ATTACHMENT A to State letter ST 13/1-11/71

BACKGROUND INFORMATION ON AVIATION SYSTEM BLOCK UPGRADES (ASBUs)

WORKING DOCUMENT

FOR THE

Aviation System Block Upgrades

THE FRAMEWORK

FOR GLOBAL HARMONIZATION

ISSUED: 16 NOVEMBER 2011

SUCCESSOR TO THE WORKING DOCUMENT FOR
GLOBAL AIR NAVIGATION INDUSTRY SYMPOSIUM (GANIS)

Preface to This Edition

This document is the successor to the GANIS Working Document issued prior to the Global Air Navigation Industry Symposium, which took place in September 2011.

This document is the result of the consultation process which followed the Symposium. All comments received were reviewed by the ASBU Technical Team and the results incorporated into this edition of the “Working Document”.

Future editions of the “Working Document” will contain detailed information on the dependencies between modules along with further refinements to the information contained within.

Please review this edition and provide your comments and feedback as requested in the accompanying State letter.

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ICAO Aviation System Block Upgrades

Introduction

The 37th Session of the International Civil Aviation Organization (ICAO) General Assembly (2010) directed the Organization to double its efforts to meet the global needs for airspace interoperability while maintaining its focus on safety. ICAO therefore initiated the "Aviation System Block Upgrades" initiative as a programmatic framework that:

- develops a set of air traffic management (ATM) solutions or upgrades,
- takes advantage of current equipage,
- establishes a transition plan, and
- enables global interoperability.

ICAO estimates that US$ 120 billion will be spent on the transformation of air transportation systems in the next ten years. While NextGen and SESAR in the United States and Europe account for a large share of this spending, parallel initiatives are underway in many areas including the Asia/Pacific, North and Latin America, Russia, Japan and China. Modernization is an enormously complex task but the Industry needs the benefit of these initiatives, as traffic levels continue to rise. It is clear that to safely and efficiently accommodate the increase in air traffic demand—as well as respond to the diverse needs of operators, the environment and other issues—it is necessary to renovate ATM systems, to provide the greatest operational and performance benefits.

Aviation System Block Upgrades comprise a suite of modules, each having the following essential qualities:

- A clearly-defined measurable operational improvement and success metric;
- Necessary equipment and/or systems in aircraft and on ground along, with an operational approval or certification plan;
- Standards and procedures for both airborne and ground systems; and
- A positive business case over a clearly defined period of time.

Modules are organized into flexible and scalable building blocks that can be introduced and implemented in a State or a region depending on the need and level of readiness, while recognizing that all the modules are not required in all airspaces.

The concept of the block upgrades originates from existing near-term implementation plans and initiatives providing benefits in many regions of the world. The Block upgrades are largely based on operational concepts extracted from the United States' Next Generation Air Transportation System (NextGen), Europe's Single European Sky ATM Research (SESAR) and Japan's Collaborative Actions for Renovation of Air Traffic Systems (CARATS) programmes. Also included was the feedback from several member states, with evolving modernization programmes, received at the recent Global Air Navigation Industry Symposium. It is also aligned with the ICAO *Global Air Traffic Management Operational Concept* (Doc 9854). The intent is to apply key capabilities and performance improvements, drawn from these programmes, across other regional and local environments with the same level of performance and associated benefits on a global scale.

The Block Upgrades describe a way to apply the concepts defined in the ICAO *Global Air Navigation Plan* (Doc 9750) with the goal of implementing regional performance improvements. They will include the development of technology roadmaps, to ensure that standards are mature and to facilitate synchronized implementation between air and ground systems and between regions. The ultimate goal is to achieve global interoperability. Safety demands this level of interoperability and harmonization. Safety must be achieved at a reasonable cost with commensurate benefits.

Leveraging upon existing technologies, block upgrades are organized in five-year time increments starting in 2013 through 2028 and beyond. Such a structured approach provides a basis for sound investment strategies and will generate commitment from equipment manufacturers, States and operators/service providers.

The block upgrades initiative will be formalized at the Twelfth Air Navigation Conference, in November 2012. Following which, it will form the basis of the Global Air Navigation Plan (GANP). The Global Air Navigation Industry Symposium,

in September 2011, will allowed industry partners as well as States to gain insight, provide feedback and ultimately commit to the initiative.

The development of block upgrades will be realized by the change of focus from top-down planning to more bottom-up and pragmatic implementation actions in the regions. The block upgrades initiative is an instrument that will influence ICAO's work programme in the coming years, specifically in the area of standards development and associated performance improvements.

Stakeholder Roles and Responsibilities

Stakeholders including service providers, regulators, airspace users and manufacturers will be facing increased levels of interaction as new, modernized ATM operations are implemented. The highly integrated nature of capabilities covered by the block upgrades requires a significant level of coordination and cooperation among all stakeholders. Working together is essential for achieving global harmonization and interoperability.

For ICAO and its governing bodies, the block upgrades will enable the development and delivery of necessary Standards and Recommended Practices (SARPs) to States and Industry in a prompt and timely manner to facilitate regulation, technological improvement and ensure operational benefits worldwide. This will be enabled by using the standards roundtable process, which involves ICAO, States and Industry, and various technological roadmaps.

States, operators and Industry will benefit from the availability of SARPs with realistic lead times. This will enable regional regulations to be identified, allowing for the development of adequate action plans and, if needed, investment in new facilities and/or infrastructure.

Different stakeholders worldwide should prepare ATM for the future. The block upgrades initiative should constitute the basis for future plans for ATM modernization. Where plans are in existence, they should be revised in line with objectives defined in the block upgrades.

For the Industry, this constitutes a basis for planning future development and delivering products on the market at the proper target time.

For service providers or operators, block upgrades should serve as a planning tool for resource management, capital investment, training as well as potential reorganization.

What is an Aviation System Block Upgrade?

An Aviation System Block Upgrade designates a set of improvements that can be implemented globally from a defined point in time to enhance the performance of the ATM System. There are four components of a Block upgrade:

Module - A module is a deployable package (performance) or capability. A module will offer an understandable performance benefit, related to a change in operations, supported by procedures, technology, regulation/standards as necessary, and a business case. A module will be also characterized by the operating environment within which it may be applied.

Of some importance is the need for each of the modules to be both flexible and scalable to the point where their application could be managed through any set of regional plans and still realize the intended benefits. The preferential basis for the development of the modules relied on the applications being adjustable to fit many regional needs as an alternative to being made mandated as a one-size-fits-all application. Even so, it is clear that many of the modules developed in the block upgrades will not be necessary to manage the complexity of air traffic management in many parts of the world.

Thread - A series of dependent modules across the block upgrades represent a coherent transition thread in time from basic to more advanced capability and associated performance. The date considered for allocating a module to a block is

that of the IOC. A thread describes the evolution of a given capability through the successive block upgrades, from basic to more advanced capability and associated performance, while representing key aspects of the global ATM concept

Block – a block is made up of modules that when combined enable significant improvements and provide access to benefits.

The notion of blocks introduces a form of quantization of the dates in five year intervals. However, detailed descriptions will allow the setting of more accurate implementation dates, often not at the exact reference date of a block upgrade. The purpose is not to indicate when a module implementation must be completed, unless dependencies among modules logically suggest such a completion date.

Performance Improvement Area (PIA) - sets of modules in each Block are grouped to provide operational and performance objectives in relation to the environment to which they apply, thus forming an executive view of the intended evolution. The PIAs facilitate comparison of ongoing programmes.

The four Performance Improvement Areas are as follows:

1. *Greener Airports*
2. *Globally Interoperable Systems and Data* – through Globally Interoperable System-Wide Information Management
3. *Optimum Capacity and Flexible Flights* – through Global Collaborative ATM
4. *Efficient Flight Path* – through Trajectory Based Operations

Table 1 illustrates the relationships between the Modules, Threads, Blocks, and Performance Improvement Areas.

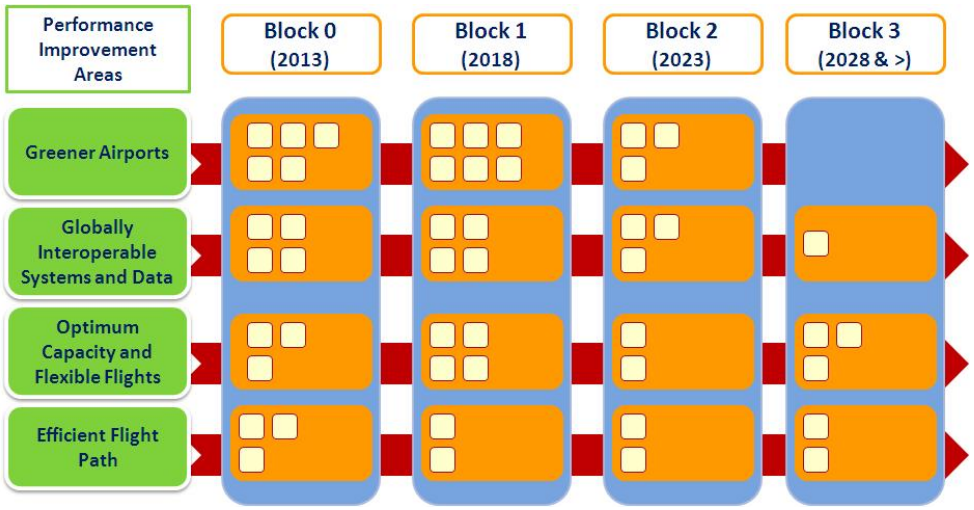

Table 1. Summary of Blocks Mapped to Performance Improvement Areas

Note that each Block includes a target date reference. Each of the Modules that form the Blocks must meet a readiness review that includes the availability of standards (to include performance standards, approvals, advisory/guidance documents, etc.), avionics, infrastructure, ground automation and other enabling capabilities. In order to provide a community perspective each Module should have been fielded in two regions and include operational approvals and procedures. This allows States wishing to adopt the Blocks to draw on the experiences gained by those already employing those capabilities.

Figure 1 illustrates the timing of each Block relative to each other. Note that early lessons learned are included in preparation for the Initial Operating Capability date. For the Twelfth Air Navigation Conference it is recognized that Blocks 0 and 1 represent the most mature of the Modules. Blocks 1 and 2 provide the necessary vision to ensure that earlier implementations are on the path to the future.

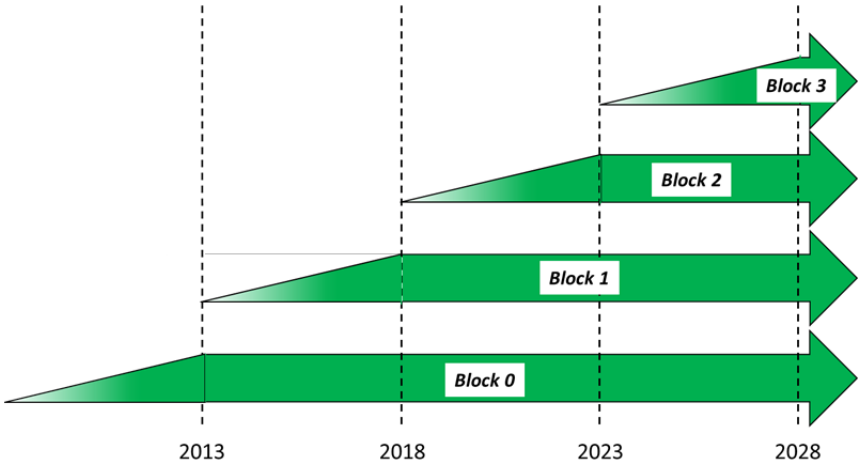

Figure 1. Timing Relationships Between Blocks

An illustration of the improvements brought by Block 0 for the different phases of flight is presented in Figure 2. It highlights that the proposed improvements apply to all flight phases, well as the network as a whole, information management and infrastructure.

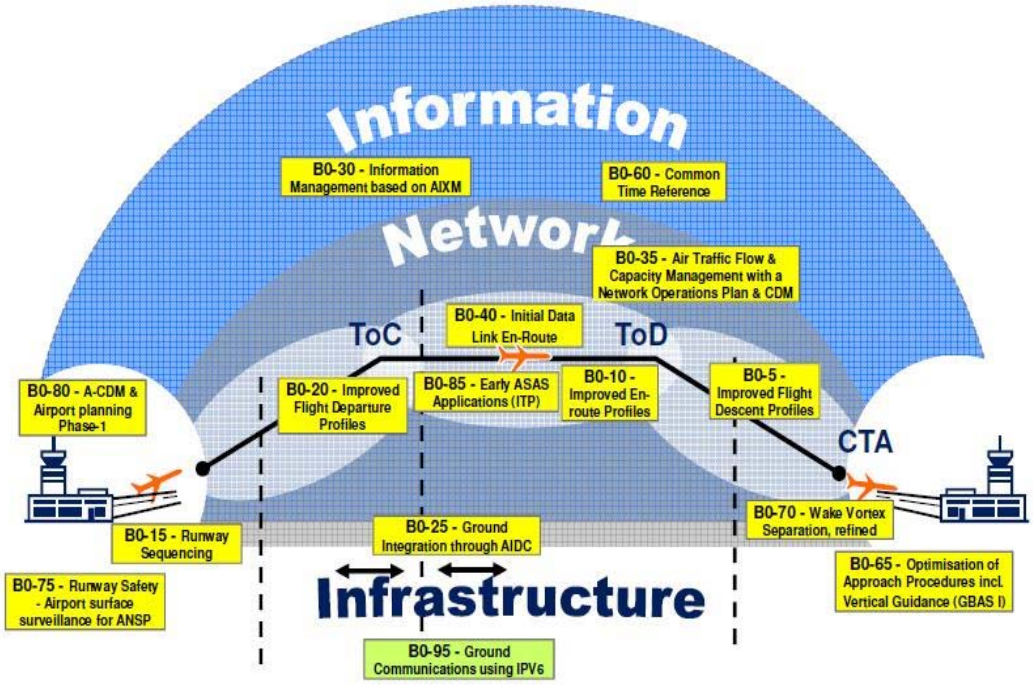

Figure 2. Block 0 in Perspective

Global Air Navigation Plan

The GANP is a strategic document that has successfully guided the efforts of States, planning and implementation regional groups (PIRGS) and international organizations in enhancing the efficiency of air navigation systems. It contains guidance for systems improvements in the near- and medium-term to support a uniform transition to the global ATM system envisioned in the Global ATM Operational Concept. Long-term initiatives from the operational concept, however, are maturing and the GANP must be updated in order to ensure its relevance and compatibility.

The United States and Europe share a common ATM modernization challenge since both operate highly complex, dense airspaces in support of their national economies. Although quite different in structure, management and control, their systems are built on a safety-focused infrastructure while actively seeking and delivering the required efficiency gains. The United States has a single system that spans the entire country, while Europe's is a patchwork of systems, service providers and airspaces defined mostly by the boundaries of States. Both legacy infrastructures must migrate to a new, upgraded and modernized operational paradigm.

Over the past ten years, as the ATM operational concepts were developed, the need was recognized to:

1) integrate the air and ground parts, including airport operations, by addressing flight trajectories as a whole and sharing accurate information across the ATM system;
2) distribute the decision-making process;
3) address safety risks; and
4) change the role of the human with improved integrated automation. These changes will support new capacity-enhancing operational concepts and enable the sustainable growth of the air transportation system.

ICAO aims for the block upgrades initiative to become the global approach for facilitating interoperability, harmonization, and modernization of air transportation worldwide. As implementation proceeds, the highly integrated nature of the block upgrades will necessitate transparency between all stakeholders to achieve a successful and timely ATM modernization.

The Twelfth Air Navigation Conference provides the rare opportunity to make significant progress and arrive at decisions toward the global coordinated deployment of the block upgrades. The anticipated result of the block upgrades work will represent a new process taking the above factors into account. Following its first application, progress reviews and updates are foreseen at regular intervals.

Conclusion

The Aviation System Global Block Upgrade initiative should constitute the framework for a worldwide agenda towards ATM system modernization. Offering a structure based on expected operational benefits, it should support investment and implementation processes, making a clear relation between the needed technology and operational improvement.

However, block upgrades will only play their intended role if sound and consistent technology roadmaps are developed and validated. As well, all stakeholders involved in the worldwide ATM modernization should accept to align their activities and planning to the related Block upgrades. The challenge of the Twelfth Air Navigation Conference will be to establish a solid and worldwide endorsement of the Aviation System Block Upgrades as well as the related technology roadmaps into the revised Global Air Navigation Plan, under the concept of One Sky.

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