



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

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Agenda Item 1: Strategic issues that address the challenge of integration, interoperability and harmonization of systems in support of the concept of “One Sky” for international civil aviation

1.1: Global Air Navigation Plan – framework for global planning

A STRATEGIC APPROACH FOR MODERNIZING THE ATM SYSTEM

(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

Modernization of ATM concepts and systems is currently under development in several regions of the world. It is essential that ICAO enables global interoperability and improved ATM Performance, as well as promoting implementation of the major concepts. The framework used by ICAO to achieve this is the Global Air Navigation Plan (GANP), consisting of a Strategy, the Block Upgrades and an indicative planning. This paper describes the main needs and makes recommendations to ICAO for future work.

Action: Action by the Conference is in paragraph 5.

1. INTRODUCTION

1.1 In Europe the Single European Sky (SES) is being developed to improve the aviation system, in particular the ATM system. Required performance and deficiencies will differ for each specific sub-region in Europe and the urgency of the need to develop new or adapted operational procedures and technologies is dependent on the general growth of air traffic and on specific local or sub-regional requirements. The scope of the SES is not restricted to EU Member States: active cooperation is sought with the EU's neighbouring States and other regions to achieve an efficient aviation network and a high performing ATM system.

1.2 Modernization of ATM concepts and systems should contribute to better performance by the ATM system in relation to capacity, efficiency, safety and impact on the environment. In Europe this modernization is pursued under the SES and its research programme SESAR. As other regions are dealing with comparable situations, this paper addresses some strategic issues for which the work of ICAO is essential to achieve global interoperability and enhanced performance.

¹ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, 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.

1.3 There is also a need for cooperation at global level to achieve global interoperability and improved performance. The Conference is taking place at the right moment and provides the opportunity to work together on new developments within the ICAO framework. This framework should not only contain the ASBU with their modules, but also a strategy and a plan related to how future developments can be enabled and deployed.

1.4 This working paper provides a strategic overview; many aspects are covered in more detail by separate WPs in relation to the specific agenda items.

2. ESSENTIAL STANDARDIZATION NEEDS

2.1 The European ATM Master Plan is the single European reference for the technical pillar of the Single European Sky (SES) programme³. It is the European counterpart of the GANP⁴. Within the totality of the work, priorities of areas for standardization are identified in Europe in order to support the essential operational changes of the European ATM Master Plan, which are outlined below. They have been identified to meet the performance needs and are defined as providing significant performance benefits and/or an essential change towards implementation of the target concept.

2.2 Essential elements are:

1. Traffic synchronization: Initial 4D trajectory operations + controlled time of arrival (CTA) - integrated arrival and departure management (AMAN DMAN) and extended AMAN Horizon;
2. 4D trajectory management: Trajectory management through the use of business/mission trajectory - system interoperability with air/ground and ground/ground data sharing - free routing; airborne and ground safety nets;
3. Network management (network operations planning), using airspace users business/mission trajectory planning and integrating airport operations planning to manage airspace and traffic flows;
4. SWIM: information exchange models, SWIM information and service modelling, and the requirements of the infrastructure over IP based networks;
5. Airport integration and throughput: Airport operations planning (A-CDM) connected to civil and military airspace users flight planning and integrated into the network operations planning - surface management integrated with arrival and departure and airport safety nets;
6. Conflict management and automation: Enhanced decision support tools and performance based navigation (PBN) - conflict detection and resolution.

2.3 These are also other major elements in the GANP and in the ASBU modules. The Conference is invited to endorse the further development of these major elements. Step by step ICAO should start developing the necessary provisions in view of their timely availability to support the ASBUs. In the updating of the Master Plan further alignment is sought with the ICAO ASBU modules to facilitate this cooperation.

2.4 The operational changes are enabled through changes of procedures, in technical systems, and human factors, as well as institutional changes including standardization and regulation. Standardization and regulation include safety throughout the whole aviation system, as it relates to both air and ground.

2.5 To achieve global interoperability, ICAO Standards are required, in particular for developing and defining 4D trajectory flight plan and the information models for SWIM services. Most of the changes proposed in the GANP require ICAO provisions for technical standards or specifications. In Europe several organizations are dealing with these. In a multi-State situation (like in ICAO, and in Europe) it is not given that standardization specifications will be applied by all States in the same way. Reference to overarching regulation

³ SES is based on 5 pillars: performance, safety, technology, airports and human factor

⁴ AN-Conf/12-WP/36 The European ATM Master Plan and ASBUs

may be needed. In Europe more and more regulation is developed to achieve interoperability and standardization, with reference to well defined technical specifications. It would be preferable if ICAO could give its support by providing similar specifications at global level. An option would be to include or refer to standard specifications made by others, provided that ICAO can arrange adequate referencing with guarantees for transparency, quality, access and monitoring of updates.

2.6 Implementation of new concepts and technologies may differ for each region and even for each specific application. It is essential, however, that ICAO enables ICAO provisions to be developed in a timely manner, as they are needed. This means that implementation in line with ICAO provisions is mandatory if and when a region or State wants to introduce new applications, so as to ensure with the fulfilment of global interoperability requirements and global performance needs. Regional and local planning and implementation are therefore essential counterparts to the planning at global level.

3. STRATEGY

3.1 Global interoperability and improved performance⁵ are essential for airspace users. They can maximize return on airspace users' investments and translate into a benefit for the global ATM system.

3.2 Global interoperability and improved performance can only be ensured when all national and multi-national/regional ATM R&D and Deployment programmes feed and maintain consistency with the global reference specified in the GANP and ASBU modules. An effective ICAO process should ensure that proposed changes to the global reference are timely captured, analysed, concluded upon as well as translated into updates following a clear update cycle. For this reason ICAO is advised to develop an ATM overarching business model and an ATM architecture⁶ that mirrors the global ATM operational Concept. An endorsement of the GANP as ICAO framework by the Conference is necessary to enable ICAO to continue working on its implementation.

3.3 The GANP and the Global Aviation Safety Plan (GASP) will be linked. It is not necessary to repeat here the outcome of the ICAO High Level Safety Conference (2010). General safety principles should be leading for the GANP too. Consequently, performance objectives need to encourage the application of the highest common standard of safety in civil aviation worldwide. As the GANP and its ASBUs lead to a closer link between the air and ground aspects of the system than in the past, a concept of total system approach for safety should be used when developing and updating ICAO provisions. This should be based on a risk based and performance based approach for safety standards.

3.4 It is therefore necessary that the GANP describes the strategy and roadmap of ICAO to develop and implement in a timely manner the ASBU with their modules, as well as how and when to produce the required material and also how the regions, States and industry will be closely involved in these activities. This will include mechanisms for updating the GANP, the link with the ICAO annual work programmes and the resources needed and the GANP updates each triennium (i.e. at each Assembly). A coordination mechanism for the major programmes and with the industry remains essential and complementary to the work of PIRGs.

4. PLANNING

4.1 The strategy of the GANP has to be complemented by a plan showing which deliverables are required of ICAO, as well as when and how. The GANP contains several roadmaps. These should focus in particular on the timely availability from a development perspective of new concepts and technologies for different aspects. They should be translated into a clear standardization roadmap describing the required ICAO

⁵ AN-Conf/12-WP/30 Global implementation of "One Sky" following a performance based approach"

⁶ AN-Conf/12-WP/33 The development of an ATM architecture

provisions for global interoperability and improved performance to enable ICAO support to the deployment of these concepts and technologies⁷.

4.2 While the ASBUs are defined at five-year intervals, the activities necessary to the realization of a block or one of its modules cannot be confined to that interval since developing and validating concepts, drafting standards and the actual deployment take substantial time. In addition to addressing the development of ICAO material, the planning needs to consider the other activities as well, and while it must and can be most accurate and detailed for Block 1, initial planning for Blocks 2 and 3 has to be performed as well.

4.3 Needs by region or even by State will differ, as has always been the case. However, in order to achieve a timely application, in particular for the early movers, there is a need for timely availability of ICAO material and planning should be based on the objective to meet that need. Other States or regions can await to have the need of implementing accordingly at a later stage, and in such case the available ICAO provisions shall be used.

4.4 The GANP will have a time horizon of 20 years. This is similar to that of the European ATM Master Plan. ICAO's work plan for material to be developed should be detailed enough to allow approval and updates of the standardization road map in line with the Assembly periodicity and to form the basis for the annual work programmes. Needs may vary over time, in relation to the actual versus forecast growth of air traffic and economic developments. Regular updates of the plan are therefore important and necessary. This requires cooperation between ICAO and States, but also with regions and industry. In addition, ICAO is invited to promote regional cooperation and to have the right counterparts in each region.

4.5 Over time the purpose of regulation remains the same, but the type of regulation is changing. In Europe and other regions there is a tendency to work more with performance based regulation and to detail the requirements in a more detailed technical regulation (including technical means of compliance) or to refer to specifications made by specialized bodies. Since regulatory and service provision functions are generally separated and the pressure on State budgets has increased, more and more expertise has been concentrated in standard making bodies from industry or specialized agencies, like the EU Safety Agency EASA. Consideration should be given to whether ICAO should organize the work on its ICAO provisions and standardization work in a similar way and capitalise on this as a means of optimising resources. It is not efficient to duplicate material which is already available or could be made so from other sources. This requires, however, that ICAO's planning should extend to cooperation with other bodies, which can support the Organization, to deliver their part of the material. ICAO is advised to work on such working arrangements as part of its planning process. Quality assurance is of course required and endorsement by ICAO via the Air Navigation Commission.

4.6 The investments for new technologies have to come from airspace users and service providers (ANSPs, airport operators and other types of providers). Early investors may be somewhat reluctant but they are key to getting the ball rolling for the introduction of new concepts. For economies of scale and adequate organization of airspace design and service provision, implementation on a larger scale may sometimes be requested. In these cases incentive principles should be sought for and made possible bearing in mind that the real applications and investments will happen at regional and national level. The ATM partners may need incentives and ICAO provisions such as priorities for handling traffic or the charging principles should recognize these needs to eventually support the implementation of the ASBU modules.⁸ In this context ICAO is advised to develop a methodology and guidance for an overarching ATM business model and methods for

⁷ AN-Conf/12-WP/61 Regulation and for Standardization in support of the ATM Master Plan

⁸ AN-Conf/12-WP/58 ATM performance and the best efficiency best served principle; AN-Conf/12-WP/35 Development of common performance methodologies and metrics to support the framework for global planning

business case developments⁹. In this area, European experience, based on work in progress, can very well be exploited and used as a contributor.¹⁰

4.7 European States, together with the European Union and its services (European Commission, EASA), Eurocontrol, SESAR JU, Eurocae and ECAC have cooperated on working papers for this Conference. Issues mentioned in this strategy paper are further specified in working papers dedicated to the relevant agenda items.

5. RECOMMENDATIONS

5.1 The Conference is invited to:

- a) request ICAO to further work out the strategy and planning aspects in general¹¹;
- b) request ICAO to deliver a roadmap for the development of the necessary ICAO provisions, by considering focusing SARPs on higher level requirements, and making reference in them to more detailed technical specifications to support the implementation of the ASBU and their modules. The provision should be performance based, and take a total systems approach;
- c) request that ICAO develop an ATM overarching business model and an ATM architecture that mirrors the global ATM operational concept;
- d) request the ICAO Council to prioritize the timely development of ICAO provisions of international standards and procedures supporting the GANP, in accordance with the above-mentioned roadmap;
- e) recognize that global interoperability and improved performance are required for those who want to apply new ATM concepts and technologies, when and where needed;
- f) recognize additionally that while the timing of the implementation may differ by region according to the needs; when implementing it should be done according to these global interoperability and performance requirements;
- g) invite the ICAO Council to approve the proposed revised GANP and to further develop a triennial and annual planning mechanism for delivering the supporting material required of ICAO, linked to the different ASBU's and modules, including a more accurate plan for Block 1 and providing the strategic way forward to implement Blocks 2 and 3; and
- h) invite ICAO to develop mechanisms to include States involved in major national or regional programmes as well as industry in the regular update of the planning schemes for mutual exchanges of views and to ensure global interoperability based on a single framework.

— END —

⁹ AN-Conf/12-WP/60 Modernizing ATM economic assessments

¹⁰ AN-Conf/12-WP/57 Towards an ICAO guidance material to facilitate GANP implementation through synchronized deployment of relevant ASBUs at regional or local level

¹¹ Referring to the AN-Conf/12-WP/61 "Regulation and for Standardization in support of the ATM Master Plan" for more detailed recommendations.