of decision-making aids	12
Inefficient use of available resources	12
Lack of means of following up decisions	13
Lack of tools for implementation and support	14
Inadequate cost control	15
IV. DEFINING A SOLUTION	15
(a) The need to separate regulatory and operational functions	15
(b) The operational function	16
(c) The regulatory function	18
V. OPTIONS FOR THE SINGLE ATM SYSTEM	19
Option 1 : a "European monolithic structure"	19
Option 2 : a solution limited to the Community	20
Option 3 : a broader European solution.	23
VI. CONCLUSIONS	25

This White Paper examines the background to the current situation in air traffic management in Europe, and the shortcomings of the present arrangements, before defining a "single ATM system for Europe" and, finally, outlining the Commission's views on the best institutional arrangements for the future. It is supported by an Annex which looks in more detail at the different aspects of building a unified system; and four technical Appendices.

I. BACKGROUND

(a). Definitions

1.- The term "air traffic management" (ATM) is generally accepted as covering all the activities involved in ensuring the safe and orderly flow of air traffic. It comprises three main services :

- Air traffic control (ATC), the principal purpose of which is to maintain sufficient separation between aircraft and between aircraft and obstructions on the ground to avoid collisions. However, this safety objective must not impede the flow of traffic and must therefore meet the needs of users. Appendix 2 describes how this service is provided in practice, and the division of responsibilities between the various parties involved.
- Air traffic flow management (ATFM), the primary objective of which is, again on safety grounds, to regulate the flow of aircraft as efficiently as possible in order to avoid the congestion of certain control sectors. The ways and means used are increasingly directed towards ensuring the best possible match between supply and demand by staggering the demand over time and space, and also by ensuring better planning of the control capacities to be deployed to meet the demand. The Commission communication on congestion and crisis in air traffic¹ describes how this service is performed.
- Airspace management (ASM), the purpose of which is to manage airspace - a scarce resource - as efficiently as possible in order to satisfy its many users, both civil and military. This service concerns both the way airspace is allocated to its various users (by means of routes, zones, flight levels, etc.) and the way in which it is structured in order to provide air traffic control services.

(b). The basic ATM functions

2.- Air traffic management comprises two distinct, basic functions - one "regulatory", in a broad sense; and the other "operational".

¹ COM(95)318 final, 5.7.1995.

The first of these functions involves setting broad objectives in terms of the safety, quantity, quality and price of the services to be provided and taking steps to ensure that they are met. It also involves the allocation of airspace to its various users, including military users, and all the measures needed to meet a wide range of *other* policy objectives to do with such issues as environmental protection, town and country planning, national defence and meeting international commitments.

The second function is the actual provision of services, for reward, within the regulatory framework provided by the first function. This is a quasi-commercial activity, the safety aspect of which is of course essential.

(c). The participants

- 3.- These services and functions are the responsibility of individual countries, which have put in place the necessary organisations and infrastructure by their own. In few cases, two or more countries have used regional organisations to provide some of the corresponding services and functions jointly on their behalf : in Europe, EUROCONTROL's control centre at Maastricht provides air traffic control for the upper airspace of the Benelux countries and Northern Germany under specific agreements between the Agency and the States concerned. EUROCONTROL has also been given responsibility for setting up and implementing a Central Flow Management Unit (CFMU) to provide ATFM over nearly all of Europe.

The regulatory framework in which the operational function is provided nevertheless always remains a national prerogative, except when exist "ICAO Standards", which are binding international commitments, or "EUROCONTROL Standards" made mandatory by the Community (Directive EC/93/65² - see paragraph 8).

As a consequence, each State is almost entirely free to decide the level of service to be provided and the means to be employed for this purpose, with the result that the technology used and the results achieved vary very widely from one country to another, making the overall system less efficient than it should be.

4. To overcome this problem, if only in part, most countries in the world have felt it necessary to develop their international cooperation. They have done so on the basis of the principle of "full and exclusive sovereignty of each country over its own territory", as established in the Chicago convention of 1944 which laid the foundation of the global system of international air transport.

In this context, the International Civil Aviation Organisation (ICAO) was set up to define and adopt the common rules - the "ICAO standards" - needed to make the system interoperable so that any one aircraft could travel anywhere in the world. This

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OJ N. L 187, 23.1.1993.

organisation, which has 184 member countries around the globe, is also responsible for ensuring that the services correspond as closely as possible to the needs of the users by adopting and amending from time to time Regional Air Navigation Plans, including the European Regional Air Navigation Plan. It may, consequently, give certain States responsibility for supplying such services to aircraft crossing international waters. It is nevertheless a relatively flexible framework, within which it is possible to notify differences from the common rules, while the undertakings given in the Regional Plans are not legally binding.

Groups of States have also chosen to cooperate more closely at regional level and, in some cases, to consider actually integrating their national services. It was for this reason that EUROCONTROL³ was set up in 1960 by an international convention, to provide air traffic control for the entire upper airspace of its Member States. This, however, represented too great a transfer of sovereignty for some of the first of its member countries : even before the Convention entered into force, France and the United Kingdom reclaimed control of the whole of their own airspace, and Germany later largely followed suit. Consequently, EUROCONTROL was given essentially a coordinating role in planning and research, and its Convention was supplemented by a multilateral agreement under which it was given responsibility for collecting route charges.

In parallel with these developments, and in view of the lessons learned from over-ambitious attempts at integration, ICAO reinforced the existing mechanisms for cooperation at regional level by setting up the EANPG,⁴ which meets once or twice a year as necessary and works more or less continuously on updating and monitoring the European Regional Air Navigation Plan.

At a more political level the European Civil Aviation Administrations have established, under the aegis of the Council of Europe, the European Civil Aviation Conference (ECAC)⁵ where they can discuss and co-ordinate their various policies.

5. Up until now, despite the existence and continuing development of its competence in aviation, the Community has no formal status in any of these organisations. It is only involved as an observer, in certain aspects of their work.

³ Today, EUROCONTROL has 20 Member States (the States of the European Union except Finland and Spain, plus Cyprus, Hungary, Malta, Norway, Slovenia, Switzerland and Turkey). The multilateral agreement on route charges covers these same countries plus Spain.

⁴ European Air Navigation Planning Group.

⁵ ECAC is now composed of 33 European States, including all EU Member States.

III. AIRSPACE CONGESTION

(a) The problem

- 5.- Air traffic control was initially regarded primarily as a safety service, the constraints of which in terms of cost and delays - which were in fact relatively minor - had to be tolerated. It did not begin to be seen as a restrictive factor before the 1980s. Until then, airports has been regarded as the main bottleneck and it was thought that the development of air transport was therefore only limited by the number of runways which the environment would tolerate.

In 1986 only 12% of intra-European flights were delayed by more than 15 minutes (for whatever reason: ATC, weather, airline, airport, etc.), but the figure rose to 20% in 1988 and 25% in 1989, chiefly because of infrastructure congestion.

This appeared unacceptable, not only because of the direct overcost of delays to airlines evaluated at 2000 MECU⁶ annually, but also in view of the millions of hours wasted by the travelling public, as well as the deteriorating perception of air transport at a time when it faced increased competition from other transport modes.

Remedial measures, and the concomitant investment programmes described hereunder, have considerably improved the situation in the early 90s: in 1993, the number of flights delayed by more than 15 minutes fell back to its 1986 level of 12% despite a 50% increase in traffic.

Since mid-1994, however, according to the Association of European Airlines (AEA), delays have been increasing again and over 1995 the proportion of flights delayed by more than 15 minutes was 18.4%.

Appendix 2 describes this trend and attempts to quantify its economic impact.

(b) The initial response

- 6.- These developments led to general frustration, and showed that inadequate capacity in air traffic control systems could also jeopardise the liberalisation process already under way and constitute a major obstacle to the free movement of persons, especially in inaccessible and island regions. Accordingly, most of those involved demanded radical action to deal with this problem, the resolution of which would bring positive social and economic benefits.

Accordingly, towards the end of 1988 the Commission proposed a number of Community measures in this field⁷.

⁶ Sources : IATA, late 1980s; INSTAR "Phase 0" report, 1995

⁷ COM(88)577 final. These proposals are now being withdrawn by the Commission.

The European Parliament also considered this issue and on 18 September 1992 adopted a resolution on the saturation of airspace⁸ which advocated the establishment of a single air traffic management system based on the Community's institutional mechanisms.

The Council did not adopt the Commission's proposals, however, and on 18 July 1989 adopted a resolution on air traffic system capacity problems⁹ which saw multilateral cooperation within ECAC as the best way of resolving them; and called upon the Commission to help EUROCONTROL to accomplish its tasks in this connection, using Community legislative instruments as appropriate to ensure that decisions or resolutions adopted by the competent international bodies are actually implemented.

- 7.- In parallel, the ATM community was itself taking stock of the situation and various strategies were devised to improve it:
- (a) In 1988 it was decided that ATFM activities should be centralised in order to make the most efficient use of the available ATC capacities with the aid of a full picture of supply and demand in Western Europe. EUROCONTROL was asked to establish a Central Flow Management Unit (CFMU), which has been set up gradually since 1992 and will be fully operational in the summer of 1996 when all the national air traffic flow management activities will have been transferred to it.
 - (b) The ECAC en-route strategy was adopted in 1990. This resulted in the launching of the European Air Traffic Control Harmonisation and Integration Programme (EATCHIP) for which EUROCONTROL was given responsibility.

The programme calls for the adoption of joint rules, procedures and specifications to ensure the interoperability and interaction of the various national systems. An EATCHIP Work Programme (EWP) has been established: in 1994 the annual expenditure under the EWP amounted to 68 million ECU, and this will have to rise even further between now and the end of the century. Its implementation will henceforth be a standing EUROCONTROL function.

At the same time, individual countries have agreed to improve the capacity and performance of their national systems in order to meet, by 1995 and 1998, jointly defined operational objectives to ensure the overall consistency of investment and avoid the emergence of weak links. The details of the various national programmes make up the Convergence and Implementation Programme (CIP). The ECAC countries have invested an estimated ECU 1 200 million per annum on average since 1992 in the modernisation of their national systems, and it is considered that a similar outlay will be needed over the next three years in order to implement the CIP.

⁸ OJ No C 284, 2.11.1992.

⁹ OJ No C 189, 26.7.1989.

EUROCONTROL and its member countries have also agreed to undertake a major effort on research and development to define the concepts and develop the tools required to meet foreseeable long-term needs. The aim is to bring about a uniform European Air Traffic Management System (EATMS).

- (c) Finally, in 1992 a strategy was established to improve the interface between airports and air traffic services (APATSI). Responsibility for monitoring this programme is shared between EUROCONTROL and the ECAC Secretariat, while the individual countries are responsible for implementing it. Within this framework, procedures have been developed for improving runway capacity and a new body, the Central Office for Delay Analysis (CODA), is being set up for collecting and analysing data on delays so as to determine their causes and take appropriate steps to reduce them.

- 8.- This pragmatic approach is supported by all concerned, particularly the airline associations actively involved in EUROCONTROL's standardisation work.

For its part the Commission, as requested by the Council, has lent its support to the implementation of the ECAC strategies through various forms of financial assistance; and the adoption of a Directive making the "EUROCONTROL standards" mandatory within the Community¹⁰ (see also paragraphs 28 and 29).

(c) The present state of play

- 9.- As already seen, there are now signs that the rate of delays is beginning to worsen again seriously after the significant improvements in recent years. The figures for 1995 are amongst the worst ever recorded. On average, some 18.4% of flights were delayed by more than 15 minutes over the year; in September, the figure was back to the 1989 level of 25% (compared to 17.5% in September 1994); and, in December, severe weather contributed to a figure as high as 27.1% (compared to 15.2% in December 1994).

Although the cost of ATC delays to airlines had steadied at around ECU 2 000 million annually despite the increase in traffic, this level remains extremely heavy as it accounts for some 5.5% of the total cost of intra-European air services.¹¹ The initial conclusions of the study by ECAC, with the support of the Commission, on organisational arrangements (INSTAR) showed that there is still considerable room for improvement in the quality of the service provided. Taken together, a reduction in delays and an improvement in the network of air routes could result in an annual saving to airspace users of some ECU 2 000 million;

- 10.- Moreover, the costs of providing ATC en-route services increased from 1986 to 1993 by 60% in real terms (120% at current value) - that is, faster than traffic has grown

¹⁰ OJ No L 187, 23.1.1993, Directive 93/65

¹¹ Sources: IATA and AEA, late 1980s; INSTAR "Phase 0" report, 1995

and accounted for 5.6% of the cost of intra-European air services, compared with 3.8% in 1986. The figure may even be as high as 20% in the case of regional services.¹² The INSTAR study also concluded that steps could be taken to curb further rises in the cost of this service, thus saving a further ECU 600 million per year in charges to airspace users. That is roughly one quarter of the total amount paid today.

- 11.- At their informal meeting in Palma on 15 July 1995, the Community Transport Ministers recognised the need for further progress in this field to achieve the objectives of economic efficiency, social cohesion and sustainable mobility, as laid down in the Treaty. They also expressed the wish that this White Paper, then being drafted, would put forward proposals to that effect.

This view is broadly shared by the European Parliament, as can be seen from its various resolutions on the subject, particularly those adopted on 27 September 1994 on air traffic control in Europe¹³ and on 14 February 1995 on the way forward for civil aviation in Europe.¹⁴ The Parliament considers, moreover, that the Community should be more involved in the process. It has therefore called for the "harmonisation and integration of the different national ATC systems, under the aegis of the EU, and the establishment of the basic framework for a single unified ATC system covering the entire Community airspace and controlled by a single Community Civil Aviation Authority", and has requested the Commission "to draw up, as soon as possible, a complete and detailed timetable to achieve this", reminding the Commission "of its powers in the event of non-compliance by a Member State with the obligations that are incumbent on it under the Treaty on European Union."

This is the view generally taken, too, by a number of airline associations and other airspace users, who have called for a full exercise of Community competence in this sphere.

The "Committee of Wise Men", set up by the Commission in 1992 to work out an overall European air transport policy, also echoed this view.

- 12.- As the technical and operational value of the ECAC strategies described here above, is recognised by all parties involved, it is clear that the lack of further progress and even the current deterioration is largely attributable to an increasing inability of the present organisational arrangements to cope with the growing demands required of them. The Commission has decided, therefore, to review what needs to be done in Europe to build an efficient Air Traffic Management system so as to identify the organisational shortcomings which slow down, hamper or block further developments. The results are set out in the Annex to this paper, and are summarised in the

¹² See Appendix 2.

¹³ OJ No C 305, 31.10.1994.

¹⁴ OJ No C 56, 6.3.1995.

following chapter. On this basis the Commission has developed its views on the appropriate organisational changes required; and how the Community could best play its role in achieving these objectives while respecting the principle of subsidiarity or proportionality and taking account of the experience and expertise of the international organisations already involved.

III. THE SHORTCOMINGS

A fragmented picture

(Sections 3.2, 3.4.2, 3.5, 3.7, 4.1, 5.1 and 5.5 of the Annex)

- 13.- Establishing a unified European air traffic management system with the capacity to satisfy the foreseeable needs in acceptable economic conditions would be a complex undertaking requiring the development of new concepts and technologies and heavy investment in equipment and human resources. But first of all, there is a need for a full understanding of all the aspects if the right decisions are to be taken and implemented in good time.

At the moment, the only means of obtaining this comprehensive picture is by getting information from various bodies working in parallel - which only adds to the confusion in an already highly complex field, and wastes resources and effort. Apart from the Community's own activities, which are described in paragraphs 28 and 29, these bodies are:

- EUROCONTROL and the ICAO European Regional Office for air traffic flow management;
- the EATCHIP Project Board, for en-route strategy, the definition of common objectives, procedures and specifications and monitoring their implementation;
- the APATSI Project Board, for the airport/air traffic services interface;
- the Joint Aviation Authorities (JAA)¹⁵, for performance levels and specifications for on-board equipment;
- NATO's Committee for European Airspace Coordination (CEAC), for the co-ordination of military and civil requirements;

¹⁵ The Joint Aviation Authorities are an informal grouping of national aviation administrations, which deals with the safety of aircraft and their operators.

- the ICAO's European Air Navigation Planning Group (EANPG), for general planning and liaison with neighbouring countries and regions.

The adverse effects of this fragmentation become particularly apparent when it comes to standardisation or research and technological development, where different bodies are responsible for different parts of what should be considered as a single, comprehensive system. Management of airspace, air traffic flow planning or the management of crises also suffer from the lack of a global approach.

Although ECAC could possibly be given responsibility for overall coordination, its present Secretariat lacks the resources to perform this role; and in any case it is by no means certain that this body has either the political dimension or the legitimacy to enable it to do so properly.

There is a need to establish a single body capable of bringing together all the elements necessary to develop a comprehensive European ATM policy.

Lack of decision-making mechanisms

(Sections 1.1, 3.2, 3.3, 3.4.1 and 3.4.3 of the Annex)

- 14.- Any comprehensive approach to ATM must also be accompanied by appropriate mechanisms for efficient decision-making. Today, however, the various bodies operate mainly on the basis of consensus, as far as the regulatory aspects of ATM are concerned. This slows down the implementation of the ECAC strategies since, now that nearly all the easiest points have been settled, the process is starting to stumble over trickier issues. This is the case with, for example, the use of airborne collision avoidance systems, the drafting of common procedures and specifications, the use of VHF frequencies and the reduction of vertical separation, on all of which decisions appear to be hard to reach through the EATCHIP processes. By contrast it seems probable that decisions could have been reached on all these points if rule-making had been based on majority voting.

But above all, the present state of affairs cannot go on as it is because it does not recognise the fact that airspace must be regarded as a common resource which has to be managed in the best interests of all users. The need to take national defence requirements into consideration is sometimes used as a justification for such an approach, but these concerns could easily be met by instituting proper safeguards.

There is a need to introduce effective decision-making processes based on majority voting instead of unanimity, together with appropriate safeguard mechanisms to deal with exceptional cases where national security could be threatened.

Lack of decision-making aids

(Sections 3.1, 3.6.1, 4.2, 4.3, 5.1 and 5.2 of the Annex)

- 15.- A major weakness in the present arrangements is the lack of management information to assist the decision-making process. This is already widely recognised, and several of the programmes in EATCHIP and APATSI are intended to address the causes.

The first cause is the lack of suitable indicators to access the quality and quantity of the service provided or to be supplied. This hampers traffic flow management and planning; and hinders any detailed cost-benefit analysis of major investment or of options under consideration for boosting the capacity of the system, such as Reduced, Vertical Separation, Area Navigation, etc.

The second lies in individual countries' reluctance to reveal details of costs, investment, manpower, etc. This lack of transparency makes it difficult to check that the common objectives are attained, to conduct cost-benefit analyses on the appropriate scale or simply to make comparisons to evaluate the performance and efficiency of all involved.

The third stems from the inadequacy of the human and technical resources available to carry out the analyses required to support the decision-making process. This can be explained by the fact that, until comparatively recently, air traffic control services were invariably provided by national authorities as a monopoly public service in which users had little say. That, however, is certainly no longer acceptable today, not least for the users, and every decision must be fully justified on the basis of technical, economic and social criteria in order to make sure that they will give the expected results in terms of safety and capacity; ensure the competitiveness of the European economies; and be acceptable to the human environment.

There is a need for a stronger support for decision-takers, which would be able to provide them with appropriate information and well-prepared proposals.

Inefficient use of available resources

(Sections 3.2, 3.5, 3.7 and 4.2.2 of the Annex)

- 16.- The poor use of available resources reflects the approach of ATC authorities which seek, first of all, to solve their particular problems on their own. This can be seen at three levels.

The most obvious, of course, is the proliferation of types of particular equipment, both civil and military, where a joint approach would have allowed more rational siting and operation. This holds true especially for communication, navigation and surveillance systems, but applies also to control centres themselves and ATM subsystems. One good example of what closer cooperation can achieve is the Initial Flightplan Processing System (IFPS), set up to assist the establishment of the Central Flow Management Unit (CFMU).

The second level is in the approach taken in making technological choices. In particular, the ATM sector appears to be denying itself access to techniques - particularly in the case of telecommunications and data transmission applications - which have already proved their worth in other fields. This seems to be due to a lack of systematic evaluation of and experimentation with new technologies which could be used for air traffic management.

The third can be seen in the procedures for drafting specifications and common standards. Today the ATM community acts as legislator, standards-setter, customer and engineer. This complicates and slows down the standardisation process and distances it from what is happening in industry. Instead, the industry could play its role in this sector as it does in others. Enlisting the help of standardisation bodies would be a better means of sharing the work to be done and, therefore, enabling the legislative bodies to concentrate more on the matters for which they are specially responsible. Establishment of a certification and labelling mechanism would also ease the task of the industry and customers and improve the functioning of the internal market.

There is a need for a central authority to decide on common options, allocate tasks and rationalise investments.

Lack of means of following up decisions

(Sections 3.2, 3.5, 3.7 and 4.3 of the Annex)

- 17.- The need for effective decision-making mechanisms has already been discussed, but experience shows that, if a decision is to be properly applied in practice, monitoring is needed to ensure that it is correctly understood by all concerned; that all the means needed to carry it out are available; and that any failure to comply properly is detected and corrective action taken in good time.

Paragraph 15 described the shortcomings in the area of decision-making aids. The same shortcomings - absence of adequate performance indicators, lack of transparency and insufficient resources - are also hampering the establishment of an objective, independent evaluation mechanism.

