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WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

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Agenda Item 5: Efficient flight paths through trajectory-based operations
5.1: Improved operations through enhanced airspace organization and routing

UNITED STATES' DEMONSTRATION ACTIVITIES IN COLLABORATION WITH EUROPE, ASIA AND OTHER INTERNATIONAL AIR NAVIGATION SERVICE PROVIDERS (ANSPs)

(Presented by the United States)

SUMMARY

This paper presents past, on-going, and planned demonstration and trial activities that take place in the United States and in conjunction with various international partners. These activities are done in support of the development of the capabilities defined in the modules of the aviation system block upgrade.

Action: The Conference is invited to agree to the recommendation in paragraph 4.

1. INTRODUCTION – SUCCESS IN GLOBAL COLLABORATION

1.1 The demonstrations presented in this working paper make evident the advantages and the importance of global collaboration in the development of air traffic management capabilities, technologies, procedures, and standards. Through collaboration, the United States and its partner air navigation service providers (ANSPs) have demonstrated the ability to develop and implement operationally beneficial capabilities that are applicable to both domestic and international operations. In other areas, the results from demonstrations and trials completed in the United States support the development of international standards and interoperable capabilities as defined by the modules in the aviation system block upgrades (ASBUs).

2. GLOBAL HARMONIZATION DEMONSTRATIONS AND TRIALS

2.1 A joint US/EU/initiative Atlantic interoperability initiative to reduce emissions (AIRE) started in 2007 as a programme designed to reduce emissions through the implementation of joint demonstration projects and the exchange of best practices. These demonstrations were designed to help the FAA and SESAR promote safe, affordable and rapidly implemented innovations into air traffic management (ATM) along oceanic routes to reduce environmental emissions. This initiative also promotes transatlantic interoperability of technology, procedures, and standards.

2.2 The Asia and Pacific initiative to reduce emissions (ASPIRE) is a partnership of ANSPs from the US, Australia, New Zealand, Singapore, Japan and Thailand that is focused on environmental stewardship in the region. ASPIRE emphasizes best practices for Asia-Pacific international flights, shared performance measurement, collaborative efficiency improvement through enhanced procedures and technologies, and shared operational demonstration exercises. The ASPIRE partners conducted a series of six Green Flights in 2008-2011 to successfully demonstrate the potential for fuel and emissions savings in the region.

2.3 The mini-global demonstration will continue the validation of the flight object concept and the readiness of the flight information exchange model (FIXM) standard. The flight object is a data-set available throughout the flight both to the user and the service provider. The flight object contains various information about a flight including its trajectories, preferences, and other pertinent information such as the unique identifier. The use of FIXM is referred to in the ASBUs, Module B1-25, as a foundation to implementing flight and flow – information for a collaborative environment (FF-ICE) capability. The demonstration will show how ANSPs and air transportation operators, in both the Pacific and Atlantic regions, can leverage the FIXM standard as a means for sharing common flight information elements. The purpose of this project is to demonstrate and prove the flight object concept by developing scenarios that leverage the flight data object demonstrations. Leveraging these technologies and lessons learned will improve collaborative decision-making, flight notification, traffic flow management, and ATC flight coordination. The demonstration will show how flight object and the FIXM standard provide an opportunity for achieving increased operational efficiency from improvements in the accuracy, availability, and consistency of flight information by sharing common, standardized flight information elements. Project success is defined when the demonstrations utilize the latest standard in order to facilitate the verification and validation of FIXM.

2.4 In support of the research being completed to enable airborne participation in system-wide information management (SWIM) capabilities as described in Module B2-31 in the ASBU, the airborne access to SWIM (AAtS) will utilize a commercial data provider to communicate information from the FAA's SWIM network, to pilots aboard aircraft utilizing commercial electronic flight bag displays and airborne network. Domestic air carrier, corporate, and international air carrier partners will be identified and engaged for participation in the flight trials. AAtS demonstrates the method of information exchange of SWIM-enabled NAS and non-NAS services to the cockpit of aircraft in both the Continental US as well as internationally for US arrivals.

2.5 The FAA, in partnership with the SESAR Joint Undertaking, is planning for a demonstration to provide an integrated decision support capability to the Airline Operation Center and ATC for an end-to-end management of transoceanic traffic between airspaces of different ANSPs. The demonstration will allocate tracks based on the arrival time requirements, improving the overall predictability and efficiency of transatlantic flight.

2.6 The FAA is currently conducting operational flight evaluations of ADS-B in-trail procedures (ITP) on aircraft in revenue service, on routes in the Oakland Oceanic Flight Information Region (FIR), using certified avionics equipment. The concept takes advantage of ADS-B-In to display traffic to the flight crew as described in Module B0-86 in the ASBU's for using ADS-B for improving climb/descent procedures. In addition to increasing flight crew awareness of the traffic around them, the ITP offer the capability of climbing or descending through altitudes currently blocked by traffic due to procedural separation standards. This capability is expected to lower the amount of contingency fuel carried, thereby reducing fuel burn and carbon emissions. The FAA has been working with the New Zealand and Fiji ANSPs and regulators, and we expect them to join the ITP Pacific operational evaluation by offering ITP in their airspace by the end of calendar year 2012.

3. OTHER ACTIVITIES IN SUPPORT OF THE AVIATION SYSTEM BLOCK UPGRADES

3.1 In addition to demonstrations with other global partners, the US will also be demonstrating US planned implementation of several of the ICAO ASBU capabilities for the purposes of developing operational requirements, prototype systems, standards, etc.

3.2 The network enabled operations (NEO) demonstration effort utilized the SWIM architecture deployed by the FAA to demonstrate concepts supporting the integration of unmanned aircraft system (UAS) operations into the National Airspace System (NAS). Future efforts will develop concepts for Inter-regional SWIM for secured information exchanges with external partners in a cloud environment.

3.3 AeroMACS is a broadband wireless communications system based on the existing IEEE 802.16-2009 standard for local area networks. It will support a wide variety of ATC and AOC data, video, voice communications and information exchanges among fixed and mobile users on the airport surface. The FAA has conducted tests using an AeroMACS prototype network test bed built at the Cleveland Hopkins International Airport to support the evaluation and development of the AeroMACS Profile, MOPS and ICAO SARPS documents.

3.4 The RNAV/RNP terminal area demonstration project determined if the arrival manager (B0-15) decision support tool could successfully manage a mixed equipage flow of required navigation performance – authorization required (RNP-AR) and non-RNP-AR traffic into an airport. The demonstration validated the need for a controller decision support tool to assist in merging RNP and non-RNP traffic in the terminal manoeuvring area (TMA). This is an important step in understanding the transition to implementation of RNAV and RNP procedures (B1-05).

3.5 The United States is improving airport operations through enhanced wake separation automated decision support tools consistent with the ICAO ASBU capability (B1-70). The wake turbulence mitigation for departures (WTMD) project will place a weather information supported decision support tool into FAA air traffic control towers (ATCTs) to allow more efficient use of an airport's closely spaced parallel runways for aircraft departure operations. WTMD applies software algorithms to process both surface wind observations and forecast winds aloft, to determine when favorable crosswinds exist in relation to an airport's closely spaced parallel runways (CSPR).

3.6 Similar to the Airport-collaborative decision-making (A-CDM) operations as described in the ASBUs (B1-80), the US is evaluating the operational benefits of trajectory-based operations (TBOs) on the airport surface. Local data exchange, the sharing of flight readiness information and collaboration, are some of the capabilities that will enable pre-planned runway schedules integrated with airborne TBOs. Surface flow management will reduce surface engine operating times, resulting in fuel-savings and reduced environmental impacts, and lead to collaborative resource allocation and avoidance of surface gridlock.

4. CONCLUSION

4.1 Collaboration among ANSPs in the development of new ATM systems, capabilities, and procedures is vital to the interoperability of the global aviation system. Many of the capabilities described in the modules of the ASBUs will require a coordinated effort among the ANSPs to mature concepts and develop the supporting standards ensuring global harmonization.

4.2 The Conference is invited to:

a) take note of the different demonstrations and trials listed in this paper and their relevance toward development of advanced capabilities identified in the ASBUs.

b) acknowledge the benefits of demonstration activities, such as those in the US and Europe, and encourage the use of demonstrations tailored to an individual region's environment to support implementation of the GANP.

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