



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

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COMMITTEE A

Agenda Item 3: Enhancing the global air navigation system 3.3: Air traffic flow management (ATFM)

NETWORK MANAGEMENT

(Presented by Austria on behalf of the European Union and its Member States¹
and the other Member States of the European Civil Aviation Conference²
and by EUROCONTROL))

EXECUTIVE SUMMARY

This paper proposes an evolution from the existing concept of regional air traffic flow management (ATFM) systems to establishing a network of interlinked regions. Through the development of regional system wide-information management (SWIM) aligned business-to-business (B2B) web services, all stakeholders in other regions can obtain all necessary flight data on traffic between regions. In addition, data received from other regions can be made available to all authenticated and authorised nodes within each regional network.

Action: The Conference is invited to agree to the recommendations in paragraph 3.

1. INTRODUCTION

1.1. Air traffic flow management (ATFM) has been in existence for more than thirty years. The function commenced in the early 1980s in both North America and Europe. Both these systems cover large geographical areas. As an example, in the case of Europe the EUROCONTROL network manager system includes a centralised flow management function operating in close cooperation with national ATFM units in the airspace of forty-three States.

1.2. Europe's own experience in applying ICAO Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS), complemented by the *Manual on Collaborative Air Traffic Flow Management* (Doc 9971), has led to an efficient deployment of cross border airspace

¹ Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

² Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

structures and services, further integration of managing shared resources and ATFM, increased interoperability and development of common structures to address crisis management. These are key directions in which network management has evolved in Europe and should contribute to further developing solutions with a view to maximise the potential of using a network management approach on a global scale.

2. DISCUSSION

2.1 Cooperative traffic management: Integrated ATM process from planning to execution

2.1.1 Cooperative traffic management (CTM) includes interdependent activities to better use available capacity and is an important step towards time-based operations. In essence, it is the collaborative process of determining and implementing optimal solutions for network operations through the continuous information sharing of individual, local and network preferences, in both the planning and execution phases of ATM. In this context it should be noted that “network management” goes beyond ATFM, its goal is to enhance the network performance in terms of safety, capacity, cost effectiveness and environmental impact.

2.1.2 The CTM aims at optimising traffic delivery through a cooperative approach: the ATM network, air traffic control (ATC), flight operations and airports work together and, with the introduction of time-based processes, make for a smoother and more predictable sequencing of flights into ATC sectors and airports. This includes also more efficient airspace management and support tools.

2.1.3 CTM covers, inter alia: the introduction of target time operations to improve the delivery of traffic and to reduce the shortcomings of the current air traffic flow and capacity management (ATFCM) by extending the management of time-measures into the ATC execution phase, located at the constraint itself, which would require addressing the air traffic control officer (ATCO) working methods.

2.2 Cross border operations

2.2.1 It should be noted that ICAO provisions already support the establishment of cross border operations. In accordance with Annex 11 – *Air Traffic Services*, paragraph 2.1.1 states that “[...] by mutual agreement, a State may delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, control areas or control zones extending over the territories of the former.” How and under which conditions this can be achieved is further explained in the associated note.

2.2.2 As can be observed from the note to Annex 11, paragraph 2.1.1, the State providing the services within the territory of the delegating State “[...] will do so in accordance with the requirements of the latter [...]”. In other words, the delegating State may e.g. require the provider State to deliver the services applying the provisions in a manner consistent with those of the delegating State. In order to facilitate cross border operations it is essential that ICAO recommends the consistent application of existing ICAO provisions with special focus on air traffic services (ATS), airspace management, management of scarce resources such as secondary surveillance radar (SSR) codes, radio frequencies etc.

2.2.3 In order to meet the increasing demands for capacity it is necessary to develop efficient cross border airspace design and capacity management independent of State and flight information region (FIR) borders. For the network operations (NOPS) concept to become effective, it is important to adopt a

new way of thinking, across FIR borders, across national and regional borders. This can be achieved today through existing technology and States using to the fullest extent possible existing ICAO Standards and recommendations.

2.2.4 In Europe, the implementation of free route concept has triggered the use of current ICAO provisions supporting cross-border operations to their fullest. The experience gathered both in preparation of the deployment and the effective use of the free route airspace concept (FRAC) across the European network shows that the framework provided by current provisions could be used when supported by the appropriate level of integration (ATC, airspace management (ASM) and ATFM) and associated data-exchange flows. A good experience has been gained from the work between States, air navigation services providers (ANSPs) and the network manager on these topics with the latter acting as an impartial body (honest broker)³. In Europe network functions led to ensure the sharing of a network vision and its performance by all stakeholders.

2.2.5 In addition to the above, this cross border approach, executed through network management functions, will support the implementation of appropriate airspace structures and flight operations of so called ‘new entrants’ above FL600.

2.3 **Regional interoperability**

2.3.1 In order to meet users’ preferences interconnectivity between regions is needed. For example European implementation of concepts such as free-route airspace is supported by the ability to use, inter alia, common concepts, extended areas of interest, automated coordination and transfer and dynamic coordination points. This needs to expand across ICAO regions and be applied in a harmonised manner.

2.3.2 Predictability is key to the current and future effective network management functions, both within regions and across ICAO regions. A key enabler in supporting a global development and harmonisation of network management functions is the enhancement of cooperation and coordination between regions. It should therefore be ensured that operational data (e.g. flight data information, capacity information, other data as required) are exchanged not only within ICAO regions but across ICAO regions. Improved short term pre-tactical predictability for major traffic flows requires that real-time flight ATC activation departure planning information is available to each concerned ATFM/network management unit.

2.3.3 Through the development of regional SWIM aligned B2B web services all stakeholders in other regions could obtain all necessary flight data on traffic between regions. In addition, data received from other regions could be made available to all authenticated and authorised nodes within each regional network.

2.3.4 Achieving such basic functionalities would require greater harmonisation of underlying operational concepts, both intra-regional and inter-regional, which in turn could drive particular requirements on supporting systems. Further integration of ATC, ASM and ATFM measures is, in Europe’s experience, an effective way to implement effective network management solutions.

³ Reference to AN-Conf/13-WP/38

2.4 Aviation network crisis management

2.4.1 In the context of this paper ‘aviation network crisis’ means a state of inability to provide air navigation services at the required level resulting in a major loss of network capacity; or a major imbalance between network capacity and demand; or a major failure in the information flow in one or several parts of the network following an unusual and unforeseen situation. It may be caused by, inter alia, volcanic eruption, nuclear incident, armed conflict, security threats etc..

2.4.2 Following Recommendation 4/8 of the Twelfth Air Navigation Conference (AN-Conf/12), the ICAO European (EUR)/North Atlantic (NAT) Office developed ICAO Crisis Management Framework Document (EUR Doc 031) which was published in November 2014. It supports crisis management arrangements at the national, sub-regional and regional level, provides guidance to States in their work to enhance their level of preparedness to threat scenarios and aims to harmonise crisis management approach across the European Region.

2.4.3 Aviation network crises impact various components of the network and at times can spill over national and regional boundaries. In most cases their impact is significant and can only be mitigated effectively through a coordinated response.

2.4.4 The need to maintain continuity of traffic flows between regions during crisis requires that the planning and execution of specific measures is given a global dimension. To achieve this, one must plan contingency scenarios between regions, coordinated at global level and supported by the sharing/exchanging of airspace and traffic data and simulation tools. This approach would enable a rapid reaction in deploying commensurate responses to unfolding crisis by executing pre-existing scenarios or developing solutions using available data and tools.

3. CONCLUSION

3.1 The Conference is invited to agree to the following recommendation:

That the Conference:

- a) request ICAO to develop provisions supporting the implementation of a global network collaborative management, based on cooperative traffic management techniques that include further ATM integration in support of time and trajectory-based operations (TBO);
- b) urge States to accelerate implementation of ICAO provisions in support of effective cross border operations with focus on the provision of efficient air traffic services (ATS) and airspace and scarce resources management;
- c) request ICAO to promote the evolution of network management measures and using flight and flow information for a collaborative environment (FF-ICE) data exchanges from intra-regional to inter-regional applicability, and to develop the necessary provisions for the management of flows based on user-preferred trajectories;
- d) request ICAO to launch the development of a global approach in support of crisis management using data-exchanges, processes and tools to deliver early warnings, situation awareness and effective recovery.