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TWELFTH AIR NAVIGATION CONFERENCE

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Agenda Item 3: Interoperability and data – through globally interoperable system-wide information management

3.2: Improved operational performance through flight and flow – information for a collaborative environment (FF-ICE)

THE FF-ICE CONCEPT

(Presented by the Presidency of the European Union on behalf of the European Union and its Member States[1]; by the other Member States of the European Civil Aviation Conference[2]; and by the Member States of EUROCONTROL)

SUMMARY

This paper provides a high level introduction to "flight and flow – information for a collaborative environment (FF-ICE)", which is a concept guided by the requirement to eliminate or reduce the limitations of the present Flight Plan and to accommodate the future detailed in the Global ATM Operational Concept (Doc 9854).

Recognising the pivotal role played by an aircraft's flight plan in the data chain, this paper highlights in particular the possibility of obtaining early benefits by early implementation of some of the ideas from the FF-ICE concept through FIXM.

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

1. INTRODUCTION

1.1 It is well recognised that present-day ICAO flight planning provisions suffer from important shortcomings. They were developed on the basis of a manual, paper-based, point-to-point, teletype communications system, and it is clear that a fundamental change is required to support the implementation of the Global ATM Operational Concept (Doc 9854). The flight and flow – information for a collaborative environment (FF-ICE) concept document Version 1.0 was agreed by the Air Traffic Management Requirement and Performance Panel (ATMRPP) on 22 November 2010.

[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.

1.2 The purpose of this paper is to provide a high level introduction to the FF-ICE concept, concentrating on those parts that can be the subject of early implementation in order to provide for improved operations through e.g. enhanced en route trajectories.

2. HIGH LEVEL FF-ICE DESCRIPTION

2.1 The FF-ICE concept supports all of the ATM Operational Concept components requiring flight information (demand/capacity balancing (DCB), conflict management (CM), service delivery management (SDM), airspace organization and management (AOM), aerodrome operations (AO), traffic synchronization (TS), and airspace user operations (AUO)), and refines Doc 9854 in the area of flight information management. The FF-ICE concept a cornerstone for evolving towards a performance-based air navigation system. It provides information and mechanisms to support a continuous performance management process, with strategic, tactical, and post-operational activities occurring over several years.

2.2 The FF-ICE is guided by the requirement to eliminate or reduce the limitations of the present Flight Plan. The main principles of FF-ICE are to:

a) provide a flexible concept that allows new technologies and procedures to be incorporated as necessary in a planned manner;
b) allow aircraft to indicate their detailed performance capabilities;
c) allow for an early indication of intent;
d) incorporate information for increased and more automated CDM;
e) support 4D management by trajectory; and
f) ensure information is machine-readable and that definitions of information elements for the FF-ICE are globally standardised.

3. FIXM

3.1 FF-ICE relies on a supporting SWIM environment and the exchange of a rich set of flight information. To support the FF-ICE concept a new international standard for flight information exchange is being developed by FAA and SESAR. This new ICAO standard would be based on a new information exchange model, similar to AIXM and WXXM, called FIXM – the Flight Information eXchange Model. FIXM aims to be the single common reference for information about flights available to all systems and air traffic stakeholders. It allows authorized system stakeholders and the Air Navigation Service Providers to electronically exchange consistent flight data that are tailored to their specific need and use. FIXM facilitates the sharing of common flight information between systems and enables collaboration using a common reference framework.

3.2 The benefits of FIXM can be summarised as increased interoperability, flexibility, adaptability leading to increased quality of information across flight operation.

3.3 FIXM v1.0 will be released in August 2012 and will primarily contain the ICAO FPL 2012 fields, the concept of GUFI and initial ED-133 element inclusions. The scope of FIXM will be progressively extended to capture the whole concept of Flight Object. For more information see www.fixm.aero.

4. EARLY IMPLEMENTATION

4.1 When fully implemented, the FF-ICE concept will provide a globally harmonized process for planning and providing consistent flight information, based on a globally consistent and unambiguous set of information elements.

4.2 However, as described in the aviation system block upgrades (ASBUs), the full implementation of FF-ICE is not expected until Block 3, with implementation in 2023 and beyond. It is therefore recognised that there is the possibility of an early implementation of some of the items of FF-ICE (the introduction of FF-ICE step 1; ASBU Module B1-25). Proposed changes must be based on clearly identified operational requirements and should be prepared in an organised way to facilitate the transition to the further steps of FF-ICE.

4.3 With the introduction of FPL 2012 a number of issues relating to the information provided in the flight plan were resolved. However, a number of information details still remain that are required in order to provide for a more flexible system allowing for improved operations and enhanced en route trajectories, and it has been proposed that some additional issues be addressed in a follow-up amendment to FPL 2012.

4.4 The EUROCAE document "ED-133 Flight Object Interoperability Specification" defines the interface between different instances of civilian ATC flight data processing systems (FDPS), in support of En-route and terminal ATC operations. This standard is under validation in the SESAR JU programme with the new FDPS generation European products and will be updated to reflect the validation results and to integrate new requirement coming from the SESAR programme. It is therefore important that the implementation of FF-ICE is consistent with ED-133.

4.5 Taking these ongoing developments into account, the objective of FF-ICE/1 is to establish the basis for transition towards a full FF-ICE deployment, towards a more sophisticated 4D trajectory management for both ground/ground and air/ground.

4.6 Apart from the introduction of a common data format, i.e. FIXM, other items to be considered for FF-ICE/1 implementation include those addressed in the following four sub-sections.

4.7 Implementation of PBN

4.7.1 To maximize the benefits of the introduction of the PBN concept, there is a strong requirement to ensure that the information provided in the flight plan reflects the ability to operate in a designated piece of airspace. The selection of the PBN specification(s) for a specific area or type of operation has to be decided based on airspace design, and in consultation with the airspace users.

4.8 Global Unique Flight Identifier (GUFI)

4.8.1 This proposed item specifies a globally unique reference for a flight, allowing all eligible members of the ATM Community to unambiguously refer to information pertaining to that flight. Elements of the Global Unique Flight Identifier (GUFI) include Next Flight GUFI and Previous Flight GUFI.

4.9 User preferences

4.9.1 In many areas, flight routings offered by ATC are static and are slow to keep pace with the rapid changes of users' operational demands, especially for long-haul city-pairs. To alleviate any adverse effects, information on airspace user preferences could be provided to allow ANSPs to select from options that best meet the preferences provided. This is a form of collaboration that expedites the selection of a solution. Preferences include such information as priority within a fleet for sequencing, maximum delay for selection of a runway over another, operating practices limiting the choices that are not acceptable to the airspace user, and movement preferences indicating preferred trajectory changes.

4.9.2 Operator flight preferences and constraints include operator flight priority; operator constraints; operator preferences and movement preferences.

4.9.2.1 Operator flight priority provides an indication of the relative priority of a flight within a group of flights for assignment of delays. Flight priorities are considered a preference.

4.9.2.2 Operator constraints include operator procedures and other operator specific information that may impact manoeuvres and clearances they are unable to accept from ATC. For example, the operator may be unable to perform circling approaches or accept a specific runway. This information must be complied with regardless of impact to ATM system optimization.

4.9.2.3 Operator preferences include preferences on operator procedures and other operator-specific information impacting manoeuvres and clearances. Unlike operating constraints, the operator would accept these but would prefer not to. Examples include procedures that would adversely affect flight efficiency, or a runway preference. This input may or may not be complied with based upon the impact on ATM system performance.

4.9.2.4 Movement preferences include preferences for consideration in the event that e.g. a re-routing becomes necessary. They could include a preference for a southerly course deviation in that event; preferring a ground delay over a re-route for pre-departure flights; for any reroutes of less than 120 NM or less, etc. Optional preferences would allow the ATM system to assign preferred choices. This is expected to be used by operators not equipped to engage in negotiation or to provide ranked trajectories where applicable.

4.9.3 The above considerations will be tailored to include the specific cases of State aircraft, their performances and their missions (e.g. including multi-aircraft formation management), as well as military training area requirements in terms of airspace dimension and location instead of fixed airspace structures. The AFUA concept (Advanced Flexible Use of Airspace) would allow using military variable profile areas (MVPA), variable geometry areas (VGA) and dynamic mobile areas (DMA) included in SESAR Target Concept.

4.10 Flight trajectory information, including support for early provision of flight intention information and support exchange of 4D trajectory information between the AO and the ANSP

4.10.1 The airspace user provides a series of ranked 4D trajectories and the ANSP selects the most suitable 4D trajectory to meet system performance (taking account of equity considerations). A CDM process is used to establish the selection method. A set of collaboratively-determined rules determines which flights are impacted and what the impacts may be. Information provided on preferences by the airspace user may be used by the rules to determine allocation.

5. RECOMMENDATIONS

5.1 The Conference is invited to:

a) support the FF-ICE Concept and prioritize a stepwise implementation supported by timely availability of standards and procedures;

b) agree to the early introduction of FF-ICE elements as described in this paper by supporting the ASBU module B1-25 (FF-ICE application before departure, FF-ICE/1);

c) support the swift development of FIXM; and

d) invite ICAO to develop proposals for the early implementation of FF-ICE elements that could bring benefits and enhance flight operations.

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