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WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

(Presented by the Secretariat)

EXPLANATORY NOTES ON THE AGENDA ITEMS

The following explanatory notes have been prepared by the Secretariat to provide a brief outline of the nature and scope of the agenda items and, where possible, to give an indication of the type of action that the meeting may be expected to take.

Introduction

As the air navigation system evolves, ICAO continues to address the challenge of the integration, interoperability and harmonization of systems leading to the concept of "One Sky" for international civil aviation. The One Sky concept emanates from the ICAO *Global Air Traffic Management Operational Concept* (Doc 9854) and supports its evolution. The concept revolves around conceiving the notion globally, developing the implementation plans regionally, and implementing required infrastructure and procedures both regionally and locally. Under One Sky, international traffic flows are addressed from end-to-end with the objective of increasing overall capacity and efficiency, and improving safety, while also reducing the impact on the environment. It is now necessary to agree to a new way of global planning, developing standards, and identifying and implementing operational improvements. Using an enhanced long-term planning regime based on the Aviation System Block Upgrades (ASBUs) initiative (Attachment A to State letter ST 13/1-11/71 refers) feeding into communications, navigation, surveillance, avionics and aeronautical information management roadmaps, the One Sky high-level global architecture should enable the digital environment, integrate aerodromes with a block-to-block strategy, facilitate trajectory-based air traffic management and support performance-based technologies.

Papers should provide proposed inputs to the respective ASBUs, modules and roadmaps along with supporting justification. Security and environment subjects will be addressed within the scope of the AN-Conf/12 as they have an important influence on the air navigation system. However, the larger issues related to security and the environment are addressed in other dedicated forums related to these fields of expertise such as the Committee for Aviation Environmental Protection (CAEP) and the Aviation Security Panel (AVSECP).

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 (GANP) – framework for global planning

a) ASBU methodology and contents
b) Communications roadmap
c) Navigation roadmap
d) Surveillance roadmap
e) Avionics roadmap
f) Aeronautical information management (AIM) roadmap

With a focus on harmonization and interoperability leading to a global air traffic management (ATM) system, this agenda item introduces the updated GANP and outlines roadmaps and ASBUs that reflect short-, medium- to long-term planning horizons in terms of systems, procedures and technologies expected to be available to States and users. In addition, the five roadmaps will form the basis for development of a frequency spectrum strategy to support implementation. In all cases, a performance-based approach is utilized, based on identified operational improvement outcomes that ensure the end-to-end interoperability of systems. High-level impediments to implementation such as cyber security should be identified and considered as part of the roadmap development process. Arrangements to ensure the periodic update of the ASBUs and roadmaps on a rolling fifteen-year planning horizon will be proposed.

The Conference will be invited to:

a) endorse the concept of ASBUs;
b) endorse communication, navigation, surveillance, avionics and AIM roadmaps;
c) agree on what more needs to be done in terms of the further development of the roadmaps and ASBUs, as well as the way in which this will done;
d) establish timelines and methodologies for the development of a frequency spectrum strategy to complement the roadmaps;
e) endorse the updated GANP, including roadmaps and ASBUs as appendices; and
f) identify and endorse a methodology to periodically update GANP to ensure there are systematic updates to the rolling fifteen-year planning horizon for ASBUs and roadmaps.

Agenda Item 2: Aerodrome operations – improving airport performance

2.1: Airport capacity
2.2: Performance-based navigation (PBN) – a practical way to improve airport performance with safety and efficiency

Increased runway infrastructure and advances in air navigation and aircraft systems are fundamental to increasing airport capacity, but are to little avail if overall airport surface operations are not also optimized to improve airport performance. Under this agenda item, the modules that support the key performance area of aerodrome operations will be presented. These are Optimized Airport Accessibility, Increased Runway Throughput through Dynamic Wake Turbulence Separation, Enhanced Safety and Efficiency of Surface Operations, Optimized Airport Operations through Airport Collaborative Decision-Making, Remote Operated Aerodrome Control Tower and Improved Airport Operations through Departure, Surface and Arrival Management. Consideration will also be given to complementary operational procedures that maximize the usage of PBN and which are essential to increasing capacity and enhancing safety through approaches with vertical guidance and stabilization of approaches to help mitigate runway excursions; and collaborative decision-making arrangements that support the sharing of information between operational partners at an airport in order to improve situational awareness and realize substantial efficiencies in the management of surface traffic. Finally, predictability and punctuality, including aspects related to the transit of security and border control points as these are

significant contributors/limiters to efficient surface operation, will be reviewed. The routine, real time collaboration and coordination between airport stakeholders in these and many other respects is critical to optimizing the timely and effective use of airport surface infrastructure.

The Conference will be invited to

a) endorse the ASBU modules related to aerodrome operations; and
b) develop strategies and provide guidance on future work for ICAO, States and industry related to PBN, CDM at airports and security issues that have an impact on the ATM system.

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

3.1: Performance improvement through the application of system-wide information management (SWIM)
3.2: Improved operational performance through flight and flow – information for a collaborative environment (FF-ICE)
3.3: Service improvement through digital AIM

Global SWIM requires system-level information management solutions rather than individual solutions to develop an integrated ATM network – a global aviation intranet. Under this agenda item, the modules that support the key performance area of interoperability and data through globally interoperable SWIM will be presented. These are Performance Improvement through the Application of SWIM**,** Service Improvement through Integration of all Digital ATM Information, and Increased Interoperability, Efficiency and Capacity through FF-ICE Application before Departure. The adoption of system-level solutions requires agreement on the various ground/ground and air/ground interfaces, types of data and exchange models to be utilized, quality/integrity requirements for data and consideration of commercial and national security aspects. Implementation methodologies need to be carefully considered to ensure functional, risk-managed deployment strategies across the global system. Recognizing the pivotal role played by an aircraft's flight plan in the data chain, the Conference will be invited to consider proposals for the phased implementation of an advanced flight planning and information sharing concept known as flight and flow information for a collaborative environment (FF-ICE).

The Conference will be invited to:

a) endorse the ASBU modules related to interoperable systems and data; and
b) develop strategies and provide guidance on future work for ICAO, States and industry related to SWIM, FF-ICE, digital AIM and integrated meteorological information.

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)
4.2: Dynamic management of special use airspace
4.3: Enhance operational decision-making through integrated meteorological information

The wide collaboration of operational stakeholders supported by appropriate information and decision-support tools will enable decisions to be made that include consideration of the preferences

expressed by respective airspace users while ensuring the most efficient use of, and greatest possible access to, all airspace resources on an equitable basis. Under this agenda item, the modules that support the key performance area of optimum capacity and flexible flights will be presented. These are Improved Operations through Free Routing, Enhanced Flow Performance through Network Operational Planning, Better Operational Decisions through Integrated Weather Information, Increased Capacity and Flexibility through Integrated Weather Information**,** Increased Capacity and Flexibility through Interval Management, and Initial Integration of Remotely Piloted Aircraft Systems into Non-Segregated Airspace. The Conference will be presented with general developments in the area of collaborative decision-making (CDM), with specific attention to the progress in overall air traffic flow management within and across flight information regions (FIRs) and the advances in arrival and departure management functions enabled by automated systems. Enhancements to the management of special use airspaces in both the civil/civil and civil/military context remain a pressing need and the Conference will seek to identify improvements based on automated sharing of real time information including aircraft surveillance data between agencies. An information exchange in relation to unmanned aircraft systems/remotely piloted aircraft system (UAS/RPAS) developments will take place under this agenda item. Developments in the digitization of AIM data and integration of digital MET data will be considered.

The Conference will be invited to:

a) endorse the ASBU modules related to optimum capacity and efficiency; and
b) develop strategies and provide guidance on future work for ICAO, States and industry related to CDM for ATM, dynamic sharing of airspace and integration and accommodation of military traffic into civil airspace.

Agenda Item 5: Efficient flight paths – through trajectory-based operations

5.1: Improved operations through enhanced airspace organization and routing
5.2: Improved traffic synchronization through 4D trajectory-based operations (TBO)
5.3: Increased flexibility and efficiency in descent and departure profiles

A move from the present ATM model (where the present location of the aircraft is known) to a trajectory-based management concept (where the future location of the aircraft is also known) is fundamental in increasing the efficiency of flight paths. By using shared dynamic trajectory information to facilitate wide area CDM between adjacent air navigation service providers (ANSP) in the same and neighboring FIRs, the ATM system will be able to analyze and accurately predict future situations based on three-dimensional and ultimately four-dimensional parameters. Under this agenda item, the modules that support the key performance area of efficient flight paths – through trajectory-based operations will be presented. These are Improved Traffic Synchronization and Initial 4D Trajectory-based Operation and Improved Flexibility and Efficiency in Descent Profiles. Flights will be accommodated in a manner that achieves the optimum system outcome with minimal deviation from the user preferred 4D flight trajectory. Automation, both in the air and on the ground, will be used to create an efficient and safe flow of traffic while preserving the ability of the human operators to intervene when and as needed to preserve the overall safety of the system. The Conference will consider developments in regard to the synchronization of traffic flows at merging points in the en-route environment, and in terminal control areas (TMAs) to optimize the landing sequence, by application of time-based metering at intermediate points. Departure and arrival procedures that take into account airspace and traffic complexity while facilitating flight via optimum profiles by enabling continuous climb operations (CCOs), continuous descent operations (CDOs) and optimized profile descents (OPDs) will be addressed. Supporting ATM procedures and arrangements such as conflict management, airspace organization and management,

demand and capacity balancing and environmental management will be an essential component of these discussions.

The Conference will be invited to:

a) endorse the ASBU modules related to efficient flight paths; and
b) develop strategies and provide guidance on future work for ICAO, States and industry related to Improved Traffic synchronization through 4D trajectory-based operation (TBO) and increased flexibility and efficiency in descent and departure profiles.

Agenda Item 6: Future direction

6.1: Implementation plans and methodologies
6.2: Standardization – approach to SARPs development in support of One Sky

At the strategic level, the operational concept provides a vision and the Global Plan provides a global framework for the implementation of air navigation systems. The regional planning and implementation process is the principal engine of ICAO's implementation work of air navigation systems. It is here that the top-down approach comprising global guidance and regional harmonization measures converge with the bottom-up approach constituted by national planning by States. Additionally, the successful rollout of new concepts and technologies will depend on well synchronized strategies for education and training. Human factors will also be addressed where there is or could be human interaction, as a user and/or as an information source. This is specifically the case with AIM, SWIM, avionics and flight procedure design, or any automated function where the fallback may be human operation. Civil aviation is served by a number of standards-making bodies at the global, regional, national and industry level, with the high-level standards produced by ICAO providing the basis for development of detailed State and industry technical standards. In an increasingly multidisciplinary environment, ensuring the efficient development and delivery of relevant global standards in a coordinated and timely manner remains a significant challenge.

The Conference will be invited to:

a) make recommendations to guide the way forward in implementing the updated GANP;
b) in the human factors context, determine where there may be need for global standardization or future emphasis; and
c) make recommendations on multi-party approaches to standards development that take advantage of coordination and collaboration within the ICAO/State relationship, and between ICAO and standards bodies, to support the implementation timeframes specified in the roadmaps.

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