International Civil Aviation Organization

Performance Based Navigation Sub-Group (PBN SG)

First Meeting
(Cairo, Egypt, 1 - 3 April 2014)

Agenda Item 4: PBN Implementation in the MID Region

Review and Update of the Draft MID Air Navigation Strategy Parts Related to PBN

(Presented by the Secretariat)

SUMMARY

The aim of this paper is to review and update the Draft MID Air Navigation Strategy Parts Related to PBN. The meeting is expected to agree on the applicability of the Aviation System Block Upgrades (ASBU) Block 0 Modules APTA, CDO and CCO and their associated Targets and Action Plans.

Action by the meeting is at paragraph 3.

REFERENCES

- Draft MID Air Navigation Strategy
- MIDANPIRG/14 Report

1. INTRODUCTION

1.1 The meeting may wish to recall that the Global Air Navigation Plan (GANP) established a framework for incremental implementations based on the specific operational profiles and traffic densities of each Region and State, which is accomplished through the evaluation of the Aviation System Block Upgrades (ASBU) modules to identify which of those modules best provide the needed operational improvements.

1.2 The meeting may wish to note that MIDANPIRG/14 agreed that as first step, it would be necessary to agree on the prioritization of the ASBU Block 0 Modules. It was emphasized that the initial prioritization would not signify that the rest of the modules could not be assigned higher priority by specific States based on the local operational requirements. It would also not mean that the rest of the modules would be given lower importance by ICAO in pursuing standardization activities. In the same vein, it was highlighted that the ASBU Implementation Plan should be a living document to be reviewed and updated on regular basis. The future objectives would be to include all 18 Block 0 Modules and gradually Block 1 Modules, for regional planning, reporting and monitoring mechanisms, as part of the future revisions.

2. DISCUSSION

2.1 MIDANPIRG/14 endorsed the ASBU Block 0 Modules prioritization Table and the Draft MID Air Navigation Strategy as at **Appendices A** and **B** to this working paper, respectively; and agreed to the following Conclusions:

CONCLUSION 14/5: MID REGION AIR NAVIGATION PRIORITIES

That,

*a) the ASBU Block 0 Modules prioritization Table at Appendices 4.1E to the Report on Agenda Item 4.1 (**Appendix A** to this WP) be endorsed as the initial version of the MID ASBU Implementation Plan; and*

b) the ASBU Block 0 Modules prioritization Table be reviewed on regular basis and be extended to cover Block 1 Modules, as appropriate.

CONCLUSION 14/6: DRAFT MID REGION AIR NAVIGATION STRATEGY

That,

*a) the Draft MID Region Air Navigation Strategy at Appendix 4.1F to the Report on Agenda Item 4.1 (**Appendix B** to this WP) be:*

i. endorsed as the initial version of the MID Region Air Navigation Strategy; and

ii. further reviewed and completed by the different MIDANPIRG subsidiary bodies

b) MID States be urged to:

i. develop their National Air Navigation Performance Framework, ensuring the alignment with and support to the MID Region Air Navigation Strategy;

ii. incorporate the agreed MID Region Performance Metrics into their National reporting and monitoring mechanisms; and

iii. provide the ICAO MID Regional Office, on annual basis, with relevant data necessary for regional air navigation planning and monitoring.

2.2 It was highlighted that the initial version of the MID Region Air Navigation Strategy/ASBU implementation Plan would cater for the reporting period of 2013-2014 and would enable the MID Region to provide the first consolidated report to ICAO HQ by April 2014.

2.3 In accordance with the above, the meeting is invited to review, discuss and agree to the applicability of the Aviation System Block Upgrades (ASBU) Block 0 Modules APTA, CDO and CCO and their associated Targets and Action Plans, taking into consideration the PBN Status of implementation and the States PBN implementation Plans. The Tables below were extracted from the Draft MID Air Navigation Strategy to be used by the meeting:

B0 – APTA: Optimization of Approach Procedures including vertical guidance

Description and purpose

The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures will enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of Basic global navigation satellite system (GNSS), Baro vertical navigation (VNAV), satellite-based augmentation system (SBAS) and GLS. The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	Y

Applicability consideration:

This module is applicable to all instrument, and precision instrument runway ends, and to a limited extent, non-instrument runway ends.

B0 – APTA: Optimization of Approach Procedures including vertical guidance					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
LNAV	All Instrument RWYs	Indicator: % of runway ends with GNSS Approach Procedures (LNAV) Supporting metric: Number of instrument runways ends provided with GNSS Approach Procedures (LNAV)	All instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016	1) Consultation meetings jointly driven by IATA, CANSO, and ICAO 2) PBN Workshops in 2014 3) MPST Go-Team visits 4) GNSS/GBAS Workshop in 2015 5) Pilot projects and trials	
LNAV/VNAV	All Instrument RWYs	Indicator: % of instrument runways ends provided with Baro-VNAV approach procedures Supporting metric: Number of instrument runways ends provided with Baro-VNAV approach procedures	All instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2018		
Precision Approach using GLS	TBD	Indicator: % of runway ends with GLS Supporting metric Number of runway ends with GLS			

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)

Description and purpose

To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex – regional/States/locations with some foundational PBN operational experience that could capitalize on near term enhancements, which include integrating procedures and optimizing performance;

b) more complex – regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex – regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics)***	***Targets***	***Action Plan***	***Remarks***
PBN STARs	TBD	Indicator: % of International Aerodromes/TMA with PBN STAR implemented Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented			List of ADs to be established through regional air navigation agreement.
International aerodromes/TMAs with CDO	TBD	Indicator: % of International Aerodromes/TMA with CDO implemented Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented		1) Pilot projects for CDOs 2) City-pair pilot projects for tailored arrivals 3) PBN Workshops	List of applicable ADs to be established through regional air navigation agreement.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Description and purpose

To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	N/A	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex: regional/States/locations with some foundational PBN operational experience that could capitalize on near-term enhancements, which include integrating procedures and optimizing performance;

b) more complex: regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex: regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
PBN SIDs	TBD	Indicator: % of International Aerodromes/TMA with PBN SID implemented Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented			List of ADs to be established through regional air navigation agreement.
International aerodromes/TMAs with CCO	TBD	Indicator: % of International Aerodromes/TMA with CCO implemented Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented		1) Pilot projects for CCOs 2) PBN Workshops	List of ADs to be established through regional air navigation agreement.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review and update the Tables related to the Aviation System Block Upgrades (ASBU) Block 0 Modules APTA, CDO and CCO at para. 2.4; and

b) urge States to align their PBN implementation plans with the MID Air Navigation Strategy objectives/priorities and performance targets related to PBN.

MID REGION ASBU BLOCK 0 MODULES PRIORITIZATION TABLE

Module Code	Module Title	Priority	High level Implementation Indicator	Remarks
B0-APTA	Optimization of Approach Procedures including vertical guidance	1	% of international aerodromes having at least one instrument runway provided with APV with Baro VNAV procedure implemented	
B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation	2	% of applicable international aerodromes having implemented increased runway throughput through optimized wake turbulence separation	List of applicable ADs to be established through regional air navigation agreement.
B0-RSEQ	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)	2	% of applicable international aerodromes having implemented AMAN / DMAN	List of applicable ADs to be established through regional air navigation agreement.
B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	1	% of applicable international aerodromes having implemented A-SMGCS Level 2	List of applicable ADs to be established through regional air navigation agreement.
B0-ACDM	Improved Airport Operations through Airport-CDM	1	% of applicable international aerodromes having implemented improved airport operations through airport-CDM	List of applicable ADs to be established through regional air navigation agreement.
B0-FICE	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration	1	% of FIRs within which all applicable ACCs have implemented at least one interface to use AIDC / OLDI with neighbouring ACCs	
B0-DATM	Service Improvement through Digital Aeronautical Information Management	1	- % States having implemented an intergrated aeronautical information database - % States having implemented QMS	
B0-AMET	Meteorological information supporting enhanced operational efficiency and safety	1	- % of States having implemented SADIS/ WIFS - % of States having implemented QMS	
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	1	% of FIRs in which FUA is implemented	

Module Code	Module Title	Priority	High level Implementation Indicator	Remarks
B0-NOPS	Improved Flow Performance through Planning based on a Network-Wide view	2	% of FIRs within which all ACCs utilize ATFM systems	
B0-ASUR	Initial capability for ground surveillance	2	% of international aerodromes where ADS-B or SSR or MLAT are implemented for ground surveillance	
B0-ASEP	Air Traffic Situational Awareness (ATSA)	2	% of States having implemented air traffic situational awareness	
B0-OPFL	Improved access to optimum flight levels through climb/descent procedures using ADS-B	2	% of FIRs having implemented in-trail procedures	
B0-ACAS	ACAS Improvements	1	% of aircraft equipped with TCAS v 7.1	
B0-SNET	Increased Effectiveness of Ground-Based Safety Nets	2	% of States having implemented ground-based safety-nets (STCA, APW, MSAW, etc.)	
B0-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDO)	1	- % of international aerodromes / TMAs with PBN STAR implemented - % of international aerodromes where CDO is implemented	List of applicable ADs to be established through regional air navigation agreement
B0-TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route	1	% of FIRs having implemented data link en-route	List of applicable FIRs to be established through regional air navigation agreement
B0-CCO	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)	1	- % of international aerodromes / TMAs with PBN SID implemented - % of international aerodromes where CCO is implemented	List of applicable ADs to be established through regional air navigation agreement

Notes:

Priority 1: Modules that have the highest contribution to the improvement of air navigation safety and/or efficiency in the MID Region. These modules should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting for the period 2013-2014.

Priority 2: Modules recommended for implementation based on identified operational needs and benefits.

MID Region Air Navigation Strategy

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MID Region Air Navigation Strategy

Strategic Air Navigation Capacity and Efficiency Objective:

To realize sound and economically-viable civil aviation system in the MID Region that continuously increases in capacity and improves in efficiency with enhanced safety, security and facilitation while minimizing the adverse environmental effects of civil aviation activities.

Background

The Global ATM Operational Concept was approved by the Eleventh Air Navigation Conference (Montreal, September-October 2003) and published as Doc. 9854-AN/458.

In order to align global planning to the ATM Operational Concept, the Eleventh Air Navigation Conference (AN-Conf/11), recommended States and Regional Planning and Implementation Groups (PIRG), through Recommendation 1/1, to consider the Concept as a common global framework to guide in the planning for the implementation of the systems in support of the air navigation services.

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. The Aviation System Block Upgrades (ASBU) methodology was formalized at the Twelfth Air Navigation Conference (AN-Conf/12) (Montreal, November 2012) and is part of the new GANP, 4th Edition (Doc 9750) available at http://www.icao.int/Meetings/a38/Documents/GANP_en.pdf

The block upgrades describe a way to apply the concepts defined in the GANP with the goal of implementing regional performance improvements. They 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 but it must be achieved at a reasonable cost with commensurate benefits.

Through Recommendation 6/1 - *Regional performance framework – planning methodologies and tools*, AN-Conf/12 urged States and PIRGs to harmonize the regional and national air navigation plans with the ASBU methodology in response to this, the MID region is developing MID Region Air Navigation Strategy that is aligned with the ASBU methodology.

Stakeholders Roles and Responsibilities

Stakeholders including service providers, regulators, airspace users and manufacturers are 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.

With the ASBU methodology States, operators and industry will benefit from the availability of Standards and Recommended Practices (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.

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, ASBU should serve as a planning tool for resource management, capital investment, training as well as potential reorganization.

Introduction

As traffic volume increases throughout the world, the demands on air navigation service providers in a given airspace increase, and air traffic management becomes more complex. Increased traffic density brings about an increase in the number of flights that cannot fly their optimum path.

It is foreseen that the implementation of the components of the ATM operational concept will provide sufficient capacity to meet the growing demand, generating additional benefits in terms of more efficient flights and higher levels of safety. Nevertheless, the potential of new technologies to significantly reduce the cost of services will require the establishment of clear operational requirements.

Taking into account the benefits of the ATM operational concept, it is necessary to make many timely decisions for its implementation. An unprecedented cooperation and harmonization will be required at both global and regional level.

ICAO introduced the Aviation System Block Upgrades (ASBU) methodology as a systemic manner to achieve a harmonized implementation of the air navigation services.

With the introduction of the ASBU the Performance Framework Forms (PFF) are restructured and aligned with the ASBU modules, and renamed as Air Navigation Report Forms (ANRF) and presents a standard format for high level monitoring of the ASBU module implementation, where as detailed monitoring of the implementation will be developed in Volume III of the revised new Regional Air Navigation Plans.

Aviation System Block Upgrades (ASBU) Framework

An ASBU 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 – 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, regulations/standards as necessary, and a business case. A module will be also characterized by the operating environment within which it may be applied. The date allocated to a module in a block is that of the initial operating capability.

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

The notion of blocks introduces a form of date segmentation in five year intervals. However, detailed considerations will call for more accurate implementation dates, often not at the exact assigned block date. 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 on-going programmes.

The four PIAs are as follows:

a) airport operations;
b) globally interoperable systems and data – through globally interoperable system-wide information management;
c) optimum capacity and flexible flights – through global collaborative ATM; and
d) efficient flight paths – through trajectory-based operations.

Figure 1 illustrates the relationships between the modules, threads, blocks, and PIAs.

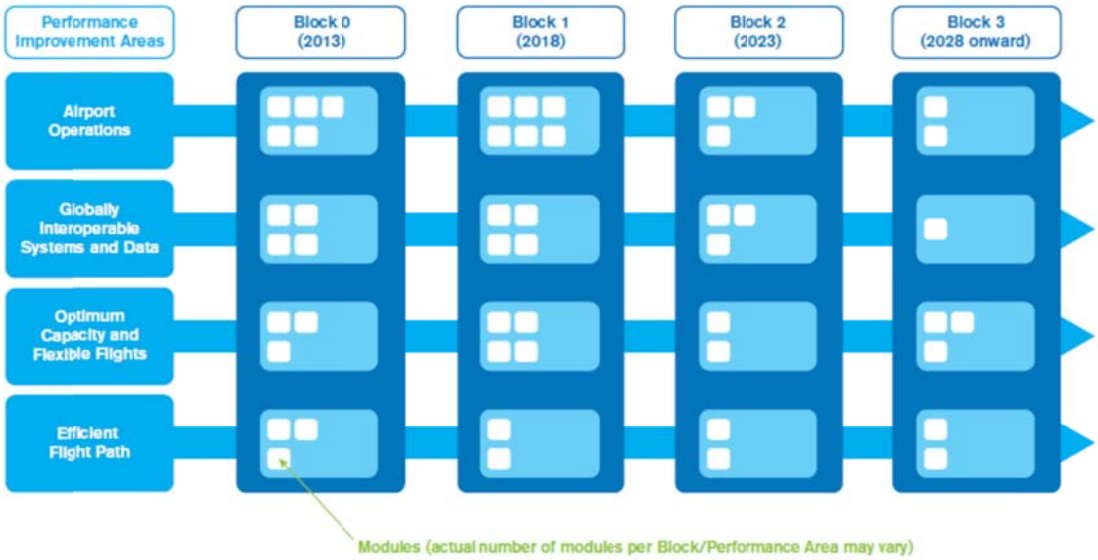

Figure 1.

MID Air Navigation Objectives:

States must focus on their Air Navigation Capacity and Efficiency priorities as they continue to foster expansion of the air transport sectors.

The ICAO Global Air Navigation Plan (GANP) represents a rolling strategic methodology which leverages existing technologies and anticipates future developments based on State/industry agreed operational objectives. The Block Upgrades are organized in five-year time increments starting in 2013 and continuing through 2028 and beyond. This structured approach provides a basis for sound investment strategies and will generate commitment from States, equipment manufacturers, operators and service providers.

The Global Plan offers a long-term vision that will assist ICAO, States and industry to ensure continuity and harmonization among their modernization programmes. It also explores the need for more integrated aviation planning at both the regional and State level and addresses required solutions by introducing Aviation System Block Upgrade (ASBU) methodology.

The MID Region air navigation objectives are in line with the global air navigation objectives and address specific air navigation operational improvements identified within the framework of the Middle East Regional Planning and Implementation Group (MIDANPIRG).

The enhancement of communication and information exchange between aviation Stakeholders and their active collaboration under the framework of MIDANPIRG would help achieving the MID Region Air Navigation objectives in an expeditious manner.

Near-term Objective (2013 - 2018): ASBU Block 0

The Fourth Edition of the *Global Air Navigation Plan* introduces ICAO's ASBU methodology and supporting technology roadmaps based on a rolling fifteen-year planning horizon. Although the GANP has a global perspective, it is not intended that all ASBU modules are to be applied around the globe. Some of the ASBU modules contained in the GANP are specialized packages that should be applied where specific operational requirements or corresponding benefits exist.

Although some modules are suitable for entirely stand-alone deployment, an overall integrated deployment of a number of modules could generate additional benefits. The benefits from an integrated implementation of a number of modules may be greater than the benefits from a series of isolated implementations. Similarly, the benefits from the coordinated deployment of one module simultaneously across a wide area (e.g. a number of proximate airports or a number of contiguous airspaces/flight information regions) may exceed the benefits of the implementations conducted on an ad hoc or isolated basis.

An example of a need for global applicability would be performance-based navigation (PBN). Assembly Resolution A37-11 urges all States to implement approach procedures with vertical guidance in accordance with the PBN concept. Therefore, the ASBU modules on PBN approaches should be seen as required for implementation at all airports. In the same way, some modules are well suited for regional or sub-regional deployment and should take this into account when considering which modules to implement regionally and in what circumstances and agreed timeframes.

Block '0' features Modules characterized by operational improvements which have already been developed and implemented in many parts of the world today. It therefore has a near-term implementation period of 2013–2018, whereby 2013 refers to the availability of its particular performance Modules and 2018 the target implementation deadline. It is not the case that all States will need to implement every Module, and ICAO will be working with its Members to help each determine exactly which capabilities they should have in place based on their unique operational requirements.

The MID Region Air Navigation Strategy is aimed to maintain regional harmonisation. The States should develop their national performance framework, including action plans for the implementation of relevant ASBU Modules.

It is important to clarify how each ASBU module fits into the framework of the MID Regional Air Navigation system.

Mid-term Objective (2018 - 2023): ASBU Block 1

Block 0 features Modules characterized by technologies and capabilities which have already been developed and implemented in many parts of the world today. It therefore features a near-term availability milestone, or Initial Operating Capability (IOC), of 2013 based on regional and State operational need. Blocks 1 through 3 are characterized by both existing and projected performance area solutions, with availability milestones beginning in 2018, 2023 and 2028 respectively.
Associated timescales are intended to depict the initial deployment targets along with the readiness of all components needed for deployment. It must be stressed that a Block's availability milestone is not the same as a deadline.

Long-term Objective (2023 - 2028): ASBU Block 2

The Block Upgrades incorporate a long-term perspective matching that of the three companion ICAO Air Navigation planning documents. They coordinate clear aircraft- and ground-based operational objectives together with the avionics, data link and ATM system requirements needed to achieve them. The overall strategy serves to provide industry wide transparency and essential investment certainty for operators, equipment manufacturers and ANSPs.

MID Region ASBU Block 0 Modules Prioritization

On the basis of operational requirements and taking into consideration the associated benefits, MID Region has prioritized the implementation of the Block "0" Modules as in **Table 1**.

Table 1: *MID REGION ASBU BLOCK 0 MODULES PRIORITIZATION*

Performance Improvement Areas (PIA)	Performance Improvement Area Name	Module	Priority	Module Name
PIA 1	Airport Operations	B0-65 APTA	1	Optimization of Approach Procedures including vertical guidance
		B0-70 WAKE	2	Increased Runway Throughput through Optimized Wake Turbulence Separation
		B0-15 RSEQ	2	Improved Traffic Flow through Sequencing (AMAN/DMAN)
		B0-75 SURF	1	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)
		B0-80 ACDM	2	Improved Airport Operations through Airport-CDM
PIA 2	Globally Interoperable Systems and Data - Through Globally Interoperable System Wide Information Management	B0-25 FICE	1	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
		B0-30 DATM	1	Service Improvement through Digital Aeronautical Information Management
		B0-105 AMET	1	Meteorological information supporting enhanced operational efficiency and safety
PIA 3	Optimum Capacity and Flexible Flights – Through Global Collaborative ATM	B0-10 FRTO	1	Improved Operations through Enhanced En-Route Trajectories
		B0-35 NOPS	2	Improved Flow Performance through Planning based on a Network-Wide view
		B0-84 ASUR	2	Initial Capability for Ground Surveillance
		B0-85 ASEP	2	Air Traffic Situational Awareness (ATSA)
		B0-86 OPFL	2	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
		B0- 101 ACAS	1	ACAS Improvements
		B0-102 SNET	2	Increased Effectiveness of Ground-based Safety Nets
PIA 4	Efficient Flight Path – Through Trajectory-based Operations	B0-05 CDO	1	Improved Flexibility and Efficiency in Descent Profiles (CDO)
		B0-TBO	1	Improved Safety and Efficiency through the initial application of Data Link En-Route
		B0-20 CCO	1	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Priority 1: Modules that have the highest contribution to the improvement of air navigation safety and/or efficiency in the MID Region. These modules should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting for the period 2013-2014.

Priority 2: Modules recommended for implementation based on identified operational needs and benefits.

Measuring and monitoring air navigation Performance:

The monitoring of air navigation performance and its enhancement is achieved through identification of relevant air navigation Metrics and Indicators as well as the adoption and attainment of air navigation system Targets.

The MID Region Air Navigation Performance Framework is based on the implementation of the Block 0 Modules shown in **Table 1** as a priority.

The MID Region air navigation Key Performance Indicators, Targets and Action Plans are detailed in the **Table 2** below.

***Note**: The different elements supporting the implementation are explained in the ASBU Document, and Global Plan (Doc 9750)*

Action Plans:

MIDANPIRG through its activities under the various subsidary bodies will continue to develop, update and monitor the implementation of Action Plans to achieve the air navigation targets.
A progress report on the implementation of the Action Plans and achieved targets will be developed by the Air Navigation System Implemenation Group (ANSIG) and presented to MIDANPIRG.

Governance:

The MIDANPIRG will be the governing body responsible for the review and update of the MID Region Air Navigation Strategy.
The MID Region Air Navigation Strategy will guide the work of MIDANPIRG and all its member States and partners.
Progress on the implementation of the MID Region Air Navigation Strategy and the achievement of the agreed air navigation targets will be reported to the ICAO Air Navigation Commission (ANC), through the review of the MIDANPIRG reports; and to the stakeholders in the Region within the framework of MIDANPIRG.

Table 2

MONITORING OF THE AVIATION SYSTEM BLOCK UPGRADES (ASBUS)

IMPLEMENTATION IN THE MID REGION

B0 – APTA: Optimization of Approach Procedures including vertical guidance

Description and purpose

The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures will enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of Basic global navigation satellite system (GNSS), Baro vertical navigation (VNAV), satellite-based augmentation system (SBAS) and GLS. The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	Y

Applicability consideration:

This module is applicable to all instrument, and precision instrument runway ends, and to a limited extent, non-instrument runway ends.

B0 – APTA: Optimization of Approach Procedures including vertical guidance					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
LNAV	All Instrument RWYs	Indicator: % of runway ends with GNSS Approach Procedures (LNAV) Supporting metric: Number of instrument runways ends provided with GNSS Approach Procedures (LNAV)	All instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016	1) Consultation meetings jointly driven by IATA, CANSO, and ICAO 2) PBN Workshops in 2014 3) MPST Go-Team visits 4) GNSS/GBAS Workshop in 2015 5) Pilot projects and trials	
LNAV/VNAV	All Instrument RWYs	Indicator: % of instrument runways ends provided with Baro-VNAV approach procedures Supporting metric: Number of instrument runways ends provided with Baro-VNAV approach procedures	All instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2018		
Precision Approach using GLS	TBD	Indicator: % of runway ends with GLS Supporting metric Number of runway ends with GLS			

Module N° B0-SURF: Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

Description and purpose

Basic A-SMGCS provides surveillance and alerting of movements of both aircraft and vehicles on the aerodrome thus improving runway/aerodrome safety. ADS-B information is used when available (ADS-B APT).

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	Y

Applicability consideration:

A-SMGCS is applicable to any aerodrome and all classes of aircraft/vehicles. Implementation is to be based on requirements stemming from individual aerodrome operational and cost-benefit assessments. ADS-B APT, when applied is an element of A-SMGCS, is designed to be applied at aerodromes with medium traffic complexity, having up to two active runways at a time and the runway width of minimum 45 m.

B0-SURF: Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)					
Elements	***Applicability***	**Performance Indicators/Supporting Metrics**	**Targets**	**Action Plan**	***Remarks***
A-SMGCS Level 1	TBD	Indicator: % of applicable international aerodromes having implemented A-SMGCS Level 1 Supporting Metric: Number of applicable international aerodromes having implemented A-SMGCS Level 1		1) Aerodrome technical missions jointly driven by ICAO, IATA and ACI 2) Airport infrastructure surveys 3) consultation meetings jointly driven by ICAO, IATA, CANSO, and ACI	List of applicable ADs to be established through regional air navigation agreement.
A-SMGCS Level 2	TBD	Indicator: % of applicable international aerodromes having implemented A-SMGCS Level 2 Supporting Metric: Number of applicable international aerodromes having implemented A-SMGCS Level 2			List of applicable ADs to be established through regional air navigation agreement.

B0 – ACDM: Improved Airport Operations through Airport-CDM

Description and purpose

To implement collaborative applications that will allow the sharing of surface operations data among the different stakeholders on the airport. This will improve surface traffic management reducing delays on movement and manoeuvring areas and enhance safety, efficiency and situational awareness.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	N

Applicability consideration:

Local for equipped/capable fleets and already established airport surface infrastructure.

B0 – ACDM: Improved Airport Operations through Airport-CDM					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
A-CDM	*TBD*	Indicator: % of applicable international aerodromes having implemented improved airport operations through airport-CDM Supporting metric: Number of applicable international aerodromes having implemented improved airport operations through airport-CDM		1) Aerodrome technical missions jointly driven by ICAO, IATA and ACI 2) consultation meetings jointly driven by ICAO, IATA, CANSO, and ACI	List of ADs to be established through regional air navigation agreement.

B0 – FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration

Description and purpose

To improve coordination between air traffic service units (ATSUs) by using ATS Interfacility Data Communication (AIDC) defined by the ICAO *Manual of Air Traffic Services Data Link Applications* (Doc 9694). The transfer of communication in a data link environment improves the efficiency of this process particularly for oceanic ATSUs.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	N	Y

Applicability consideration:

Applicable to at least two area control centres (ACCs) dealing with enroute and/or terminal control area (TMA) airspace. A greater number of consecutive participating ACCs will increase the benefits.

B0 – FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
AMHS implementation	*All States'*	Indicator: % of States with AMHS implemented Supporting metric: Number of States with AMHS implemented			
AMHS interconnection	*All States'*	Indicator: % of States with AMHS interconnected with other States AMHS Supporting metric: Number of States with AMHS interconnections implemented with other States AMHS			
Implementation of AIDC/OLDI between adjacent ACCs	*All ACCs*	Indicator: Percentage of ACCs with AIDC/OLDI systems implemented between adjacent ACCs Supporting metric: Number of AIDC/OLDI interconnections implemented between adjacent ACCs			

B0 – DATM: Service Improvement through Digital Aeronautical Information Management

Description and purpose

The initial introduction of digital processing and management of information, through aeronautical information service (AIS)/aeronautical information management (AIM) implementation, use of aeronautical information exchange model (AIXM), migration to electronic aeronautical information publication (AIP) and better quality and availability of data

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	N	Y	Y	Y

Applicability consideration:

Applicable at State level, with increased benefits as more States participate

B0 – DATM: Service Improvement through Digital Aeronautical Information Management					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
1-AIXM	*All States*	Indicator: % of States that have implemented an AIXM-based Integrated Aeronautical Information Database (IAID) Supporting Metric: Number of States that have implemented an AIXM-based Integrated Aeronautical Information Database (IAID)			
2-eAIP	*All States*	Indicator: % of States that have implemented an IAID driven AIP Production (eAIP) Supporting Metric: Number of States that have implemented an IAID driven AIP Production (eAIP)			
3-QMS	*All States*	Indicator: % of States that have implemented QMS for AIS/AIM Supporting Metric: Number of States that have implemented QMS for AIS/AIM			
4-WGS-84	*All States*	Indicator: % of States that have implemented WGS-84 for Enroute			

		Supporting Metric: Number of States that have implemented WGS-84 for Enroute Indicator: % of States that have implemented WGS-84 for Terminal Supporting Metric: Number of States that have implemented WGS-84 for Terminal Indicator: % of States that have implemented WGS-84 for Aerodromes Supporting Metric: Number of States that have implemented WGS-84 for Aerodromes Indicator: % of States that have implemented Geoid Undulation Supporting Metric: Number of States that have implemented Geoid Undulation			
5-eTOD	*All States*	Indicator: % of States that have implemented required Terrain datasets Supporting Metric: Number of States that have implemented required Terrain datasets Indicator: % of States that have implemented required Obstacle datasets Supporting Metric: Number of States that have implemented required Obstacle datasets			
6-Digital NOTAM*	*All States*	Plan for the implementation of Digital NOTAM			

B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety

Description and purpose

Global, regional and local meteorological information:

a) forecasts provided by world area forecast centres (WAFC), volcanic ash advisory centres (VAAC) and tropical cyclone advisory centres (TCAC);
b) aerodrome warnings to give concise information of meteorological conditions that could adversely affect all aircraft at an aerodrome including wind shear; and
c) SIGMETs to provide information on occurrence or expected occurrence of specific en-route weather phenomena which may affect the safety of aircraft operations and other operational meteorological (OPMET) information, including METAR/SPECI and TAF, to provide routine and special observations and forecasts of meteorological conditions occurring or expected to occur at the aerodrome.

This module includes elements which should be viewed as a subset of all available meteorological information that can be used to support enhanced operational efficiency and safety.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:

Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage.

B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
SADIS 2G satellite broadcast	***All** States*	Indicator: % of States implemented SADIS 2G satellite broadcast Supporting metric: : % of States implemented SADIS 2G satellite broadcast			
Secure SADIS FTP service	***All** States*	Indicator: % of States implemented Secure SADIS FTP service Supporting metric: % of States implemented Secure SADIS FTP service			

B0 – FRTO: Improved Operations through Enhanced En-Route Trajectories

Description and purpose

To allow the use of airspace which would otherwise be segregated (i.e. special use airspace) along with flexible routing adjusted for specific traffic patterns. This will allow greater routing possibilities, reducing potential congestion on trunk routes and busy crossing points, resulting in reduced flight length and fuel burn.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	N/A

Applicability consideration:

Applicable to en-route and terminal airspace. Benefits can start locally. The larger the size of the concerned airspace the greater the benefits, in particular for flex track aspects. Benefits accrue to individual flights and flows. Application will naturally span over a long period as traffic develops. Its features can be introduced starting with the simplest ones.

B0 – FRTO: Improved Operations through Enhanced En-Route Trajectories					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
Flexible use of airspace (FUA)	*All States*	Indicator: % of States implementing FUA Supporting metric: number of States implementing FUA			Implementation should be based on the published aeronautical information
Flexible routing	*All States*	Indicator: % of established Routes overflying segregated airspace Supporting metric: Number of established Routes overflying segregated airspace			Based on published aeronautical information

B0 – ACAS: ACAS Improvements

Description and purpose

To provide short-term improvements to existing airborne collision avoidance systems (ACAS) to reduce nuisance alerts while maintaining existing levels of safety. This will reduce trajectory deviations and increase safety in cases where there is a breakdown of separation

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	N/A	Y	N/A	Y

Applicability consideration:

Safety and operational benefits increase with the proportion of equipped aircraft.

B0 – ACAS: ACAS Improvements					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
Avionics	All aircraft with a max certificated take-off mass greater than 5.7 tons	Indicator: % of aircraft equipped with TCAS v 7.1 as applicable Supporting metric: Number of aircraft equipped with TCAS v 7.1 as applicable			

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)

Description and purpose

To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex – regional/States/locations with some foundational PBN operational experience that could capitalize on near term enhancements, which include integrating procedures and optimizing performance;

b) more complex – regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex – regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics)***	***Targets***	***Action Plan***	***Remarks***
PBN STARs	TBD	Indicator: % of International Aerodromes/TMA with PBN STAR implemented Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented			List of ADs to be established through regional air navigation agreement.
International aerodromes/TMAs with CDO	TBD	Indicator: % of International Aerodromes/TMA with CDO implemented Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented		1) Pilot projects for CDOs 2) City-pair pilot projects for tailored arrivals 3) PBN Workshops	List of applicable ADs to be established through regional air navigation agreement.

B0 –TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route

Description and purpose
To implement an initial set of data link applications for surveillance and communications in ATC, supporting flexible routing, reduced separation and improved safety.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	Y	N/A	N/A	Y

Applicability consideration:
Requires good synchronization of airborne and ground deployment to generate significant benefits, in particular to those equipped. Benefits increase with the proportion of equipped aircraft.

B0 –TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
ADS-C and CPDLC	TBD	Indicator: % of FIRs having implemented data link en-route Supporting Metric: Number of FIRs having implemented data link en-route		1. Technical and operational support for datalink trials. 2. As a priority start with datalink implementation in the Empty Quarter as a pilot project.	List of FIRs to be established through regional air navigation agreement.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Description and purpose

To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	N/A	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex: regional/States/locations with some foundational PBN operational experience that could capitalize on near-term enhancements, which include integrating procedures and optimizing performance;

b) more complex: regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex: regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
PBN SIDs	TBD	Indicator: % of International Aerodromes/TMA with PBN SID implemented Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented			List of ADs to be established through regional air navigation agreement.
International aerodromes/TMAs with CCO	TBD	Indicator: % of International Aerodromes/TMA with CCO implemented Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented		1) Pilot projects for CCOs 2) PBN Workshops	List of ADs to be established through regional air navigation agreement.

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