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English, French, Russian and Spanish only[*]

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 4: Capacity-enhancement measures
4.1 Global measures
:

FLOW AND CAPACITY MANAGEMENT: GETTING THE BEST OF AVAILABLE CAPACITY

(Presented by the European Organisation for the Safety of Air Navigation — EUROCONTROL, on behalf of its Member States and those of ECAC[1])

SUMMARY

This paper addresses the evolution of air traffic flow management in Europe towards flow and capacity management. It also notes the impact of the network effect on this activity and proposes a worldwide common approach.

Suggested action by the conference is in paragraph 4.

[*] English, French, Russian and Spanish versions provided by EUROCONTROL.

[1] The ECAC Member States are: **Albania**, Armenia, **Austria**, Azerbaijan, **Belgium**, Bosnia and Herzegovina, **Bulgaria**, **Croatia**, **Cyprus**, **the Czech Republic**, **Denmark**, Estonia, **Finland**, **France**, **Germany**, **Greece**, **Hungary**, Iceland, **Ireland**, **Italy**, Latvia, Lithuania, **Luxembourg**, **Malta**, **Moldova**, **Monaco**, **the Netherlands**, **Norway**, Poland, **Portugal**, **Romania**, Serbia and Montenegro, **the Slovak Republic**, **Slovenia**, **Spain**, **Sweden**, **Switzerland**, **the former Yugoslav Republic of Macedonia**, **Turkey**, Ukraine and **the United Kingdom**.

The 31 Member States of EUROCONTROL appear in **bold**.

1. INTRODUCTION

1.1 In the report of a Eurocontrol Independent Study for the Improvement of air traffic flow management (ATFM), it was stated that the current European ATFM system was more focussed on the protection of air traffic control (ATC) than the optimisation of the efficiency of the global ATC system. It was further stated that, in its role definition, ATFM should not be restricted to slot allocation mechanisms but should also be extended to the optimisation of traffic patterns and capacity management, so that the slot allocation process is achieved in an optimised manner.

1.2 In order to achieve this improvement in the management of traffic flows, in which an embedded aim will be the prevention of overloads through capacity management, a series of air traffic flow and capacity management (ATFCM) solutions are being developed and will be implemented progressively.

1.3 The purpose of this paper is to encourage an evolution of the ICAO ATFM strategy towards a global ATFCM strategy. Capacity management is the realisation and optimization of the planning process and as such should be further elaborated in ICAO documentation.

1.4 The increasing commercialization of air navigation service providers (ANSPs) has put pressure on the coordinated planning process. As these providers are required to meet stronger economic parameters, the global planning process may be compromised. Under this scenario, a coordinated ATFCM strategy becomes even more important to fully utilize the available capacity.

2. EVOLUTION OF ATFM OPERATIONS IN EUROPE

2.1 Within the European Civil Aviation Conference (ECAC) area the EUROCONTROL Central Flow Management Unit (CFMU) is responsible, together with the local flow management positions (FMP), for managing the ATFM situation in accordance with existing ICAO principles. As the CFMU has evolved, it has become evident that the original ICAO concept needs to be amended to reflect the evolution from ATFM to ATFCM.

2.2 Flow and capacity management

2.2.1 The ATFM mandate is perceived as too restrictive. For aircraft operations, but also for ATC, ATFM is seen as a synonym for restrictions to flight operations; ground delays through slot allocation is a good example of this.

2.2.2 ATFM operations have shown that an advanced ATFM service could not be separated from the management of the capacity, including the impact of airspace availability. This is even more relevant in Europe where the fragmentation of the airspace and the division of responsibilities create important network effects. Thus, the need for coordinated capacity management procedures appeared necessary and important efforts are undertaken in this domain. Optimization of traffic pattern and capacity management have to be part of the daily tasks at each of the ATFM phases.

2.2.3 Moreover, they are supported by a more collaborative approach to ATFM. The use of “collaborative decision-making” (CDM) emphasises the necessity to involve all the key players in the flow

and capacity management process. The participation of key players, the sharing of information and the common agreement on best solutions alleviate the problems created by network effects. They also allow an optimal choice for any of the participants within the agreement.

2.3 ATFM phases

2.3.1 The process is being implemented in each of the ATFM phases, which are differentiated according to the nature of the work.

Strategic phase (planning)

2.3.2 The evolution in the strategic ATFM phase is towards more dialogue among the ATFM partners themselves and also with the capacity "providers" such as airspace, airports or ATC. The purpose is to identify as early as possible the potential discrepancies between the traffic demand and the capacity and to define common agreed solutions having a minimum impact on the flows. Solutions are not frozen at a point in time, but they are prepared for use according to the expected traffic demand.

2.3.3 The main outcome of this phase is the list scenarios, some of them being published in aeronautical information publications (AIPs), e.g. route accessibility, airspace availability; or by other means, e.g. patterns of sector configurations.

2.3.4 Getting feed back from ATFM operations at that stage, enables the capacity planners to find solutions for the critical areas, but also to improve their support to ATFM by anticipating solutions to possible traffic patterns.

Pre-tactical phase (anticipating)

2.3.5 The pre-tactical activity has a declared objective to optimize the capacity through a more efficient organization of the resources according to the predicted traffic demand (e.g. sector configuration management). The working process is to maintain collaborative optimisation, and is based on a close relationship between the central ATFM unit, the local flow management positions at the air traffic control centres and the other partners as required (airspace managers, aircraft operators). The end result is a plan, which describes the required capacity resources and the still remaining flow measures.

2.3.6 This activity uses scenarios elaborated in the strategic phase and adapts them according to the expected situation using simulations and teleconferences. The time limits to the activity are related to the accuracy of the forecast (one week is a maximum) and to the ability of the different partners to take into account the plan for their own purposes (flight plan filing being one of the constraints).

2.3.7 The success of the activity depends to a large extent on the quality of human relations between individuals and confidence in each other, as well as accuracy, reliability and timeliness of information exchanged. This requires a successful combination of highly technical and diplomatic skills for efficient results.

Tactical phase (reacting)

2.3.8 The plan prepared in the pre-tactical phase has been agreed and promulgated to all concerned. It serves as a basis for the more short-term activity when the time pressure does not allow long negotiations or exchanges.

2.3.9 The tactical flow and capacity management consists of considering the real-time events that are affecting the plan and applying any refinements. The main purpose is to minimise the impact of disruptions and to take benefit of opportunities that emerge.

2.3.10 The need to adapt the original plan may result from staffing issues, significant weather phenomena, crisis and special events, unexpected ground or airspace infrastructure opportunities/limitations, more accurate flight plan (FPL) data, revised sectors capacity values, etc. The provision of actual information is essential at this stage as it allows a prognosis for the short term including the impact on any event on the network.

2.3.11 The type of solutions to be used are different, as flights may either be already airborne, or close to take-off. The interaction with traffic synchronization and with ATC is essential to find best compromises.

Feedback

2.3.12 The planning and proactive management phases are using all available forecast information. In addition, it is essential that the above phases are refined through relevant feedback. ATFM is a part of the overall ATM process and while preparing for the near future, it should progress through lessons learnt from the past experience.

2.4 Seamless process

2.4.1 Historically the ATFM has been divided into three phases (strategic, pre-tactical and tactical) during which specific activities have been conducted according to pre-defined timeframes. The evolution should consist of ensuring seamless flow and capacity management operations from strategic planning to tactical usage. The main differences between the ATFCM phases will therefore be the number and role of the partners involved in the collaborative decision making process, the time specified to do it and the requirement for advance notice of the decision taken.

2.4.2 This seamless ATFCM process should utilise the planned resources (airspace structure, ATC capabilities, airport schedule and traffic forecast) to organise the ATM/airport capacity according to the traffic demand. Real-time operations should be conducted with the intention of minimising the impact of any disruptions and to take benefit from any opportunity.

2.4.3 Although military operational air traffic (OAT) is not bound by any ATFM measures, civil-military cooperation and coordination at all ATFCM phases is of vital interest to achieve enhanced capacity for GAT as well as mission effectiveness for OAT.

2.4.4 The strategic, pre-tactical and tactical phases constituting this seamless ATFCM process should be continuously iterative and interactive. The output of a phase will aim at preparing the next phase

and will therefore be used as input elements to be considered at the beginning of the next activity. The phases will be supported at any stage by post-analyses to ensure that the rationale for the next step remains valid in the light of the operational experience. The post-analyses shall be based on indicators showing what is effective and what is not in order to implement the required improvement. In addition "best practices" should be identified by the process and shared with all stakeholders and taken into account during the CDM process.

3. NEEDS FOR A GLOBAL ATFCM

3.1 The events of September 11, 2001 demonstrated that a crisis in one region can have immediate global consequences. The closing of the airspace in the United States at the busiest time for westbound trans-Atlantic traffic necessitated action from not only adjacent States, i.e. Canada, but also from Iceland and the United Kingdom. Furthermore the effect of returning traffic on the European system required action from the EUROCONTROL CFMU to ensure a safe and orderly flow of traffic.

3.2 This one event alone demonstrates the vital global role of ATFM in crisis management. However, it also demonstrated that ATFM by itself was no longer sufficient but that there is a need to progress to ATFCM. Such a concept incorporates the realization that crisis management needs to be a regionally centralized function linked to other regional ones.

3.3 In the debriefing of these actions, the need for a common phraseology emerged. Each of the ATFM units has developed its own terminology and any resulting misunderstanding could jeopardize the effectiveness of the operations. A first attempt to produce an ATFM phraseology with a lexicon of wording and meaning has already started through the ICAO European and North Atlantic Office with the Russian Federation, United States Federal Aviation Administration (FAA) and EUROCONTROL. A world-wide expansion under the ICAO umbrella would be beneficial to all.

4. ACTION BY THE CONFERENCE

4.1 The conference is invited to:

a) note the evolution of ATFM towards flow and capacity management;

b) recommend that ICAO considers this evolution or inclusion within its documentation;

c) recognize the need for a world-wide ATFM coordination; and

d) recommend that an ATFM phraseology be further developed through ICAO for world-wide use.

— END —