



ASSEMBLY — 39TH SESSION

TECHNICAL COMMISSION

Agenda Item 34: Aviation safety and air navigation policy

ENABLERS FOR GLOBAL INTEROPERABILITY AND IMPLEMENTATION

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

EXECUTIVE SUMMARY

A more coordinated and operationally focussed application of communications, navigation, surveillance and information management enablers is essential to support an efficient implementation of ATM operational services. This is, for example, also the case for the enablers needed to enhance the exchange of accurate flight data information between flight information regions (FIRs) and regions. ICAO therefore is requested to ensure that the required enablers are developed in a more integrated and timely manner.

Action: The Assembly is invited to:

- a) request ICAO to align and synchronise the CNS, avionics and information management roadmaps and initiate the development of an integrated view of all these enablers with a clear transitional path for their implementation;
- b) call upon ICAO to support the development of credible State CNS-enabler optimisation plans taking into account the foreseen improvements in aircraft capability and interaction with ground capabilities; and
- c) recognise the need for accelerating the FF-ICE developments for the purpose of exchanging flight data information in and between FIRs and ICAO regions and as such to request ICAO to extend the FF-ICE concept and develop relevant specifications in support of trajectory-based operations.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objectives: Air Navigation Capacity and Efficiency, and Safety.
<i>Financial implications:</i>	The activities referred to in the attached Assembly paper will be undertaken subject to the resources available in the 2017 – 2019 Regular Programme Budget and/or from extra budgetary contributions
<i>References:</i>	Doc 9750, <i>Global Air Navigation Plan (GANP)</i> Doc 10022, <i>Assembly Resolutions in Force</i> (as of 4 October 2013) Doc 10007, <i>Twelfth Air Navigation Conference Report (AN-Conf/12)</i>

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, Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1. INTRODUCTION

1.1 The implementation of air traffic management (ATM) operational improvements, as foreseen by the GANP, requires the introduction of new enablers to current and/or new system or infrastructure. Those enablers, primarily in the domains of communications, navigation and surveillance (CNS), interact, however, with several systems and components and are integrated in an overarching aviation system. An in-depth understanding of how these enablers integrate and interoperate is fundamental to the safety and efficiency of flight operations.

1.2 This working paper addresses the need to ensure that required enablers are developed in a harmonised, synchronised and timely manner with due considerations for their further integration. This is particularly true for CNS and flight information exchange for which the enabler development must be clearly linked with their technical and functional capability and the targeted aviation operational needs.

2. PROBLEM STATEMENTS

2.1 Technical capabilities of components and systems are the enablers that support air traffic services and ultimately flight operations. Although their developments occur at a fast rate, these developments are not always consistent with the operational needs nor, in some cases, do they take sufficiently into account the required dependencies among them, such to ensure a successful integration. Furthermore their implementation, if not managed properly, can create functional and system redundancies that can lead to major inefficiencies for both air and ground domains and also delay the benefits from investment. This lack of clear links between those enablers and agreed operational requirements can also result in the proliferation of technical solutions and constitute a risk to their interoperability. This ultimately can be also translated into increased cost for both the air and ground domains, resulting in delays and confusion in implementation. Some clear examples can be seen with respect to communication and in particular, data communications.

2.2 Flight operations will always benefit from improvements in air traffic services that result in improved flight efficiency and safety. However, to achieve this benefit, especially for States, air navigation services provider (ANSPs) and regional traffic, there is a need to reinforce cooperation through improved notifications about flights based on an enhanced exchange of accurate flight data information. Such notifications will enable balancing the demand with the capacity of air traffic control (ATC) and airports operations and will reduce unnecessary capacity buffers and hence improve flight efficiency.

3. DISCUSSION

3.1 *Communications, Navigation, Surveillance, Avionics and Information Management*

3.1.1 The implementation of new operational concepts imposing changes on aircraft and on the ground infrastructure requires a coordinated and, where possible, synchronised approach to those changes. Furthermore, required CNS infrastructure and operational procedures must exist and their deployment must be coordinated and subject to an appropriate operational and economic impact assessment. The development of separate communications, navigation and surveillance roadmaps which neither are aligned with operational requirements nor recognise the interaction of CNS enablers within a modern aviation system will result in inefficiencies and reluctance to deploy new operational concepts.

3.1.2 Considering that the goal of any enabler is ultimately to ensure the safe and efficient operation of flights, it should also be noted that improving aircraft capabilities will become more

operationally integrated with the ground infrastructure and system capabilities. The improved avionics capabilities, including for State aircraft, should be well taken into account when implementing operational concepts applicable to all stakeholders. In this context, the avionics roadmap should also be aligned with the CNS infrastructure ones.

3.1.3 The information management dimension should, however, not be forgotten in this alignment of roadmaps. The exchange of information between aviation applications has traditionally been rigidly connected to the underlying communication technologies in monolithic systems using different and very often proprietary solutions. A service orientation offers a means of information exchange between applications in a technology-agnostic way. To enable this information exchange, the applications need to be decoupled from the underlying infrastructure. This will facilitate the identification and production of interoperability requirements and specifications to provide highly interoperable information exchange between the producers and consumers.

3.1.4 Whilst, considering the above, there is a need for ICAO to align and synchronise the CNS, avionics and information management roadmaps and initiate the development of an integrated view of all these enablers with a clear transitional path for their implementation, there is also a general trend and need to transition to a performance-based environment and to develop performance-based Standards and Recommended Practices (SARPs) and regional or national regulations. A performance-based environment requires a careful assessment when deploying CNS, Avionics and information management systems. These systems function correctly, and subsequently permit safe and efficient operations, only with full interoperability between all the systems, including harmonised operational procedures. In order to ensure global interoperability, associated standards, some of which are prescriptive³, must be developed, validated and promoted. Detailed specifications need to be made available to support deployment and industry standards, prepared by standards-making organisations (SMO), should also be referenced as required by Resolution A38-11, as agreed by The Twelfth Air Navigation Conference (AN-Conf/12) (REC.6/13 (b)) and currently discussed in the ICAO Standardisation Roundtable initiative. This should notably prevent aircraft operators being faced with different regional requirements for aircraft equipage.

3.1.5 In parallel to this need to build an integrated vision and aligned roadmap for CNS, avionics and information management, it is important to duly consider that legacy systems are currently deployed and that some are still in operation and require maintenance. This is adding to the system complexity and, without a clear transitional path towards an optimal infrastructure, the implementation of an integrated CNS, avionics and information management roadmap will remain a challenge for States. While transition difficulties are well known and ambitions to rationalise and exploit the infrastructure have been continually stated, it should be possible, considering the current maturity in CNS implementation, to develop credible State CNS-enabler optimisation plans of existing CNS infrastructure. Such development should be supported by ICAO.

3.2 *Exchange of flight data information enables improved Air Navigation Services*

3.2.1 The exchange of information related to flight plans, airspace availability and capacity using real-time data is good example of a growing need for the exchange of information between aviation applications. Such information improves the predictability of demand, enabling the optimum use of capacity across FIRs and the application of less penalising and more refined ATC and air traffic flow management (ATFM) measures that facilitate airspace user choices whilst minimising negative performance impact.

³ As noted by para 2.12 of ICAO AN-WP/9036

3.2.2 Real-time data exchange within and between FIRs will bring significant benefits:

- ATM resources (airspace and airports) within an FIR can operate at optimum or maximum capacity as the level of uncertainty and unpredictability is decreased.
- Major traffic flows can be efficiently managed and ideally synchronised across FIRs as a common long-range situational awareness is established.
- The collaborative management of traffic flows between regions when disruptive factors disturb or threaten to disturb normal traffic patterns will be facilitated.
- Airspace users, airports and other ATM stakeholders will benefit from this by higher predictability allowing more flexible operations.

3.2.3 The access to standardised flight data information and the subsequent procedures for its use is an important enabler to improve global traffic efficiency. Especially the definition of the technical standards to permit harmonisation and the contents of flight data information packages are essential to foster and provide the possibility of data exchange across regions. Such enhanced exchange of flight data information is a good example of a SWIM application.

3.2.4 As a starting point, and whilst recognising that ICAO provisions enabling flight and flow - information for a collaborative environment (FF-ICE) implementation are well underway, it is important to accelerate and enhance such FF-ICE developments for the purpose of exchanging flight data information between FIRs and ICAO regions and to develop relevant specifications in support of trajectory-based operations using real-time data. This will support two key performance improvement areas (Globally-interoperable systems and data, and Optimum capacity and flexible flights) of the ICAO Global Air Navigation Plan, and allow avoiding undue delays and flight inefficiencies.

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