



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 4: Optimum capacity and efficiency – through global collaborative ATM

4.1: Efficient management of airspace and improved flow performance through collaborative decision-making (CDM)

NETWORK MANAGEMENT ISSUES

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

SUMMARY

This paper presents the performance driven network operations in Europe, and their key developments and response to crises. It recommends enhanced and expanded ATFM cooperation across regional boundaries.

Action: The Conference is invited to agree to the recommendation in paragraph 5.

1. NETWORK OPERATIONS DRIVEN BY ATM PERFORMANCE NEEDS

1.1 Network operations, and ATFM as their integral part, are increasingly driven by ATM performance needs. The pre-requisite for the ATM performance delivery is an effective operational partnership in the CDM context among the principal stakeholders, i.e. civil and military airspace users, air navigation service providers (ANSPs), airports, and the functions performing network management services, including ATFM.

1.2 In Europe the role of the network manager (NM) is assigned to Eurocontrol, which is a key component of the European Commission's programme Single European Sky (SES) together with the performance framework and functional airspace blocks (FABs). The NM is the tool of the European Commission to implement SES in a pan-European dimension, meet strategic objectives, and deliver performance in partnership with all operational stakeholders.

1.3 The overarching mission of the NM is to contribute to the delivery of ATM performance in the pan-European network for performance reference period RP1 (2012-2014) in the areas of safety, capacity, flight efficiency/emission and cost effectiveness through:

- a) value added support to ANSPs, airports, civil and military airspace users; and
- b) direct operational performance contribution as a result of NM activities.

¹ Austria, Belgium, Bulgaria, 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. All these 27 States are also Members of ECAC.

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

1.4 In addition, the NM prepares the operational concepts, infrastructure and procedures for network operations in the next performance reference period RP2 (2015-2019).

1.5 The NM adds value to the European ATM network performance in the areas of capacity, environment/flight efficiency, safety and cost effectiveness, as illustrated in the figure below.

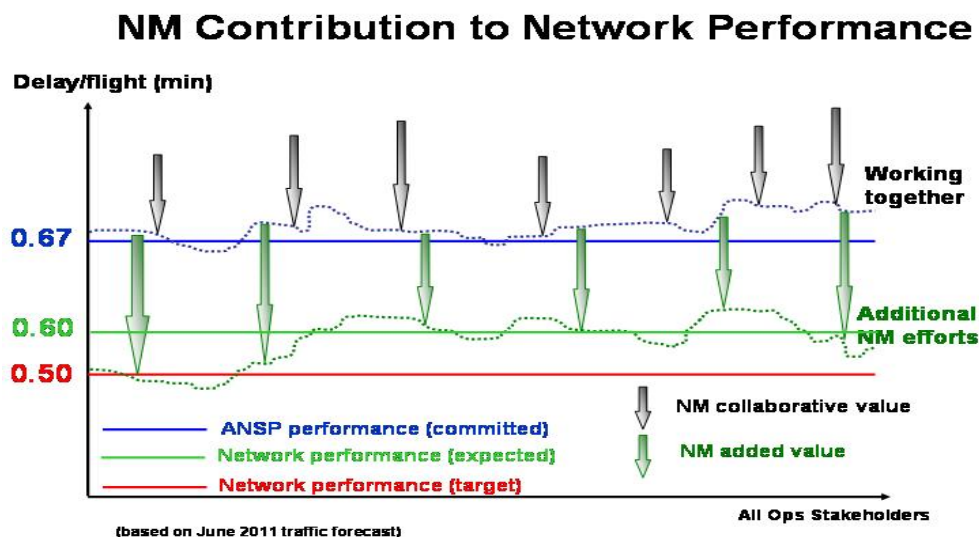


Figure 1. NM contribution to network performance

2. NETWORK OPERATIONS – KEY IMPROVEMENTS

2.1 EUROCONTROL has considered the overall SESAR direction to determine the required evolution of Network Operations. This approach is building on the network performance improvement activities of the last years, and takes account of the current difficult economic environment. Assuming that the cost of fuel will continue to increase, airspace users will focus on reducing their operating costs, and will apply pressure to ensure that their flight operations in the European airspace are supported by cost effective service provision.

2.2 Within the overall aim to improve ATM cost-efficiency in a safer environment, the operational direction in Europe will lead to better use of network resources. Moreover, the aim is to improve flexibility in planning operations allowing users to better handle their own operational business priorities. Simplified, less fragmented and more flexible airspace infrastructures and airport configurations are the basis for improved network performance.

2.3 To manage network performance against targets as set for them in the network operations plan, each and every actor will participate in network operations through a rolling cooperative process and by sharing operational data to support predictability. When constraints cannot be avoided, more focused ATFM measures will reduce the impact on both flight efficiency and delays.

2.4 The following three sections address key pre-requisites for this operational direction, with some specific examples.

2.5 Improved Operational ATC-Network Integration

2.5.1 The current gap between ATFM and ATC operations needs to be addressed from the strategic planning to the execution phases. Network planning is currently not always the basis for ATC planning and execution, with ATC mainly concentrating on local and sub-regional objectives. Similarly, ATFM is not always

addressing adequately the (predictability) needs of ATC. This provides a cycle that maintains the gap between ATFM and ATC, with consequential performance penalties.

2.5.2 A number of developments optimising the ATC-ATFM relation are ongoing in SESAR and EUROCONTROL, aimed at improving predictability, supporting (multiple) arrival management processes, and reducing the need for ATFM measures. Two examples are addressed here, a) from calculated take-off time (CTOT) to target time over/arrival (TTO/TTA), and b) dynamic demand capacity balancing (dDCB). The associated activities will require a standardisation of new elements of phraseology to support the CDM process underlying ATC-ATFM integration as well as of the technical exchanges between ATFM and ATC.

From CTOT to TTO/TTA

2.5.3 The objective of the “From CTOT to TTO/TTA” time-based concept is to address specific weaknesses that disturb the effectiveness of the current pre-flight planning phase demand capacity balancing (DCB). By acting upon ground delay measures this concept aims to improve the utilisation of the available (constrained) ATC capacity.

2.5.4 Currently, pre-flight DCB time-based measures (CTOT or re-routes) are intended to resolve imbalances between planned traffic demand and the available network capacity. By applying time constraints, traffic demand will no longer exceed the available capacity and will be presented in a smoothed flow. This current operating method assumes that the departure ground delay will be evenly propagated along the planned route so that it will deliver the planned traffic sequence. The reality is that many flights deviate from their planned trajectory. The resulting lack of predictability causes ineffective use of available capacity, reduced sector capacity used for ATFM, and reactive measures taken in the tactical phase to re-establish a smoothed traffic sequence.

2.5.5 This concept proposes that the DCB process be extended and integrated within the flight execution phase. This requires that a measure (e.g. target time at fix) is distributed to the actors of the execution phase, flight crews and controllers, to allow them to implement it within their processes. The flight crews endeavour flight execution towards achievement of their allocated target with ATC supporting, if safety permits. The Network Manager will continue to monitor network operations and identify the need for updated measures.

Dynamic Demand Capacity Balancing (dDCB)

2.5.6 The dDCB concept aims to reduce traffic complexity and streamline air traffic controller workload by means of minute-based short-term ATFCM measures (STAM) to reduce traffic peak at sector level, such as short ground delays, flight level cappings or minor re-routings, to a limited number of flights. dDCB is integrated with airport, en-route and airspace user planning and execution processes. This process takes place on the day of operations between a few hours and a few minutes before sector entry time, reconciling activities at local and network level.

2.5.7 The iterative process of dDCB consists of: detection of demand and capacity imbalances in sectors, consolidation flow management advisories in network view, assessing complexity and preparing STAM by local flow management units based on enhanced flight lists (e.g. it can involve dynamic capacity adjustments based on short-notice configuration changes, negotiations with military authorities, or cherry-picking actions based on identification of the flights creating the complexity), coordinating proposed STAM with partners concerned (adjacent ACCs, airspace users, etc), and finally STAM implementation.

2.6 Improved ASM-ATFCM integration

2.6.1 The design and utilisation of the airspace structures and routes need to be linked directly to network-wide DCB to ensure optimal network performance. This is achieved through increased flexibility in the planning of packages (including time) of runways, SIDs/STARs, ATC sectors, ATS routes, modular airspace reservations, terminal routes, free route airspace, while minimising the effect on network operations of national borders. These so-called airspace configurations aim to accommodate specific civil and military demand

requirements through synchronised agreements, and are adapted dynamically to the traffic and airspace demand in response to airspace user performance needs.

2.7 Improved Operational Airport-Network Integration

2.7.1 Airports need to become a truly integral part of network operations, as a pre-requisite for optimised network performance. This involves building on current activities to deploy Airport-CDM with associated information exchange with the network. Network planning is significantly enhanced with the provision of more accurate data directly from a number of partners involved in airport operators and airspace users. For airports, comprehensive capacity assessments are carried out to ensure that all aspects of the slot allocation process are fully aligned and most up-to-date data is used as part of the network planning process.

2.7.2 The present reporting of airport delays has evolved from one of reporting effects to reporting the causes of the delay, which includes information on when demand exceeded agreed capacity, and the reasons for the excessive demand.

3. NETWORK OPERATIONS RESPONSE TO CRISES

3.1 In May 2010 the European Commission and EUROCONTROL together established the European Aviation Crisis Coordination Cell (EACCC) to coordinate management of response to network crises affecting aviation in Europe and enhance coordination among States. Since then, the Network Manager has established internal arrangements to support the EACCC and the management of disruptions and crises in Europe. In 2011 there were a number of events that led to raising the level of alert of the NM. They include, among others: eruption of Mount Etna in January, war in Libya from March to October, the serious nuclear accident in Japan in March, the threat of industrial action by ATCOs in Germany in August, the major disruption due to staff issues in Greece in September/October, and the uncontrolled re-entry of the UARS satellite in September.

3.2 The EACCC was first activated in May 2011 to coordinate the response to the eruption of the Grímsvötn volcano that began on 21 May, as ash moved over parts of Europe, impacting air traffic. The EACCC, continuously monitoring the situation, worked closely with all aviation partners to minimise the impact of the volcanic ash on European airspace, while maintaining Europe's high safety levels. Within the framework of the EACCC, the European Commission, EUROCONTROL and European Aviation Safety Agency (EASA) provided relevant information to national authorities and airlines to enable them to take the best possible decisions on how to manage safety in the interest of the travelling public. As a result only some 900 flights of a total of 90,000 were cancelled between 22 and 25 May, significantly fewer than would have been the case without the new processes.

4. NEED FOR REGIONAL COOPERATION

4.1 ATFM was initially established in support of the resolution of local congestion issues from the network perspective. In regions where ATC service provision is fragmented, such as Europe, it was felt that, in order to be effective, ATFM had to be applied at the regional network level. The increased pressure on ATM performance requires that the cooperation in ATFM be enhanced and expanded across the regional boundaries. Some initiatives have already been undertaken in this direction between Europe and USA, and Europe and Russian Federation.

4.2 The earlier ATFM is tackled from the global perspective, the less disruption is likely to be caused by uncoordinated actions taken in isolation by individual regions. Additional benefits of cross regional cooperation include, among others things the sharing the experience and good practice in ATFM, achieving the economy of scale, and meeting performance targets.

4.3 Cooperative ATFM at the global level is currently addressed by a Global ATFM forum, which may benefit from a more formalized ICAO status. To facilitate the development of global air traffic flow

management provisions, ICAO has decided to establish a group of experts called the ATFM Manual Coordinating Team, which will develop an ATFM Manual addressing globally applicable provisions such as procedural and technical aspects, as well as interoperability and data exchange models. A final draft of this manual is expected to be completed by October 2012. EUROCONTROL will actively support this activity.

5. **RECOMMENDATIONS**

5.1 The Conference is invited to encourage ICAO to:

- a) define a suitable status to the continued regional cooperation performed through the global air traffic flow management (ATFM) forum;
- b) expedite the preparation of an ATFM manual including the definition of a common ATFM data exchange format;
- c) encourage a global approach to the consideration of network issues and development, including the close civil/military cooperation and consider European experience as an example;
- d) facilitate, with States, the handling of network issues across the regional boundaries by reinforcing cooperation on and exchange of suitable planning and traffic data; and
- e) include in its work programme the future standardisation of new elements of phraseology to support the CDM process underlying the ATC-ATFM integration as well as of the technical exchanges between ATFM and ATC.

— END —