INTERNATIONAL CIVIL AVIATION ORGANIZATION

DRAFT MATERIAL FOR THE DEVELOPMENT OF AN AIR NAVIGATION SYSTEM IMPLEMENTATION ACTION PLAN FOR THE AFRICA-INDIAN OCEAN (AFI) REGION

Version 1.0

September 2013

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RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by
1	September		

CORRIGENDA			
No.	Date applicable	Date entered	Entered by

1. INTRODUCTION

Presentation of the ICAO Global Air Navigation Plan

1.1. The ICAO Global Air Navigation Plan (GANP) (Doc 9750) is an overarching framework that includes key civil aviation policy principles to assist ICAO Regions, sub-regions and States with the preparation of their Regional and State air navigation plans.

1.2. The objective of the GANP is to increase capacity and improve efficiency of the global civil aviation system whilst improving or at least maintaining safety. The GANP also includes strategies for addressing the other ICAO Strategic Objectives.

1.3. The GANP includes the Aviation System Block Upgrade (ASBU) framework, its modules and its associated technology roadmaps covering inter alia communications, surveillance, navigation, information management and avionics.

1.4. The ASBUs are designed to be used by the Regions, sub-regions and States when they wish to adopt the relevant Blocks or individual Modules to help achieve harmonization and interoperability by their consistent application across the Regions and the world.

1.5. The GANP, along with other high-level ICAO plans, will help ICAO Regions, sub-regions and States establish their air navigation priorities for the next 15 years.

1.6. The GANP outlines ICAO's 10 key civil aviation policy principles guiding global, regional and State air navigation planning.

From the GANP to Regional Planning

1.7. Although the GANP has a global perspective, it is not intended that all ASBU modules are implemented at all facilities and in all aircraft. Nevertheless, coordination of deployment actions by the different stakeholders, within a State, and within or across regions are expected to deliver more benefits than implementations conducted on an ad hoc or isolated basis. Furthermore, an overall integrated deployment of a set of modules from several threads at an early stage could generate additional benefits downstream.

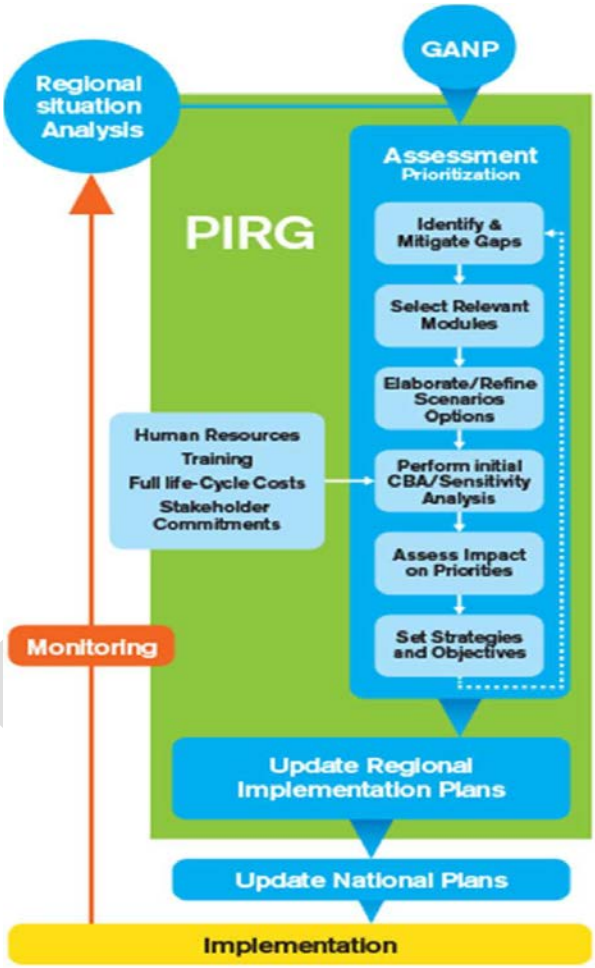
1.8. Guided by the GANP, the Regional planning process as well as National planning should be aligned and used to identify those modules which best provide solutions to the operational needs identified. Depending on implementation parameters such as the complexity of the operating environment, the constraints and the resources available, regional and national implementation plans will be developed in alignment with the GANP. This planning requires interaction between stakeholders including regulators, users of the aviation system, the Air Navigation Service Providers (ANSP's) and Aerodrome operators in order to obtain commitments to implementation.

1.9. Accordingly, deployments on a global, regional and sub-regional basis and ultimately at State level should be considered as an integral part of the global and regional planning process through the planning and implementation regional groups (PIRGs). In this way, deployment arrangements including applicability dates can be agreed and collectively applied by all stakeholders involved.

1.10. For some modules worldwide applicability will be essential; they may, therefore, eventually become the subject of ICAO Standards with mandated implementation dates.

1.11. In the same way, some modules are well suited for regional or sub-regional deployment and the regional planning processes under the PIRG are designed to consider which modules to implement regionally, under which circumstances and according to agreed timeframes.

1.12. For other modules, implementation should follow common methodologies defined either as Recommended Practices or Standards in order to leave flexibility in the deployment process but ensure global interoperability at a high level.



Regional situation Analysis

GANP PIRG
Human Resources
Training
Full life-Cycle Costs
Stakeholder Commitments

Monitoring

Assessment Prioritization
Identify and Mitigate Gaps
Select Relevant Modules
Elaborate/Refine Scenarios Options
Perform initial CBA/Sensitivity Analysis
Assess Impact on Priorities
Set Strategies and Objectives

Update Regional Implementation Plans

Update National Plans

Implementation

2. AVIATION SYSTEM BLOCK UPGRADES

Introduction: Aviation System Block Upgrades

2.1. The Global Air Navigation Plan introduces a systems engineering planning and implementation approach which has been the result of extensive collaboration and consultation between ICAO, its Member States and industry stakeholders.

2.2. ICAO developed the Block Upgrade global framework primarily to ensure that aviation Safety will be maintained and enhanced, that ATM improvement programmes are effectively harmonized, and that barriers to future aviation efficiency and environmental gains can be removed at reasonable cost.

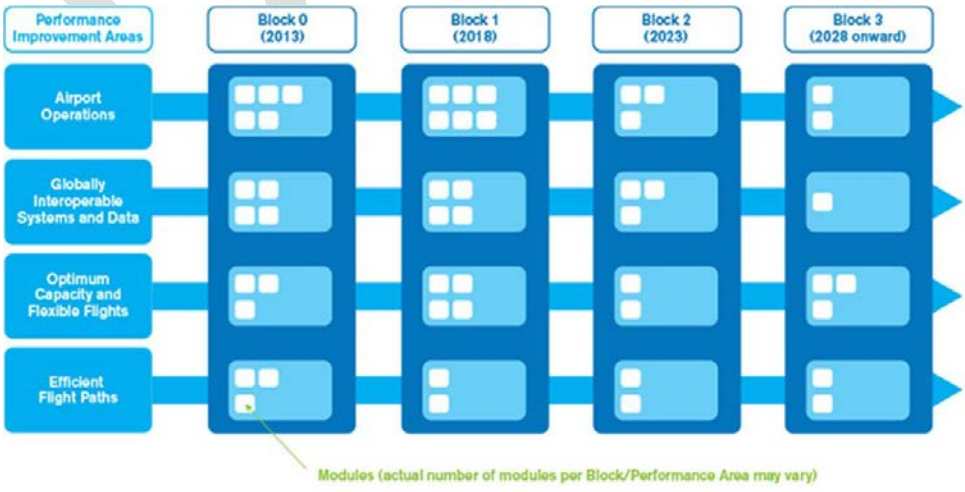
2.3. The Block Upgrades incorporate a long-term perspective matching that of the three companion ICAO Air Navigation planning documents. They coordinate clear aircraft- and ground-based operational objectives together with the avionics, data link and ATM system requirements needed to achieve them. The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

2.4. The core of the concept is linked to four specific and interrelated aviation performance improvement areas, namely:

a) Airport operations;
b) Globally-interoperable systems and data.
c) Optimum capacity and flexible flights.
d) Efficient flight paths.

2.5. The performance improvement areas and the ASBU Modules associated with each have been organized into a series of four Blocks (Blocks 0, 1, 2 and 3) based on timelines for the various capabilities they contain, as illustrated in **Fig 1** below, depicting Block 0–3 availability milestones, Performance Improvement Areas, and technology/procedure/capability Modules.

Figure 1



2.6. 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.

2.7. 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. Though Block 0's milestone is set at 2013, for example, it is expected that the globally harmonized implementation of its capabilities (as well as the related Standards supporting them) will be achieved over the 2013 to 2018 timeframe. The same principle applies for the other Blocks and therefore provides for significant flexibility with respect to operational need, budgeting and related planning requirements.

2.8. While the traditional Air Navigation planning approach addresses only ANSP needs, the ASBU methodology calls for addressing regulatory as well as user requirements. The ultimate goal is to achieve an interoperable global system whereby each State has adopted only those technologies and procedures corresponding to its operational requirements.

Understanding Modules and Threads

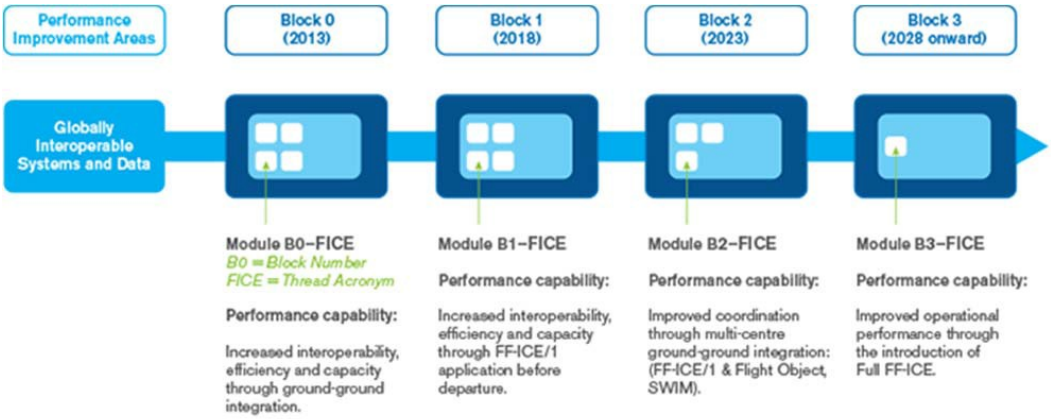
2.9. Each block is made up of distinct Modules, as shown in the previous illustrations and those below. Modules only need to be implemented if and when they satisfy an operational need in a given State, and they are supported by procedures, technologies, regulations or Standards as necessary, as well as a business case.

2.10. A Module is generally made up of a grouping of elements which define required CNS Upgrade components intended for aircraft, communication systems, air traffic control (ATC) ground components, decision support tools for controllers, etc. The combination of elements selected ensures that each Module serves as a comprehensive and cohesive deployable performance capability.

2.11. A series of dependent Modules across consecutive Blocks is therefore considered to represent a coherent transition 'Thread' in time, from basic to more advanced capability and associated performance. Modules are therefore identified by both a Block number and a Thread acronym, as illustrated below.

2.12. Each Thread describes the evolution of a given capability through the successive Block timelines as each Module is implemented realizing a performance capability as part of the Global Air Traffic Management Operational Concept (Doc 9854).

Fig. 2: A Module Thread is associated with a specific performance improvement area. Note that the Modules in each consecutive Block feature the same Thread Acronym (FICE), indicating that they are elements of the same Operational Improvement process.



2.13. Each block includes a target date reference for its availability. 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.

Aviation System Block Upgrade (ASBU) Block 0

2.14. Block 0 is composed of Modules containing technologies and capabilities which have already been developed and can be implemented from 2013. Based on the milestone framework established under the overall Block Upgrade strategy, ICAO Member States are encouraged to implement those Block 0 Modules applicable to their specific operational needs. **Appendix D** to this document provides a detailed description of Block 0 Modules.

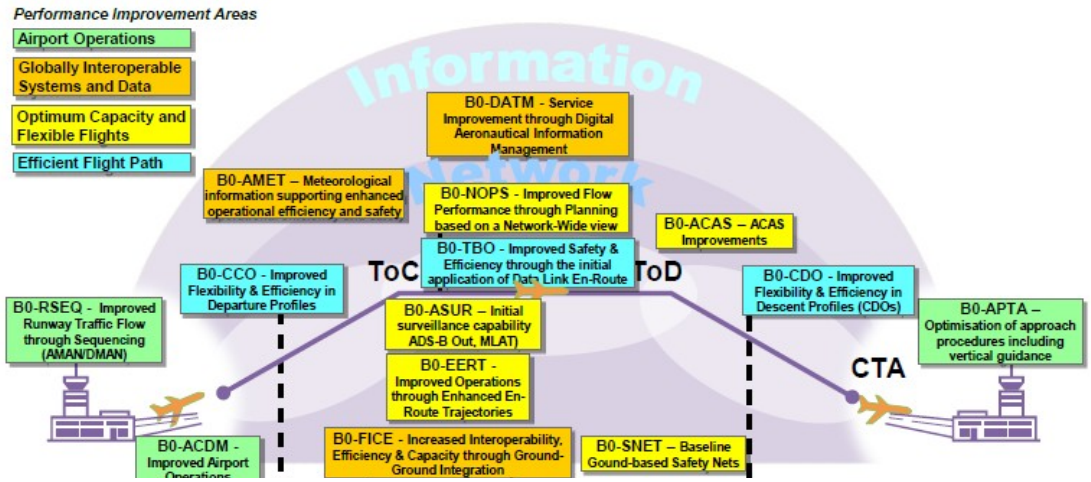


Figure 3. Block 0 in perspective

3. CATEGORIZATION OF ASBU BLOCK 0 MODULES FOR THE AFI REGION

3.1. 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.

3.2. 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.

3.3. 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.

3.4. Based on the above paragraphs, it is important to clarify how each ASBU module fits into the framework of AFI regional air navigation system. To assist in this regard, a module categorization has been developed below with the objective of ranking each module in terms of implementation priority. On the basis of operational requirements and taking into benefits associated, AFI region has chosen all 18 Block 0 Module for implementation. The categories of 18 Block 0 Modules are as follows:

a) Essential (E): These are the ASBU modules that provide substantial contribution towards global interoperability, safety or regularity. The five (5) Modules for all States of AFI region are FICE, DATM; ACAS, FRTO and APTA

b) Desirable (D): These are the ASBU modules that, because of their strong business and/or safety case, are recommended for implementation almost everywhere. The eight (8) Modules for all States of AFI region are ACDM, NOPS, ASUR, SNET, AMET, TBO, CDO, and CCO

c) Specific (S): These are the ASBU modules that are recommended for implementation to address a particular operational environment in specific countries of AFI region (for example South Africa). The (3) Modules are OPFL, ASEP and WAKE.

d) Optional (O): These are the ASBU modules that address particular operational requirements in specific countries of AFI region and provide additional benefits that may not be common everywhere. The two (2) Modules are SURF and RSEQ.

3.5. The 18 modules considered and associated to each of the Performance Improvement Areas (PIA) are the following:

Performance Improvement Areas (PIA)	Performance Improvement Area Name	Module	Module Name
PIA 1	Airport Operations	B0-15 RSEQ	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)
		B0-65 APTA	Optimization of Approach Procedures including vertical guidance
		B0-70 WAKE	Increased Runway Throughput through optimized Wake Turbulence Separation
		B0-75 SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)
		B0-80 ACDM	Improved Airport Operations through Airport-CDM
PIA 2	Globally Interoperable Systems and Data - Through Globally Interoperable System Wide Information Management	B0-25 FICE	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
		B0-30 DATM	Service Improvement through Digital Aeronautical Information Management
		B0-105 AMET	Meteorological information supporting enhanced operational efficiency and safety
PIA 3	Optimum Capacity and Flexible Flights – Through Global Collaborative ATM	B0-10 FRTO	Improved Operations through Enhanced En-Route Trajectories
		B0-35 NOPS	Improved Flow Performance through Planning based on a Network-Wide view
		B0-84 ASUR	Initial capability for ground surveillance
		B0-85 ASEP	Air Traffic Situational Awareness(ATSA)
		B0-86 OPFL	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
		B0-101 ACAS	ACAS Improvements
		B0-102 SNET	Increased Effectiveness of Ground-Based Safety Nets
PIA 4	Efficient Flight Path – Through Trajectory-based Operations	B0-05 CDO	Improved Flexibility and Efficiency in Descent Profiles (CDO)
		B0-40 TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route
		B0-20 CCO	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

4. PRIORITIZATION OF ASBU BLOCK 0 MODULES FOR THE AFI REGION

4.1 Table 1 provides the list of Block 0 modules with suggested allocated priority for implementation within the AFI Region. The allocation of priority is based on the following criteria. Priority 1 = immediate implementation; Priority 2 = recommended implementation. Although AFI region has categorized all 18 Block 0 Modules for its implementation, only 7 Modules will have priority 1 as it covers most of the AFI States. Remaining Modules are priority 2 and applies to only specific State (s) of AFI region.

Table 1: AFI ASBU Block 0 Priority

PIA	Module Description	Module	Priority
PIA 1	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)	B0-15 RSEQ	2
	Optimization of Approach Procedures including vertical guidance	B0-65 APTA	1
	Increased Runway Throughput through optimized Wake Turbulence Separation	B0-70 WAKE	2
	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	B0-75 SURF	2
	Improved Airport Operations through Airport-CDM	B0-80 ACDM	1
PIA 2	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration	B0-25 FICE	1
	Service Improvement through Digital Aeronautical Information Management	B0-30 DATM	1
	Meteorological information supporting enhanced operational efficiency and safety	B0-105 AMET	1
PIA 3	Improved Operations through Enhanced En-Route Trajectories	B0-10 FRTO	1
	Improved Flow Performance through Planning based on a Network-Wide view	B0-35 NOPS	2
	Initial capability for ground surveillance	B0-84 ASUR	2
	Air Traffic Situational Awareness(ATSA)	B0-85 ASEP	2
	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	B0-86 OPFL	2
	ACAS Improvements	B0-101 ACAS	1
	Increased Effectiveness of Ground-Based Safety Nets	B0-102 SNET	2
PIA 4	Improved Flexibility and Efficiency in Descent Profiles (CDO)	B0-05 CDO	2
	Improved Safety and Efficiency through the initial application of Data Link En-Route	B0-40 TBO	2
	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)	B0-20 CCO	2

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5. AIR NAVIGATION REPORT FORMS

5.1. Air Navigation Report Form (ANRF): This form is nothing but the revised version of Performance Framework Form that was being used by Planning and Implementation Regional Groups (PIRGs)/States until now. The ANRF is a customized tool for Aviation System Block Upgrades (ASBU) Modules which is recommended for application for setting planning targets, monitoring implementation, identifying challenges, measuring implementation/performance and reporting. Also, the PIRGs and States could use this report format for any other air navigation improvement programmes such as Search and Rescue. If necessary, other reporting formats that provide more details may be used but should contain as a minimum the elements described in this ANRF template. The results will be analyzed by ICAO and aviation partners and utilized in developing the Regional Performance Dashboard and the Annual Global Air Navigation Report. The conclusions from the Global Air Navigation Report will serve as the basis for future policy adjustments, aiding safety practicality, affordability and global harmonization, amongst other concerns.

5.2. Regional/National Performance objective: In the ASBU methodology, the performance objective will be the title of the ASBU module itself. Furthermore, indicate alongside corresponding Performance Improvement area (PIA).

5.3. Impact on Main Key Performance Areas: Key to the achievement of a globally interoperable ATM system is a clear statement of the expectations/benefits to the ATM community. The expectations/benefits are referred to eleven Key Performance Areas (KPAs) and are interrelated and cannot be considered in isolation since all are necessary for the achievement of the objectives established for the system as a whole. It should be noted that while safety is the highest priority, the eleven KPAs shown below are in alphabetical order as they would appear in English. They are access/equity; capacity; cost effectiveness; efficiency; environment; flexibility; global interoperability; participation of ATM community; predictability; safety; and security. However, out of these eleven KPAs, for the present, only five have been selected for reporting through ANRF, which are Access & Equity, Capacity, Efficiency, Environment and Safety. The KPAs applicable to respective ASBU module are to be identified by marking Y (Yes) or N (No). The impact assessment could be extended to more than five KPAs mentioned above if maturity of the national system allows and the process is available within the State to collect the data.

5.4. Planning Targets and Implementation Progress: This section indicates planning targets and status of progress in the implementation of different elements of the ASBU Module for both air and ground segments.

5.5. Elements related to ASBU module: Under this section list elements that are needed to implement the respective ASBU Module. Furthermore, should there be elements that are not reflected in the ASBU Module (example: In ASBU B0-ACDM, Aerodrome certification and data link applications D-VOLMET, D-ATIS, D-FIS are not included; Similarly in ASBU B0-DATM, note that WGS-84 and eTOD are not included) but at the same time if they are closely linked to the module, ANRF should specify those elements. As a part of guidance to PIRGs/States, every Regional ANP will have the complete list of all 18 Modules of ASBU Block 0 along with corresponding elements, equipage required on the ground and in the air as well as metrics specific to both implementation and benefits.

5.6. Targets and implementation progress (Ground and Air): Planned implementation date (month/year) and the current status/responsibility for each element are to be reported in this section. Please provide

as much details as possible and should cover both avionics and ground systems. If necessary, use additional pages.

5.7. Implementation challenges: Any challenges/problems that are foreseen for the implementation of elements of the Module are to be reported in this section. The purpose of the section is to identify in advance any issues that will delay the implementation and if so, corrective action is to be initiated by the concerned person/entity. The four areas, under which implementation issues, if any, for the ASBU Module to be identified, are as follows:

- Ground System Implementation:
- Avionics Implementation:
- Procedures Availability:
- Operational Approvals:

5.8. Should be there no challenges to be resolved for the implementation of ASBU Module, indicate as "NIL".

5.9. Performance Monitoring and Measurement: Performance monitoring and measurement is done through the collection of data for the supporting metrics. In other words, metrics are quantitative measure of system performance – how well the system is functioning. The metrics fulfill three functions. They form a basis for assessing and monitoring the provision of ATM services, they define what ATM services user value and they can provide common criteria for cost benefit analysis for air navigation systems development. The Metrics are of two types:

5.10. Implementation Monitoring: Under this section, the indicator supported by the data collected for the metric reflects the status of implementation of elements of the Module. For example- Percentage of international aerodromes with CDO implemented. This indicator requires data for the metric "number of international aerodromes with CDO".

5.11. Performance Monitoring: The metric in this section allows to asses benefits accrued as a result of implementation of the module. The benefits or expectations, also known as Key Performance Areas (KPAs), are interrelated and cannot be considered in isolation since all are necessary for the achievement of the objectives established for the system as a whole. It should be noted that while safety is the highest priority, the eleven KPAs shown below are in alphabetical order as they would appear in English. They are access/equity; capacity; cost effectiveness; efficiency; environment; flexibility; global interoperability; participation of ATM community; predictability; safety; and security. However, out of these eleven KPAs, for the present, only five have been selected for reporting through ANRF, which are Access & Equity, Capacity, Efficiency, Environment and Safety. It is not necessary that every module contributes to all of the five KPAs. Consequently, a limited number of metrics per type of KPA, serving as an example to measure the module(s)' implementation benefits, without trying to apportion these benefits between module, have been identified below. This approach would facilitate States in collecting data for the chosen metrics. If it is not possible to identify performance metrics for an individual module, mention qualitative benefits under this section.

EXAMPLES OF PERFORMANCE METRICS FOR ASBU MODULES
RELATED TO THE ELEVEN KPAs (ICAO Doc 9883)

Key Performance Area	Related Performance Metrics
1. Access & Equity	1. KPA/Access: Number of international aerodromes with APV
	2. KPA/Access: Percentage of time Special Use Airspace (SUA) available to Civil Operations
	3. KPA/Access: Percentage of requested flight level versus cleared flight level
	4. KPA/Access: Number of access denials due to equipment failure
	5. KPA/Equity: Percentage of aircraft operators by class who consider that equity is achieved
	6. KPA/Equity: Percentage of different types of aircraft operating in a particular airspace or international aerodrome.
2. Capacity	1. Number of operations (arrivals and departures) per international aerodrome per day
	2. Average ATFM delay per flight at an international aerodrome
	3. Number of landings before and after APV per international aerodrome
	4. Average en-route ATFM delay generated by airspace volume
	5. Number of aircraft in a defined volume of airspace for a period of time
3. Cost effectiveness	1. IFR movements per ATCO hour on duty
	2. IFR flights (en-route) per ATCO hour duty
4. Efficiency	1. Kilograms of fuel saved per flight
	2. Average ATFM delay per flight at the international aerodrome
	3. Percentage of PBN routes
5. Environment	1. Kilograms of CO_2 emissions reduced per flight (= KGs fuel saved per flight x 3.157)
	2. The number of electronic pages dispatched
6. Flexibility	1. Number of backups available in emergency
	2. Number of changes approved to the flight plan
	3. Number of alternatives granted
7. Global Interoperability	1. Number of ATC automated systems that are interconnected
8. Participation of the ATM Community	1. Level of participation in meetings
	2. Level of responses to planning activities
9. Predictability	1. Arrival/departure delay (in minutes) at international aerodrome
10. Safety	1. Number of runway incursions per international aerodrome per year.
	2. Number of incidents/accidents with MET conditions as a sole or as a contributory factor.
	3. Number of ACAS RA events.
	4. Number of CFIT accidents.
	5.Number of missed approaches avoided due to use of CDO.
11. Security	Not Applicable.

APPENDIX A: AIR NAVIGATION REPORTING FORMS

1. AIR NAVIGATION REPORT FORM (ANRF)

AFI Regional planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-15/RSEQ: Improve Traffic Flow Through Runway Sequencing (AMAN/DMAN) **Performance Improvement Area 1: Airport Operations**					
3. ASBU B0-15/RSEQ: Impact on Main Key Performance Areas					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	Y	N	N

4. ASBU B0-15/RSEQ: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. AMAN and time based metering	Dec. 2015
2. Departure management	Dec. 2015
3. Movement Area Capacity Optimization	Dec. 2015

7. ASBU B0-15/RSEQ: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics** Implementation	**Procedures Availability**	**Operational Approvals**
1. AMAN and time based metering	Lack of automation system to support synchronization	NIL	Lack of appropriate training. Lack of STARs PBN Lack of Slots assignment.	
2. Departure management	Lack of automation system to support synchronization	NIL	Lack of slots assignment. Lack of SIDs PBN Lack of appropriate training	
3. Movement Area Capacity Optimization	NIL	NIL	Lac of procedures for RWY, TWY & platform capacity calculation. Guidelines for movement area capacity optimization	NIL

8. ASBU B0-15/RSEQ Performance Monitoring and Measurement 8A. ASBU B0-15/RSEQ: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. AMAN and time based metering	Indicator: Percentage of international aerodromes with AMAN and time based metering Supporting metric: Number of international airport with AMAN and time based metering
2. Departure management	Indicator: Percentage of international aerodromes with DMAN Supporting metric: Number of international airport DMAN
3. Movement Area Capacity Optimization	Indicator: percentage of international aerodromes with Airport-capacity calculated Supporting metric: Number of international aerodromes with Airport capacity calculated.

8. ASBU B0-15/RESQ. Performance Monitoring and Measurement 8 B. ASBU B0-15/RESQ: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Not applicable.
Capacity	Increase airport movement area capacity through optimization.
Efficiency	Efficiency is positively impacted as reflected by increased runway throughput and arrival rates.
Environment	Not applicable.
Safety	Not applicable.

1. AIR NAVIGATION REPORT FORM (ANRF)
AFI Regional Planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-65/APTA: Optimization of Approach Procedures Including Vertical Guidance Performance Improvement Area 1: Airport Operations					
3. ASBU B0-65/APTA: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	Y	Y	Y	Y	Y

4. ASBU B0-65/APTA: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
4. APV with Baro VNAV	December 2016 – Service Providers and users
5. APV with SBAS	Not applicable
6. APV with GBAS	December 2018 – Initial implementation at some States (services providers)

7. ASBU B0-65/APTA: Implementation Challenges				
Elements	**Implementation Area**			
	Ground system Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. APV with Baro VNAV	NIL	Insufficient number of equipped aircraft	Insufficient appropriate training	Lack of appropriate training
2. APV with SBAS	Not Applicable	Not applicable	Not applicable	Not applicable
3. APV with GBAS	Lack of cost benefit analysis Adverse ionosphere	Insufficient number of equipped aircraft	Insufficient appropriate training	Lack of appropriate training Evaluation of a real operational requirement

8. ASBU B0-65/APTA: Performance Monitoring and Measurement **8A. B0-65/APTA: Implementation Monitoring**	
Elements	**Performance Indicators/Supporting Metrics**
1. APV with Baro VNAV	Indicator: Percentage of international aerodromes having instrument runways provided with APV with Baro VNAV procedure implemented Supporting metric: Number of international airport having approved APV with Baro VNAV procedure implemented
2. APV with SBAS	Not Applicable
3. APV with GBAS	Indicator: Percentage of international aerodromes having instrument runways provided with APV GBAS procedure implemented Supporting metric: Number of international airport having APV GBAS procedure implemented.

ASBU B0-65/APTA: Performance Monitoring and Measurement 8 B. ASBU B0-65/APTA: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Increased aerodrome accessibility
Capacity	Increased runway capacity
Efficiency	Reduced fuel burn due to lower minima, fewer diversions, cancellations, delays
Environment	Reduced emissions due to reduced fuel burn
Safety	Increased safety through stabilized approach paths.

1. AIR NAVIGATION REPORT FORM (ANRF)

AFI Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-75/SURF **Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)** **Performance Improvement Area 1:** **Airport operation**					
3. ASBU B0-75/SURF: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	Y	Y	Y	Y	Y

4. B0-75/SURF: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. Surveillance system for ground surface movement (PSR, SSR, ADS B or Multilateration)	June 2018 Service provider
2. Surveillance system on board (SSR transponder, ADS B capacity)	June 2018 Service Provider
3. Surveillance system for vehicle	June 2018 Service Provider
4. Visual aids for navigation	December 2015 Service Provider
5. Wild life strike hazard reduction	December 2015 Aerodrome operator/wildlife committee
6. Display and processing information	June 2018 Service Provider

7. ASBU B0-75/SURF: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. Surveillance system for ground surface movement (PSR, SSR, ADS B or Multilateration)	NIL	NIL	Lack of procedures and training	Lack of inspector for approvals operations
2. Surveillance system on board (SSR transponder ,ADS B capacity)	NIL	Lack of surveillance system on board (ADS B capacity) On general aviation and some commercial aircraft	Lack of procedures and training	NIL
3. Surveillance system for vehicle	NIL	NIL	Lack of procedures and training	NIL
4. Visual aids for navigation	Implementation of new	NIL	NIL	NIL

7. ASBU B0-75/SURF: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
	technologies (such as LED) not compliant with Annex 14			
5. Wild life strike hazard reduction	NIL	NIL	Lack of Aerodrome Wildlife Committee	NIL

8. ASBU B0-75/SURF: Performance Monitoring and Measurement 8A. ASBU B0-15/RSEQ: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
6. Surveillance system for ground surface movement (PSR, SSR, ADS B or Multilateration)	Indicator: Percentage of international aerodromes with SMR/ SSR Mode S/ ADS-B Multilateration for ground surface movement Supporting metric: Number of international aerodrome with SMR/ SSR Mode S/ ADS-B Multilateration for ground surface movement
7. Surveillance system on board (SSR transponder ,ADS B capacity)	Indicator: Percentage of surveillance system on board (SSR transponder, ADS B capacity) Supporting metric: Number of aircraft with surveillance system on board (SSR transponder ,ADS B capacity)
8. Surveillance system for vehicle	Indicator Percentage of international aerodromes with a cooperative transponder systems on vehicles Supporting metric: Number of vehicle with surveillance system installed
9. Visual aids for navigation	Indicator: Percentage of international aerodromes complying with visual aid requirements as per Annex 14 Supporting metric: Number of international aerodromes complying with visual aid requirements as per Annex 14
10. Wild life strike hazard reduction	Indicator: Percentage of reduction of wildlife incursions Supporting metric: Number of runway incursions due to wild life strike

8. ASBU B0-75/SURF: Performance Monitoring and Measurement 8 B. ASBU B0-75/SURF: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Improves portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft. Ensures equity in ATC handling of surface traffic regardless of the traffic's position on the international aerodrome
Capacity	Sustained level of aerodrome capacity during periods of reduced visibility
Efficiency	Reduced taxi times through diminished requirements for intermediate holdings based on reliance on visual surveillance only. Reduced fuel burn
Environment	Reduced emissions due to reduced fuel burn
Safety	Reduced runway incursions. Improved response to unsafe situations. Improved situational awareness leading to reduced ATC workload

1. AIR NAVIGATION REPORT FORM (ANRF)

AFI Regional Planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-80/ACDM Improved Airport Operations through Airport - CDM Performance Improvement Area 1: Airport Operations					
3. ASBU B0-80/ACDM: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	Y	Y	N

4. ASBU B0-80/ACDM: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
7. Airport –CDM	Dec. 2015 – Airport Operator
8. Aerodrome certification	Dec 2018 – State CAA
9. Airport Planning	Dec. 2018 – State CAA
10. Heliport Operations	Dec. 2018 – State CAA

7. ASBU B0-80/ACDM: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
4. Airport –CDM	Interconnection of ground systems of different partners for Airport-CDM	NIL	NIL	NIL
5. Aerodrome certification	NIL	NIL	LAR AGA	NIL
6. Airport Planning	NIL	NIL	NIL	NIL
7. Heliport Operations	NIL	NIL	NIL	NIL

8. ASBU B0-80/ACDM: Performance Monitoring and Measurement 8A. ASBU B0-80/ACDM: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
4. Airport –CDM	Indicator: Percentage of international aerodromes with Airport-CDM Supporting metric: Number of international aerodromes with Airport-CDM
5. Aerodrome certification	Indicator: Percentage of certified international aerodromes Supporting metric: Number of certified international aerodromes
6. Airport Planning	Indicator: Percentage of international aerodromes with Master Plans Supporting metric: Number of international aerodromes with Master Plans
7. Heliport Operations	Indicator: Percentage of Heliports with operational approval Supporting metric: Number of Heliports with operational approval

8A. ASBU B0-80/ACDM: Performance Monitoring and Measurement 8 B. ASBU B0-80/ACDM: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Enhanced equity on the use of aerodrome facilities.
Capacity	Enhanced use of existing Implementation of gate and stands (unlock latent capacity). Reduced workload, better organization of the activities to manage flights. Enhanced aerodrome capacity according with the demand
Efficiency	Improved operational efficiency (fleet management); and reduced delay. Reduced fuel burn due to reduced taxi time and lower aircraft engine run time. Improved aerodrome expansion in accordance with Master Plan
Environment	Reduced emissions due to reduced fuel burn
Safety	Not applicable

1. AIR NAVIGATION REPORT FORM (ANRF)

AFI Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-25/FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration **Performance Improvement Area 2: Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management**					
3. ASBU B0-25/FICE: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	Y	N	Y

4. ASBU B0-25/FICE: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. Complete AMHS implementation at States still not counting with this system	December 2014 Services provider
2. AMHS interconnection	December 2014 Services provider
3. Implement AIDC /OLDI at some States automated centres	June 2014 Services provider
4. Implement operational AIDC/OLDI between adjacent ACC´s	June 2018 Services provider
5. Implement the AFI Comn regional network	June xxx Services provider

7. ASBU B0-25/FICE: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. Complete AMHS implementation at States still not counting with this system	NIL	NIL	NIL	NIL
2. AMHS interconnection	TPDI negotiations between MTAs	NIL	NIL	NIL
3. Implement AIDC /OLDI at some States automated centres	NIL	NIL	NIL	NIL
4. Implement operational AIDC/OLDI between adjacent ACC´s	Compatibility between AIDC or OLDI systems from various manufacturers	NIL	NIL	NIL
5. Implement the AFI regional com network	NIL	NIL	NIL	NIL

8. ASBU B0-25/FICE: Performance Monitoring and Measurement 8A. ASBU B0-25/FICE: Implementation	
Elements	**Performance Indicators/Supporting Metrics**
1. Complete AMHS implementation at States still not counting with this system	Indicator: Percentage of States with AMHS implemented Supporting metric: Number of AMHS installed
2. AMHS interconnection	Indicator: Percentage of States with AMHS interconnected with other AMHS Supporting metric: Number of AMHS interconnections implemented
3. Implement AIDC /OLDI at some States automated centres	Indicator: Percentage of ATS units with AIDC or OLDI Supporting metric: Number of AIDC or OLDI systems installed
4. Implement operational AIDC/OLDI between adjacent ACC´s	Indicator: Percentage of ACCs with AIDC or OLDI systems interconnection implemented Supporting metric: Number of AIDC interconnections implemented, as per AFI FASID Table CNS 1Bb
5. Implement AFI regional comn network	Indicator: Percentage of phases completed for the implementation of the AFI digital network Supporting metric: Number of phases implemented

8A. ASBU B0-25/FICE: Performance Monitoring and Measurement 8 B. ASBU B0-25/FICE: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NIL
Capacity	Reduced controller workload and increased data integrity supporting reduced separations translating directly to cross sector or boundary capacity flow increases
Efficiency	The reduced separation can also be used to more frequently offer aircraft flight levels closer to the optimum; in certain cases, this also translates into reduced en-route holding
Environment	NIL
Safety	Better knowledge of more accurate flight plan information

1. AIR NAVIGATION REPORT FORM (ANRF)
AFI Regional Planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-30/DATM: Service Improvement through Digital Aeronautical Information Management Performance Improvement Area 2: Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management					
3. ASBU B0-30/DATM: Impact on Main Key Performance Areas					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	N	N	Y	Y

4. ASBU B0-30/DATM: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
11. QMS for AIM	Dec.2015
12. e.TOD implementation	Dec.2016
13. WGS-84 implementation	Implemented
14. AIXM implementation	Dec.2018
15. E-AIP implementation	Dec.2015
16. Digital NOTAM	Dec. 2018

7. ASBU B0-30/DATM: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. QMS for AIM 2. e-TOD implementation 3. WGS-84 implementation 4. AIXM implementation 5. e-AIP implementation 6. Digital NOTAM	Lack of electronic Database. Lack of electronic access based on Internet protocol services.	NIL	Lack of procedures to allow airlines provide digital AIS data to on-board devices, in particular electronic flight bags (EFBs). Lack of training for AIS/AIM personnel.	NIL

8. ASBU B0-30/DATM: Performance Monitoring and Measurement **8A. ASBU B0-30/DATM: Implementation**	
Elements	**Performance Indicators/Supporting Metrics**
1. QMS for AIM	Indicator: % of States QMS Certified Supporting Metric: number of States QMS Certification
2. e-TOD implementation	Indicator: % of States e-TOD Implemented Supporting Metric: number of States with e-TOD Implemented
3. WGS-84 implementation	Indicator: % of States WGS-84 Implemented Supporting Metric: number of States with WGS-84 Implemented
4. AIXM implementation	Indicator: % of States with AIXM implemented Supporting Metric: number of States with AIXM implemented

8. ASBU B0-30/DATM: Performance Monitoring and Measurement 8A. ASBU B0-30/DATM: Implementation	
Elements	**Performance Indicators/Supporting Metrics**
5. e-AIP implementation	Indicator: % of States with e-AIP Implemented Supporting Metric: number of States with e-AIP Implemented
6. Digital NOTAM	Indicator: % of States with Digital NOTAM Implemented Supporting Metric: number of States with Digital NOTAM Implemented

8A. ASBU B0-30/DATM: Performance Monitoring and Measurement 8 B. ASBU B0-30/DATM: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	NA
Efficiency	NA
Environment	Reduced amount of paper for promulgation of information
Safety	Reduction in the number of possible inconsistencies

1. AIR NAVIGATION REPORT FORM (ANRF)

AFI Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – Module N° B0-105/AMET: Meteorological information supporting enhanced operational efficiency and safety Performance Improvement Area 2: Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management					
3. ASBU B0-105/AMET: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	Y	Y	Y

4. ASBU B0-105/AMET: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. WAFS	In process of improvement
2. IAVW	In process of improvement
3. Tropical cyclone watch	In process of improvement
4. Aerodrome warnings	In process of improvement
5. Wind shear warnings and alerts	MET provider services / 2015
6. SIGMET	MET provider services / 2015
7. QMS/MET	MET provider services / 2018

7. ASBU B0-105/AMET: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. WAFS	Connection to the AFS satellite and public Internet distribution systems	Nil	Prepare a contingency plan in case of public Internet failure	N/A
2. IAVW	Connection to the AFS satellite and public Internet distribution systems	Nil	Prepare a contingency plan in case of public Internet failure	N/A
3. Tropical cyclone watch	Connection to the AFS satellite and public Internet distribution systems	Nil	Prepare a contingency plan in case of public Internet failure	N/A
4. Aerodrome warnings	Connection to the AFTN	Nil	Local arrangements for reception of aerodrome warnings	N/A
5. Wind shear warnings and alerts	Connection to the AFTN	Nil	Local arrangements for reception of wind shear warning and alerts	N/A
6. SIGMET	Connection to the AFTN	Nil	N/A	N/A
7. QMS/MET	Nil	Commitment of top management	N/A	N/A

8. ASBU B0-105/AMET: Performance Monitoring and Measurement 8A. ASBU B0-105/AMET: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. WAFS	Indicator: States implementation of WAFS Internet File Service (WIFS) Supporting metric: Number of States implementation of WAFS Internet File Service (WIFS)
2. IAVW	Indicator: Percentage of international aerodromes/MWOs with IAVW procedures implemented Supporting metric: Number of international aerodromes/MWOs with IAVW procedures implemented
3. Tropical cyclone watch	Indicator: Percentage of international aerodromes/MWOs with tropical cyclone watch procedures implemented Supporting metric: Number of international aerodromes/MWOs with tropical cyclone watch
4. Aerodrome warnings	Indicator: Percentage of international aerodromes/AMOs with Aerodrome warnings implemented Supporting metric: Number of international aerodromes/AMOs with Aerodrome warnings implemented
5. Wind shear warnings and alerts	Indicator: Percentage of international aerodromes/AMOs with wind shear warnings procedures implemented Supporting metric: Number of international aerodromes/AMOs with wind shear warnings and alerts implemented
6. SIGMET	Indicator: Percentage of international aerodromes/MWOs with SIGMET procedures implemented Supporting metric: Number of international aerodromes/MWOs with SIGMET procedures implemented
7. QMS/MET	Indicator: Percentage of MET Provider Sates with QMS/MET implemented Supporting metric: Number of MET Provider Sates with QMS/MET certificated

ASBU B0-105/AMET: Performance Monitoring and Measurement 8 B. ASBU B0-105/AMET: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Not applicable
Capacity	Optimized usage of airspace and aerodrome capacity due to MET support
Efficiency	Reduced arrival/departure holding time, thus reduced fuel burn due to MET support
Environment	Reduced emissions due to reduced fuel burn due to MET support
Safety	Reduced incidents/accidents in flight and at international aerodromes due to MET support.

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2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – ASBU B0-10/FRTO: Improved Operations through Enhanced En-Route Trajectories Performance Improvement Area3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM					
3. ASBU B0-10/FRTO: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	Y	Y	Y	Y	N

4. ASBU B0-10/FRTO: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. Airspace planning	Dec.2018
2. Flexible Use of airspace	Dec. 2016
3. Flexible Routing	Dec. 2018

7. ASBU B0-10/FRTO: Implementation Challenges				
Elements	**Implementation Area**			
	Ground system Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. Airspace planning	Lack of organize and manage airspace prior to the time of flight Lack of AIDC		Lack of procedures	
2. Flexible Use of airspace	NIL		Lack of implementation FUA Guidance	
3. Flexible Routing	ADS-C/CPDLC	Lack of FANS 1/A Lack of ACARS	Lack of LOAs and procedures	Poor percentage of fleet approvals

8. ASBU B0-10/FRTO: Performance Monitoring and Measurement 8A. ASBU B0-10/FRTO: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. Airspace planning	Not assigned Indicator and metrics.
2. Flexible Use of airspace	Indicator: % of time segregated airspaces are available for civil operations in the State Supporting Metric: Reduction of delays in time of civil flights.
3. Flexible Routing	Indicator: % of PBN routes implemented Supporting Metric: KG of Fuel savings Supporting Metric: Tons of CO2 reduction

8. ASBU B0-10/FRTO: Performance Monitoring and Measurement 8 B. ASBU B0-10/FRTO: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Better access to airspace by a reduction of the permanently segregated volumes of airspace.
Capacity	Flexible routing reduces potential congestion on trunk routes and at busy crossing points. The flexible use of airspace gives greater possibilities to separate flights horizontally. PBN helps to reduce route spacing and aircraft separations.
Efficiency	In particular the module will reduce flight length and related fuel burn and

8. ASBU B0-10/FRTO: Performance Monitoring and Measurement 8 B. ASBU B0-10/FRTO: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
	emissions. The module will reduce the number of flight diversions and cancellations. It will also better allow avoiding noise sensitive areas.
Environment	Fuel burn and emissions will be reduced
Safety	NA

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AFI Regional Planning for ASBU Modules

2 REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – ASBU B0-35/NOPS: Improved Flow Performance through Planning based on a Network-Wide view Performance Improvement Area3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM					
3. ASBU B0-35/NOPS: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	Y	Y	Y	Y	Y

4. ASBU B0-35/NOPS: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
4. Air Traffic Flow Management	Dec. 2015

7. ASBU B0-35/NOPS: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. Air Traffic Flow Management	Lack of system software for ATFM Lack of ATFM units implemented	NIL	Lack of ATFM and CDM procedures Lack of training	

8. ASBU B0-35/NOPS: Performance Monitoring and Measurement **8A. ASBU B0-35/NOPS: Implementation Monitoring**	
Elements	**Performance Indicators/Supporting Metrics**
1. Air Traffic Flow Management	Indicator: % of implemented FMUs Support Metric: Number of States with ATFM units implemented.

8. ASBU B0-35/NOPS: Performance Monitoring and Measurement **8 B. ASBU B0-35/NOPS: Performance Monitoring**	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	Improved Access and equity in the use of airspace or aerodrome by avoiding disruption of air traffic. ATFM processes take care of equitable distribution of delays
Capacity	Better utilization of available capacity, ability to anticipate difficult situations and mitigate them in advance
Efficiency	Reduced fuel burn due to better anticipation of flow issues; Reduced block times and times with engines on
Environment	Reduced fuel burn as delays are absorbed on the ground, with shut engines; or at optimum flight levels through speed or route management
Safety	Reduced occurrences of undesired sector overloads

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AFI Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – ASBU B0-84/ASURF: Initial capability for ground surveillance Performance Improvement Area 3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM					
3. ASBU B0-84/ASURF: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	N	N	Y

4. ASBU B0-84/ASURF: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
5. Implementation of ADS B	June 2018 Users and service provider
6. Implementation of Multilateration	June 2018 Users and service provider
7. Automation system (Presentation)	Dec 2017 Users and service provider

7. ASBU B0-84/ASURF: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. Implementation of ADS B	Lack of ADS B systems implementation due to recent implementation of conventional surveillance systems	Lack of ADS B implementation in general aviation, and old commercial fleet	Lack of procedures	Lack of inspectors with appropriate capability
2. Implementation of multilateration	Facilities at remote stations Establishment of communications networks	NIL	NIL	Lack of inspectors with appropriate capability
3. Automation system (Presentation)	Lack of any automation functionality	NIL	NIL	NIL

8. ASBU B0-84/ASURF: Performance Monitoring and Measurement **8A. ASBU B0-84/ASURF: Implementation Monitoring**	
Elements	**Performance Indicators/Supporting Metrics**
1. Implementation of ADS B	Indicator: Percentage of international aerodromes with ADS-B implemented Supporting metric: Number of ADS B implemented
2. Implementation of Multilateration	Indicator: Percentage of multilateration system implemented Supporting metric: Number of multilateration system implemented
3. Automation system (Presentation)	Indicator: Percentage of ATS units with automation system implemented Supporting metric: Number of automation system implemented in ATS units

8. ASBU B0-84/ASURF: Performance Monitoring and Measurement 8 B. ASBU B0-84/ASURF: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	Typical separation minima are 3 NM or 5 NM enabling an increase in traffic density compared to procedural minima TMA surveillance performance improvements are achieved through high accuracy, better velocity vector and improved coverage
Efficiency	NA
Environment	NA
Safety	Reduction of the number of major incidents. Support to search and rescue

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2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-101/ACAS: ACAS Improvements Performance Improvement Area 3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM					
3. ASBU B0-101/ACAS: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	N	Y	N	Y

4. ASBU B0-101/ACAS: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air))**
1. ACAS II (TCAS Version 7.1)	

7. ASBU B0-101/ACAS: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. ACAS II (TCAS Version 7.1)				

8. ASBU B0-101/ACAS: Performance Monitoring and Measurement 8A. ASBU B0-101/ACAS: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. ACAS II (TCAS Version 7.1)	

8. ASBU B0-101/ACAS: Performance Monitoring and Measurement 8 B. ASBU B0-101/ACAS: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	NA
Efficiency	ACAS improvement will reduce unnecessary resolution advisory (RA) and then reduce trajectory deviations
Environment	NA
Safety	ACAS increases safety in the case of breakdown of separation

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2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-102/SNET: Increased Effectiveness of Ground-Based Safety Nets Performance Improvement Area3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM					
3. ASBU B0-102/SNET: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	N	N	N	Y

4. ASBU B0-102/SNET: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
2. Short Term Conflict Alert (STCA)	June 2014 /Service Provider
3. Area Proximity Warning (APW)	June 2014 / Service Provider
4. Minimum Safe Altitude Warning (MSAW)	June 2014

7. ASBU B0-102/SNET: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
2. Short Term Conflict Alert (STCA)	NIL	NIL	NIL	NIL
3. Area Proximity Warning (APW)	NIL	NIL	NIL	NIL
4. Minimum Safe Altitude Warning (MSAW)	NIL	NIL	NIL	NIL

8. ASBU B0-102/SNET: Performance Monitoring and Measurement **8A. ASBU B0-102/SNET: Implementation Monitoring**	
Elements	**Performance Indicators/Supporting Metrics**
2. Short Term Conflict Alert (STCA)	Indicator Percentage of ATS units with ground based safety nets (STCA,) implemented Metric Support Number of safety NET (STCA) implemented
3. Area Proximity Warning (APW)	Indicator Percentage of ATS units with ground based safety nets (APW) implemented Metric Support Number of safety NET (APW) implemented
4. Minimum Safe Altitude Warning (MSAW)	Indicator Percentage of ATS units with ground based safety nets (MSAW) implemented Metric Support: Number of Safety NET (MSAW)

8. ASBU B0-102/SNET: Performance Monitoring and Measurement 8 B. ASBU B0-102/SNET: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	NA
Efficiency	NA
Environment	NA
Safety	Significant reduction of the number of major incidents

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AFI Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-05/CD0: Improved Flexibility and Efficiency in Descent Profiles (CDO) Performance Improvement Area 4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-05/CDO: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	N	Y	N	Y

4. ASBU B0-05/CDO: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. CDO implementation	Dec.2017
2. PBN STARs	Dec.2017

7. ASBU B0-05/CDO: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. CDO implementaion	The ground trajectory calculation function will need to be upgraded.	CDO Function	LOAs and Training	In accordance with application requirements
2. PBN STARs	Airspace Design		LOAs and Training	

8. ASBU B0-05/CDO: Performance Monitoring and Measurement **8A. ASBU B0-05/CDO: Implementation Monitoring)**	
Elements	**Performance Indicators/Supporting Metrics**
1. CDO implementation	Indicator: % of International Aerodromes/TMA with CDO implemented Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented
2. PBN STARs	Indicator: % of International Aerodromes/TMA with PBN STAR implemented Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented

8. ASBU B0-05/CDO: Performance Monitoring and Measurement **8 B. ASBU B0-05/CDO: Performance Monitoring**	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	NA
Efficiency	Cost savings through reduced fuel burn. Reduction in the number of required radio transmissions
Environment	Reduced emissions as a result of reduced fuel burn
Safety	More consistent flight paths and stabilized approach paths. Reduction in the incidence of controlled flight into terrain (CFIT

1. AIR NAVIGATION REPORT FORM (ANRF)
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2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – B0-40/TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route Performance Improvement Area4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-40/TBO : Impact on Main Key Performance Areas (KPA)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	Y	Y	Y	Y

4. ASBU B0-40/TBO: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
1. ADS-C over oceanic and remote areas	June 2018 Service provider
2. Continental CPDLC	June 2018 Service provider

7. ASBU B0-40/TBO: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. ADS-C over oceanic and remote areas	NIL	Implementation of ADS general aviation pending	Implementation of GOLD procedures pending	Lack of duly trained inspectors for approval of operations
2. Continental CPDLC	NIL	Implementation of CPDLC general aviation pending	Implementation of GOLD procedures pending	Lack of duly trained inspectors for approval of operations

8. ASBU B0-40/TBO: Performance Monitoring and Measurement 8A. ASBU B0-40/TBO: Implementation Monitoring	
Elements	**Performance Indicators/Supporting Metrics**
1. ADS-C over oceanic and remote areas	Indicators: Percentage of FIRs with ADS C implemented Supporting metric: Number of ADS C approved procedures over oceanic and remote areas
2. Continental CPDLC	Indicators: Percentage of CPDLC implemented at oceanic and remote area FIRs Supporting metric: Number of CPDLC approved procedures over oceanic and remote areas

8. ASBU B0-40/TBO: Performance Monitoring and Measurement 8 B. ASBU B0-40/TBO: Performance Monitoring	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	NA
Capacity	A better localization of traffic and reduced separation allow increased capacity. Reduced communication workload and better organization of controller tasks allowing increasing sector capacity.
Efficiency	Routes/tracks and flights can be separated by reduced minima, allowing to apply flexible routings and vertical profiles closer to the user-preferred ones
Environment	Reduced emissions as a result of reduced fuel burn
Safety	ADS-C based safety nets supports cleared level adherence monitoring, route adherence monitoring, danger area infringement warning and improved search and rescue. Reduced occurrences of misunderstandings; solution to stuck microphone situations.

1. AIR NAVIGATION REPORT FORM (ANRF)
AFI Regional Planning for ASBU Modules

2. REGIONAL PERFORMANCE OBJECTIVE – B0-20/CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO) Performance Improvement Area 4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-20/CCO: Improved Flexibility and Efficiency in Departure Profiles (CCO)					
	Access & Equity	**Capacity**	**Efficiency**	**Environment**	**Safety**
Applicable	N	N	Y	N	N

4. ASBU B0-20/CCO: Planning Targets and Implementation Progress	
5. Elements	**6. Targets and implementation progress (Ground and Air)**
8. CCO implementation	Dec.2017
9. PBN SIDs implementation	Dec.2017

7. ASBU B0-20/CCO: Implementation Challenges				
Elements	**Implementation Area**			
	Ground System Implementation	**Avionics Implementation**	**Procedures Availability**	**Operational Approvals**
1. CCO implementation			LOAs and Training	In accordance with application requirements
2. PBN SIDs implementation	Airspace Design		LOAs and Training	

8. ASBU B0-20/CCO: Performance Monitoring and Measurement **8A. ASBU B0-20/CCO: Implementation Monitoring**	
Elements	**Performance Indicators/Supporting Metrics**
1. CCO implementation	Indicator: Percentage of international aerodromes with CCO implemented Supporting metric: Number of international airport with CCO implemented
2. PBN SIDs implementation	Indicator: Percentage of international aerodromes with PBN SIDs implemented Supporting metric: Number of international airport with PBN SIDs implemented

8. ASBU B0-20/CCO: Performance Monitoring and Measurement **8 B. ASBU B0-20/CCO: Performance Monitoring**	
Key Performance Areas	**Metrics (if not indicate qualitative Benefits)**
Access & Equity	
Capacity	
Efficiency	Cost savings through reduced fuel burn and efficient aircraft operating profiles. Reduction in the number of required radio transmissions
Environment	Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted. Environmental benefits through reduced emissions
Safety	More consistent flight paths. Reduction in the number of required radio transmissions. Lower pilot and air traffic control workload

6. PERFORMANCE-BASED PLANNING FRAMEWORK IN THE AFI REGION

6.1. The ICAO Special Regional Air Navigation Meeting (November 2008) supported the need to adopt a performance-based approach to regional and national air navigation planning in the AFI Region, which was aligned with the Global Air Navigation Plan (Doc 9750, GANP). The GANP was developed to assist States and regional planning groups in identifying the most appropriate operational improvements to achieve near- and medium-term benefits on the basis of current and foreseen aircraft capabilities and ATM infrastructure while the Global Air Traffic Management Operational Concept (Doc 9854) provided the overall vision of a performance based ATM system.

6.2. Several other ICAO documents are available to support the planning process including the Manual on Air Traffic Management System Requirements (Doc 9882) which converted the overall vision of the operational concept into material specifying the functional evolution of ATM, and the Manual on Global Performance of the Air Navigation System (Doc 9883) which provided a broad overview of the tasks that needed to be undertaken to transition to such a system. This approach would support the further evolution of the communication, navigation surveillance/air traffic management (CNS/ATM) transition plans that were already in place, which should be integrated with the performance-based approach to planning.

6.3. The AFI Planning and Implementation Regional Group (APIRG) uses the performance framework forms (PFFs) developed by the ICAO Special AFI RAN of 2008 as amended from time to time through the regional planning process, to identify individual parties responsible for achieving the performance objectives as well as to establish timeframes for implementation.

6.4. States should develop national plans, using the PFFs, harmonized and aligned with the regional PFFs, and that associated tasks should include the necessary, detailed actions to successfully achieve national performance objectives.

6.5. The PFFs developed by the APIRG are provided as **Appendix B** to this document. These PFFs need to be reviewed and aligned with the ICAO Aviation System Block Upgrade (ASBU) Block 0 Modules. **Appendix C** to this document shows the relationship between the existing PFFs and ASBU Block 0 modules.

APPENDIX B : AFI REGIONAL PERFORMANCE FRAMEWORK FORMS

APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL

PERFORMANCE OBJECTIVES FOR RVSM

OPERATIONAL SAFETY ASSESSMENT METHODOLOGY (PFF ATM/01)				
Benefits				
Environment	☐ reductions in fuel consumption			
Efficiency	☐ ability of aircraft to conduct flight more closely to preferred trajectories ☐ facilitate utilization of advanced technologies (e.g. improved altimetry systems) thereby increasing efficiency			
Safety	☐ enhance safety by wider distribution of aircraft in a given airspace			
Strategy ***Short term (2010) Medium term (2011 - 2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM	***En-route airspace***	2009-….		
	☐ create a scrutiny group to monitor and analyze the safety of operations in the AFI region in a formal basis. The scrutiny group will utilize safety management principles outlined in Doc 9859 in order to analyze operational errors and deviations and propose mitigation measures to control them	2009		
	☐that AFI States' use Safety Programmes and SMS methodologies in the control and mitigation of risks in the region	2009		
	☐ that a yearly CRA be conducted by the RMA for analysis by the scrutiny group. The CRA will be used as a relative reference from year to year. The initial acceptability of a collision risk to be determined by experts of the scrutiny group. Meeting the TLS of $2.5x10^{-9}$ fatal accidents per aircraft flying hour for **technical risk** be maintained as a requirement to continue with RVSM operations	ongoing		
	☐ the Scrutiny Group provide yearly report to APIRG about the status of operations safety in the region	ongoing		
Linkage to GPIs	GPI/02: Support implementation of RVSM			

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APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL

PERFORMANCE OBJECTIVES FOR PBN

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES OPTIMIZATION OF THE ATS ROUTE STRUCTURE IN EN-ROUTE AIRSPACE (PFF ATM/02)				
Benefits				
Environment	• reduction in gas emissions			
Efficiency **Safety**	• ability of aircraft to conduct flight more closely to preferred trajectories			
	• increase in airspace capacity			
	• facilitate utilization of advanced technologies (e.g., FMS-based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency			
Strategy ***Short term (2010)*** ***Medium term (2011-2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM	***En-route airspace***	2008		
	• develop regional implementation plan	2008-2009	APIRG	Completed
	• develop regional action plan	2009-2010	APIRG	Completed
	• establish collaborative decision making (CDM) process	2010	States	Continuous
	• develop airspace concept based on AFI PBN regional implementation plan, in order to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN, e.g. RNAV 10 and RNAV 5, and taking into account interregional harmonization	2009-2012	APIRG/States	In progress
	• harmonize national and regional PBN implementation plans	2010-2016	APIRG/States	On-going
	• develop performance measurement plan	2010-2012	States	In progress
	• formulate safety plan	2010-2012	States	To be developed
	• publish national regulations for aircraft and operators approval using PBN manual as guidance material	2010-2011	States	To be developed
	• identify training needs and develop corresponding guidelines	2010-2011	States	In progress
	• identify training programmes and develop corresponding guidelines	2010-2011	APIRG/States	in progress

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES OPTIMIZATION OF THE ATS ROUTE STRUCTURE IN EN-ROUTE AIRSPACE (PFF ATM/02)				
	• formulate system performance monitoring plan	2010-2011	APIRG/States	To be developed
	• implementation of en-route ATS routes	2010-2012	APIRG/States	In progress
	• monitor implementation progress in accordance with AFI PBN implementation plan and State implementation plan	2010 and beyond	APIRG/States	On-going
Linkage to GPIs	GPI/5: performance-based navigation; GPI/7: dynamic and flexible ATS route management; GPI/8: collaborative airspace design and management; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs; GPI/12: FMS-based arrival procedures.			

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES OPTIMIZATION OF THE ATS ROUTE STRUCTURE IN TERMINAL AIRSPACE (PFF ATM/03)				
Benefits				
Environment **Efficiency** **Safety**	• reduction in gas emissions • ability of aircraft to conduct flight more closely to preferred trajectories • increase in airspace capacity • improved availability of procedures • facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency			
Strategy ***Short term (2010)*** ***Medium term (2011-2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM	***Terminal airspace***	2008		
	• develop regional implementation plan	2009	APIRG	Completed
	• develop regional action plan	2009-2010	APIRG	Completed
	• develop State PBN implementation plan	2009 (see note1)	States	In progress
	• establish collaborative decision making (CDM) process	2010	States	In progress
	• develop airspace concept based on AFI PBN roadmap, in order to design and implement an optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), holding and associated instrument flight procedures, on the basis of PBN and, in particular RNAV 1 and Basic-RNP 1	2009-2012	PBN TF/States	In progress
	• develop performance measurement plan	2010-2012	States	In progress
	• formulate safety plan	2010-2012	States	To be developed
	• publish national regulations for aircraft and operators approval using PBN manual as guidance material	2010-2011	States	To be developed
	• identify training needs and develop corresponding guidelines	2010-2011	States	In progress
	• identify training programmes and develop corresponding guidelines	2010-2011	APIRG	To be developed
	• formulate system performance monitoring plan	2010-2012	APIRG/States	In progress
	• develop a regional strategy and work programme implementation of SIDs and STARs	2009-2012	APIRG/States	In progress
	• monitor implementation progress in accordance with AFI PBN implementation roadmap and State implementation plan	2010 and beyond	APIRG/States	On going
Linkage to GPIs	GPI/5: performance-based navigation; GPI/7: dynamic and flexible ATS route management; GPI/8: collaborative airspace design and management; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs; GPI/12: FMS-based arrival procedures.			

OPTIMIZATION OF VERTICALLY GUIDED RNP APPROACHES (PFF ATM/04)				
Benefits				
Environment **Efficiency** **Safety**	• reduction in gas emissions • increased accessibility to aerodromes, including continuity of access • increased runway capacity • reduced pilot workload • availability of reliable lateral and vertical navigation capability			
Strategy				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM	***Terminal airspace***	2008		
	• develop regional implementation plan	2008 – 2009	APIRG	Completed
	• develop regional action plan	2009-2010	APIRG	Completed
	• develop State PBN implementation plan	2009	States	In progress
	• establish collaborative decision making (CDM) process	2010	States	In progress
	• develop airspace concept based on AFI PBN implementation plan, in order to design and implement RNP APCH with Baro-VNAV or LNAV only (see note 1) in accordance with relevant Assembly resolutions , and RNP AR APCH where beneficial	2009 – 2012	APIRG/States	In progress
	• develop performance measurement plan	2010-2012	States	In progress
	• formulate safety plan	2010-2012	States	To be developed
	• publish national regulations for aircraft and operators approval using PBN manual as guidance material	2010-2011	States	To be developed
	• identify training needs and develop corresponding guidelines	2010-2011	States	In progress
	• identify training programmes and develop corresponding guidelines	2010-2011	APIRG/States	To be developed
	• implementation of APV procedures	2010 - 2016	APIRG/States	In progress
	• Formulate system performance monitoring plan	2010-2012	APIRG/States	in progress
Linkage to GPIs	GPI/8: collaborative airspace design and management; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs; GPI/12: FMS-based arrival procedures			

Note 1: States that have not already done so should complete preparation of their national PBN implementation plans as soon as possible.

Note 2: Where altimeter setting does not exist or aircraft are not suitably equipped for APV.

APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES / NATIONAL PERFORMANCE OBJECTIVES FOR AIM

TRANSITION FROM AIS TO AIM (PFF AIM/01)				
Benefits				
Environment **Efficiency** **Safety**	. reductions in fuel consumption; . improved planning and management of flights; . efficient use of airspace; . improved safety			
KPI	Status of implementation of the AIRAC system in the AFI Region Status of implementation of QMS in the AFI Region Status of implementation of AIS Automation in the AFI Region			
Proposed Metrics	Number of States complying with the AIRAC procedures Number of Posting of AIS information on the ICAO AFI Forum Number of States having developed and signed service Level Agreements between AIS and data originators Number of States having organized QMS awareness campaigns and training programmes Number of States having implemented QMS Number of States having developed eAIP Number of States having developed a National Plan for the transition from AIS to AIM			
Strategy ***Short term (2010-2011)*** ***Medium term (2011 – 2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AUO, ATM SDM	• Improve the compliance with the AIRAC system	Ongoing	States & AFI AIMTF	Valid
	• Use of the internet, including the ICAO AFI Forum, for the advance posting of the aeronautical information considered of importance to users;	2009 – 2011	States & ICAO	Valid
	• Signature of service Level Agreements between AIS and data originators;	2009 – 2011	States	Valid
	• Foster the implementation of AFI QMS based on the AFI Region Methodology for the implementation of QMS ;	2009 – 2011	ICAO & AFI AIMTF & States	Valid
	• Monitor the implementation of QMS until complete implementation of the requirements by all AFI States;	2008 - 2013	ICAO & AFI AIMTF	Valid
	• Foster the development of eAIPs by AFI States;	2009 - 2013	States & AFI AIMTF	Valid

	• Monitor the implementation of AIS automation in the AFI Region in order to ensure availability, sharing and management of electronic aeronautical information;	2008 -2013	ICAO & AFI AIMTF	Valid
	• Foster the development of National/regional AIS databases;	2010 – 2015	ICAO & AFI AIMTF & States	Valid
Linkage to GPIs	GPI-5: performance-based navigation; GPI-11: RNP and RNAV SIDs and STARs; GPI-18: Aeronautical Information			

APPENDIX B

REGIONAL PERFORMANCE OBJECTIVES / NATIONAL PERFORMANCE OBJECTIVES FOR AIM

REGIONAL/NATIONAL PERFORMANCE OBJECTIVE IMPLEMENTATION OF WGS-84 AND e-TOD (PFF AIM/02)				
Benefits				
Environment	• Supporting benefits described in performance objectives for PBN			
Efficiency	• WG8 -84 is a prerequisite for performance-based navigation, benefits described in performance objectives for PBN.			
	• support approach and departure procedure design and implementation			
	• improve aircraft operating limitations analysis			
	• support aeronautical chart production and on-board databases			
Safety	• improve situational awareness			
	• support determination of emergency contingency procedures			
	• support technologies such as ground proximity and minimum safe altitude warning systems			
	• see benefits described in performance objectives for PBN			
KPI	• status of implementation of WGS-84 in the AFI Region • status of implementation of e-TOD in the AFI Region (for Areas 1 & 4)			
Proposed Metrics	• number of States having fully implemented WGS-84 • number of States having organized e-TOD awareness campaigns and training programmes • number of States having implemented e-TOD for Areas 1 & 4.			
Strategy Short term (2010-2012) Medium term (2012 - 2016)				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
ATM CM	***Electronic terrain and obstacle data (e-TOD)*** • share experience and resources in the implementation of e-TOD through the establishment of an e-TOD working group	2008-2011	APIRG States	e-TOD WG has been established
	• report requirements and monitor implementation status of e-TOD using a new AIS Table of the AFI FASID (Ref. Appendix B)	2008-ongoing	APIRG States	
ATM AUO	• develop a high level policy for the management of a national e-TOD programme	2008-2012	States	
ATM AUO	***Electronic terrain and obstacle data (e-TOD)*** • Provide Terrain and Obstacle data for area 1	2008-2012	States	

	• Provide Terrain and Obstacle data for area 4	2008-2012	States	
	• assessment of Annex 15 requirements related to the provision of e-TOD for area 2 and 3	2010-2012	States	
	• development of an action plan for the provision of e-TOD for area 2 and 3	2013	States	
	• provide necessary Terrain and Obstacle data for area 2	2015	States	
	• provide necessary Terrain and Obstacle data for area 3	2015	States	
	WGS-84 • establish WGS-84 implementation goals in coordination with the national PBN implementation plan	2008-2012	States	
	• report requirements and monitor implementation status of WGS-84 using the new AIM-5 Table of the AFI FASID and take remedial action if required • completeWGS-84 implementation	2011- 2013 2013	APIRG States States	
Linkage to GPIs	GPI-5: Performance-based navigation; GPI-9: Situational awareness; GPI-ll: RNP and RNAV SIDs and STARs; GPI-18: Aeronautical Information; GPI-20: WGS-84; GPI-2l: Navigation systems			

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APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL

PERFORMANCE OBJECTIVES FOR SEARCH AND RESCUE (SAR)

ESTABLISHMENT OF SUB-REGIONAL SAR ARRANGEMENTS (PFF SAR/01)				
Benefits				
Efficiency and Safety	• cost-efficient use of accommodation and RCC equipment on a shared basis • service provision more uniform across a geographic area defined by risk • proficient services provided near and within States with limited resources. • harmonization of aviation / maritime procedures • inter-operability of life-saving equipment • development of a pool of experienced SAR mission coordinators skilled across both aviation and maritime domains thus reducing coordination and fragmentation			
Strategy				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
N/A	• conduct AFI Regional SAR workshop	every year	ICAO	
	• establish collaborative decision making process • Collaboration between states • Networking process by setting up a website; nominate a focal point within ICAO to manage the website • Nominate a focal point within each state/organization to coordinate SAR issues	2011 – 2012	ICAO /States	Not started
	• develop needs assessment and gap analysis • conduct self audits	2011 – 2012	APIRG/STATES	Not started
	• develop regional action plan to resolve the deficiencies	2011 – 2012	APIRG/STATES	Not started
	• conduct regional SAR Administrators training and SAR Mission Coordinators training	2011 – 2012	ICAO	Not started
	• determine regional and sub regional organisation, functions and responsibilities, accommodation and equipment needs.	2011 – 2012	APIRG/ STATES	Not started
	• produce draft legislation, regulations, operational procedures, letters of agreement SAR plans and safety management policies for regional SAR provision using IAMSAR manual as guidance.	2010 – 2012	APIRG	Implementation on a continuous basis
	• determine future training needs and develop training plans and conduct training as required	2010 – permanent	APIRG/STATES	Implementation on a continuous basis

	• develop SAR plan • alerting procedures • resource databases • interface procedures with aerodrome emergency procedures and generic disaster response providers • RCC check lists • staffing, proficiency and certification plans • preventive SAR programmes • quality programmes • education and awareness programmes • in-flight emergency response procedures	2011 – 2012	States	Not started
	• conduct SAR exercises required: -National -Multinational	2012 - Permanent	States	Not started
	• monitor implementation process	As appropriate	ICAO/States	Not started
Linkage to GPIs	N/A			

Notes:

1. Enablers: Regional Organizations like SADC, ECOWAS, CEMAC, EAC etc.

2. The Task Force has identified the following groups of RCCs as potential base for regional/sub-regional SAR close co-operation e.g. SAR exercise, training, meetings etc..

- Casablanca, Canarias, Dakar, Roberts, Sal,
- Algiers, Asmara, Cairo, Tripoli, Tunis,
- Accra, Brazzaville, Kano, Kinshasa, Ndjamena, Niamey,
- Addis, Entebbé, Khartoum, Mogadishu, Nairobi,
- Southern African States,
- Antananarivo, Mauritius, Seychelles.

3. All work requires close cooperation with all States affected, ICAO, IMO, Cospas-Sarsat and other worldwide bodies as required.

APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES FOR METEOROLOGY

FOSTER THE IMPLEMENTATION OF SIGMET AND QMS IN THE AFI REGION (PFF MET/01)				
Benefits				
Environment **Efficiency** **Safety**	☐ contribution in the reduction in fuel consumption ☐ improvement of efficiency of meteorological services to aircraft in flight ☐ ensure timely preparation and provision to airlines of aviation warnings for en-route meteorological hazards ☐ ensure the quality management system (QMS) in the provision of MET information to international civil aviation ☐ minimize encounters by aircraft of hazardous meteorological conditions			
Strategy ***Short term (2010) Medium term (2011 - 2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM, **DCB,** **AO,** **TS,** **AUO**	SIGMET ☐ assessment on the current level of implementation through a first SIGMET test in the AFI Region ☐ establishment of an updated list of deficiencies including States not compliant with SIGMET format ☐ provision of details guidance to States not issuing SIGMET or correct SIGMET ☐ second SIGMET test to re-assess the level of implementation ☐ establishment of an implementation project in terms of seminars through special implementation projects (SIPs) and IFFAS projects for States not meeting their obligation QMS ☐ two seminars in French and English for the chief executive of MET authorities and assessment of the current level of implementation during the seminars	2008-2010 2008-2011	RO, MET RO, MET	

	☐ establishment of an updated list of States not implemented or partly implemented the QMS ☐ training of trainers for personnel in States not implemented through projects ☐ establishment of an implementation project in terms of seminars and consultancy services through projects during the initial stages of implementation for States not meeting their obligation			
Linkage to GPIs	GPI/19: Meteorological systems			

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APPENDIX B

AFI REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES FOR METEOROLOGY

FOSTER THE IMPLEMENTATION OF TERMINAL AREA WARNINGS AND FORECASTS, PROVISION OF WAFS FORECASTS AND OPTIMIZATION OF OPMET DATA EXCHANGES IN THE AFI REGION (PFF MET/02)				
Benefits				
Environment ☐ contribution in the reduction in fuel consumption; **Efficiency** ☐ improvement of efficiency in meteorological services to aircraft in flight; ☐ ensure timely preparation and provision to airlines of aviation warnings for terminal area meteorological hazards; ☐ improvement in the efficiency of flight planning by airlines taking into account prevailing and expected meteorological conditions along the route based on WAFS forecasts; **Safety** ☐ minimize encounters by aircraft of hazardous meteorological conditions.				
Strategy ***Short term (2010) Medium term (2011 - 20015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AOM, DCB, AO, TS, AUO	***Terminal area warnings and forecasts*** ☐ Step 1: Assessment of the current level of implementation of facilities at aerodromes for monitoring hazardous meteorological conditions; ☐ Step 2: Establishment of an updated list of deficiencies including States not compliant with required facilities stipulated in Annex 3 and the AFI ANP and for States to develop action plans to eliminate the deficiencies; ☐ Step 3: Provision of details guidance to States not issuing terminal area warnings and forecasts; ☐ Step 4: Establishment of an implementation project in terms of seminars and consultancy services through special implementation projects (SIP) and IFFAS projects respectively for States not meeting their obligation;	2008-2010		

	World area forecast system (WAFS) ☐ Step 1: Two seminars in French and English on new WAFS gridded forecasts; ☐ Step 2: Establishment of an updated list of States not receiving WAFS products and areas of constraints in implementing SADIS VSAT and FTP service and States concerned to develop remedial action plans; ☐ Step 3: Establishment of an implementation project in terms of seminars and consultancy services through SIPs and IFFAS projects respectively; ***Optimization of OPMET data Exchange and implementation of OPMET databanks*** ☐ Step 1: Undertake an assessment of the availability and quality of OPMET data in the region and States not meeting the required levels of implementation to develop remedial action plans; ☐ Step 2: Two seminars in French and English on AMBEX and OPMET AFI data banks procedures; ☐ Step 3: Establishment of an implementation project in terms of seminars and consultancy services through SIPs and IFFAS projects respectively obligation;	2008-2011 2008-2011		
Linkage to GPIs	GPI/19: Meteorological systems			

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APPENDIX B

REGIONAL PERFORMANCE OBJECTIVES/NATIONAL PERFORMANCE OBJECTIVES FOR COMMUNICATIONS, NAVIGATION AND SURVEILLANCE

AERONAUTICAL TELECOMMUNICATIONS (PFF CNS/01)				
Benefits				
Safety	• Improvement of safety in airspace and at aerodromes			
	• enhanced safety in flight operations			
Efficiency	• Improved ATS coordination • Increased availability of communications • Avoid misunderstanding in communications • Facilitate the utilization of advanced technologies			
Environment	• TBD			
Strategy **Short term (2010)** ***Medium term (2011 - 2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSI-BILITY**	**STATUS**
	Aeronautical mobile service (AMS)			
AO, TS, CM, AUO, AOM, SDM	• provision of VHF in FIRs Luanda, Khartoum, Somalia-and Kinshasa	2008–2012		Ongoing Implemented in DRC
	• provision of controller-pilot data link communications (CPDLC) procedures	2010-2015	States	On-going
	• establishment of a regional central reporting agency (CRA)	2010-2012	APIRG	Not started
	• development of regional guidance for required communication performance (RCP)	2010-2011	APIRG	On-going Global Operational Data Link Document (GOLD) adopted
	• implementation of RCP	2010-2015	States	Not started
	Aeronautical fixed service (AFS)			
	• implementation of bit-oriented protocol (BOP) between AFTN main centres	2010-2012	States	In progress
	• implementation of Aeronautical Message Handling System (AMHS)	2010-2012	States	In progress

	• implementation of ATS Inter-facility Data Communications (AIDC)	2010-2012	States	In progress
	Navigation			
	• implementation of navigational aids to increase safety at terminal areas	2008 – 2011		Ongoing
	• implementation of GNSS – carry out survey to determine the implementation status and identify the specific assistance needed if any	2009-2015	States	Ongoing
	Surveillance			
	• update of AFI surveillance plan for en-route operations	2008 – 2010	APIRG	In progress
	• implementation of AFI surveillance plan for en-route operations, including provision of automatic dependent surveillance (ADS-C) procedures	2008-2015	States	In progress
	• development of AFI surveillance plan for TMA and aerodromes	2009-2012	APIRG	In progress
	• development of State implementation action plan based on AFI surveillance plan	2009 – 2012	APIRG	Not started
	Aeronautical spectrum			
	• implementation of automation support tools to enhance frequency management	July 2008 – 2009		Ongoing
	• AFI to join ICARD	August 2008 – March 2009		
	Performance measurement			
	• Development of performance measurement plan for CNS services	2010-2012	APIRG	Not started
Linkage to GPIs	GPI/9: Situational awareness; GPI/10: Terminal area design and management; GPI/17: Implementation of data link applications; - GPI/21: Navigation systems; GPI/22: Communication network infrastructure; GPI/23 – Aeronautical spectrum			

APPENDIX B

AFI REGIONAL OPERATIONAL OBJECTIVES/NATIONAL OPERATIONAL OBJECTIVES FOR AERODROME OPERATIONS

IMPLEMENTATION OF AERODROME CERTIFICATION (PFF AOP/01)				
Benefits				
Efficiency	☐ ensure aerodrome operators comply with relevant ICAO SARPs and/or applicable national regulations ☐ continued provision of safe and efficient aircraft operations at aerodromes			
Safety	☐ strengthen States' safety oversight responsibility on aerodrome operations			
Strategy ***Short term (2010) Medium term (2011 - 2015)***				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
AO	☐ create a scrutiny group to assist and monitor the implementation of aerodrome certification in the AFI Region	January 2009 – June 2009		
	☐analyze Annex 14, Volume I provisions on aerdrome certification vis-a-vis national legislations and regulations	June 2009 – December 2009		
	☐ analyze guidance in the *Manual on Certification of Aerodromes* (Doc 9774) vis-à-vis national regulations	June 2009 – December 2009		
	☐ develop and/or complete national regulations on aerodrome certification as necessary; and training of aerodrome inspectors	ongoing		
	☐develop an action plan for certifying all remaining aerodromes used for international operations, including implementation of SMS	ongoing		
	☐ implement the action plan; and the scrutiny group to provide yearly feedback to APIRG regarding the status of the implementation of aerodrome certification	ongoing		
Linkage to GPIs	GPI/13: Aerodrome design and management; GPI/14: Runway operations			

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APPENDIX C
RELATIONSHIP BETWEEN AFI PFFS AND ASBU BLOCK 0 MODULES SELECTED FOR THE AFI REGION

APPENDIX C

RELATIONSHIP BETWEEN AFI PFFS AND ASBU BLOCK 0 MODULES SELECTED FOR THE AFI REGION

	PIA1					PIA2			PIA3						PIA4		
	B0-15 RSEQ	B0-65 APTA	B0-70 WAKE	B0-75 SURF	B0-80 ACDM	B0-25 FICE	B0-30 DATM	B0-105 AMET	B0-10 FRTO	B0-35 NOPS	B0-84 ASUR	B0-86 OPFL	B0- 101 ACAS	B0-102 SNET	B0-05 CDO	B0-20 CCO	B0-40 TBO
PFF AFI ATM/01									X			X					
PFFAFI ATM/02									X								X
PFFAFI ATM/03		X							X						X	X	X
PFF AFI ATM/04									X						X	X	X
PFF AFI CNS/01						X		X		X							X
PFFAFI MET/01								X									
PFF AFI MET/02				X				X									
PFFAFI SAR/01																	
PFF AFI AIM/01							X										
PFF AFI AIM/02							X	X									
PFF AFI AGA/01				X	X												

APPENDIX D:

DETAILED DESCRIPTION OF ASBU BLOCK 0 MODULES (AS PER ICAO GLOBAL AIR NAVIGATION PLAN, DOC 9750, 4TH EDITION)

PERFORMANCE IMPROVEMENT AREA 1:
AIRPORT OPERATIONS

B0-APTA Optimization of Approach Procedures including Vertical Guidance

The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures to 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.

Applicability

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

Benefits

Access and Equity: Increased aerodrome accessibility.

Capacity: In contrast with instrument landing systems (ILS), the GNSS-based approaches (PBN and GLS) do not require the definition and management of sensitive and critical areas. This results in increased runway capacity where applicable.

Efficiency: Cost savings related to the benefits of lower approach minima: fewer diversions, over flights, cancellations and delays. Cost savings related to higher airport capacity in certain circumstances (e.g. closely spaced parallels) by taking advantage of the flexibility to offset approaches and define displaced thresholds.

Environment: Environmental benefits through reduced fuel burn.

Safety: Stabilized approach paths.

Cost: Aircraft operators and Air Navigation Service Providers (ANSPs) can quantify the benefits of lower minima by using historical aerodrome weather observations and modelling airport accessibility with existing and new minima. Each aircraft operator can then assess benefits against the cost of any required avionics upgrade. Until there are GBAS (CAT II/III) Standards, GLS cannot be considered as a candidate to globally replace ILS. The GLS business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event.

B0-WAKE Increased Runway Throughput through Optimized Wake Turbulence Separation

Improves throughput on departure and arrival runways through optimized wake turbulence separation minima, revised aircraft wake turbulence categories and procedures.

Applicability

Least complex – Implementation of revised wake turbulence categories is mainly procedural.
No changes to automation systems are needed.

Benefits

Access and Equity: Increased aerodrome accessibility. Capacity:

a) Capacity and departure/arrival rates will increase at capacity constrained aerodromes as wake categorization changes from three to six categories.

b) Capacity and arrival rates will increase at capacity constrained aerodromes as specialized and tailored procedures for landing operations for on-parallel runways, with centre lines spaced less than 760 m (2 500 ft) apart, are developed and implemented.

c) Capacity and departure/arrival rates will increase as a result of new procedures which will reduce the current two-three minutes delay times. In addition, runway occupancy time will decrease as a result of these new procedures.

Flexibility Aerodromes can be readily configured to operate on three (i.e. existing H/M/L) or six wake turbulence categories, depending on demand.

Cost: Minimal costs are associated with the implementation in this Module. The benefits are to the users of the aerodrome runways and surrounding airspace, ANSPs and operators. Conservative wake turbulence separation standards and associated procedures do not take full advantage of the maximum utility of runways and airspace. U.S. air carrier data shows that, when operating from a capacity- constrained aerodrome, a gain of two extra departures per hour has a major beneficial effect in reducing delays.

The ANSP may need to develop tools to assist controllers with the additional wake turbulence categories and decision support tools. The tools necessary will depend on the operation at each airport and the number of wake turbulence categories implemented.

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

Basic advanced-surface movement guidance and control systems (A-SMGCS) provides surveillance and alerting of movements of both aircraft and vehicles at the aerodrome, thus improving runway/aerodrome safety. Automatic dependent surveillance-broadcast (ADS-B) information is used when available (ADS-B APT).

Applicability

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.

Benefits

Access and Equity: A-SMGCS improves access to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft. Sustains an improved aerodrome capacity during periods of reduced visibility. Ensures equity in ATC handling of surface traffic regardless of the traffic's position on the aerodrome.

ADS-B APT, as an element of an A-SMGCS system, provides traffic situational awareness to the controller in the form of surveillance information. The availability of the data is dependent on the aircraft and vehicle level of equipage.

Capacity: A-SMGCS: sustained levels of aerodrome capacity for visual conditions reduced to minima lower than would otherwise be the case.

ADS-B APT: as an element of an A-SMGCS system, potentially improves capacity for medium complexity aerodromes.

Efficiency: A-SMGCS: reduced taxi times through diminished requirements for intermediate holdings based on reliance on visual surveillance only.

ADS-B APT: as an element of an A-SMGCS, potentially reduces occurrence of runway collisions by assisting in the detection of the incursions.

Environment: Reduced aircraft emissions stemming from improved efficiencies.

Safety: A-SMGCS: reduced runway incursions. Improved response to unsafe situations. Improved situational awareness leading to reduced ATC workload.

ADS-B APT: as an element of an A-SMGCS system, potentially reduces the occurrence of occurrence of runway collisions by assisting in the detection of the incursions.

Cost: A-SMGCS: a positive CBA can be made from improved levels of safety and improved efficiencies in surface operations leading to significant savings in aircraft fuel usage. As well, aerodrome operator vehicles will benefit from improved access to all areas of the aerodrome, improving the efficiency of aerodrome operations, maintenance and servicing.

ADS-B APT: as an element of an A-SMGCS system less costly surveillance solution for medium complexity aerodromes.

B0-ACDM Improved Airport Operations through Airport-CDM

Implements 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.

Applicability

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

Benefits

Capacity: Enhanced use of existing infrastructure of gate and stands (unlock latent capacity). Reduced workload, better organization of the activities to manage flights.

Efficiency: Increased efficiency of the ATM system for all stakeholders. In particular for aircraft operators: improved situational awareness (aircraft status both home and away); enhanced fleet predictability and punctuality; improved operational efficiency (fleet management); and reduced delay.

Environment: Reduced taxi time; reduced fuel and carbon emission; and lower aircraft

engine run time.

Cost: The business case has proven to be positive due to the benefits that flights and the

other airport operational stakeholders can obtain. However, this may be influenced depending upon the individual situation (environment, traffic levels investment cost, etc.).

A detailed business case has been produced in support of the EU regulation which was solidly positive.

B0-RSEQ Improve Traffic Flow through Sequencing (AMAN/DMAN)

Manage arrivals and departures (including time-based metering) to and from a multi-runway aerodrome or locations with multiple dependent runways at closely proximate aerodromes, to efficiently utilize the inherent runway capacity.

Applicability

Runways and terminal manoeuvring area in major hubs and metropolitan areas will be most in need of these improvements.

The improvement is least complex – runway sequencing procedures are widely used in aerodromes globally. However some locations might have to confront environmental and operational challenges that will increase the complexity of development and implementation of technology and procedures to realize this Module.

Benefits

Capacity: Time-based metering will optimize usage of terminal airspace and runway capacity. Optimized utilization of terminal and runway resources.

Efficiency: Efficiency is positively impacted as reflected by increased runway throughput and arrival rates. This is achieved through:

a) Harmonized arriving traffic flow from en-route to terminal and aerodrome. Harmonization is achieved via the sequencing of arrival flights based on available terminal and runway resources.

b) Streamlined departure traffic flow and smooth transition into en-route airspace. Decreased lead time for departure request and time between call for release and departure time. Automated dissemination of departure information and clearances.

Predictability: Decreased uncertainties in aerodrome/terminal demand prediction.

Flexibility: By enabling dynamic scheduling.

Cost: A detailed positive business case has been built for the time-based flow management programme in the United States. The business case has proven the benefit/cost ratio to be positive. Implementation of time-based metering can reduce airborne delay. This capability was estimated to provide over 320,000 minutes in delay reduction and $28.37 million in benefits to airspace users and passengers over the evaluation period.

Results from field trials of DFM, a departure scheduling tool in the United States, have been positive. Compliance rate, a metric used to gauge the conformance to assigned departure time, has increased at field trial sites from sixty-eight to seventy-five per cent. Likewise, the EUROCONTROL DMAN has demonstrated positive results. Departure scheduling will streamline flow of aircraft feeding the adjacent center airspace based on that center's constraints. This

capability will facilitate more accurate estimated time of arrivals (ETAs). This allows for the continuation of metering during heavy traffic, enhanced efficiency in the NAS and fuel efficiencies. This capability is also crucial for extended metering.

PERFORMANCE IMPROVEMENT AREA 2:
GLOBALLY INTEROPERABLE SYSTEMS AND DATA

B0-FICE Increased Interoperability, Efficiency and Capacity though Ground-Ground Integration

Improves coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC) defined by ICAO's *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.

Applicability

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

Benefits

Capacity: Reduced controller workload and increased data integrity supporting reduced separations translating directly to cross sector or boundary capacity flow increases.

Efficiency: The reduced separation can also be used to more frequently offer aircraft flight levels closer to the flight optimum; in certain cases, this also translates into reduced en-route holding.

Interoperability: Seamlessness: the use of standardized interfaces reduces the cost of development, allows air traffic controllers to apply the same procedures at the boundaries of all participating centres and border crossing becomes more transparent to flights.

Safety: Better knowledge of more accurate flight plan information.

Cost: Increase of throughput at ATS unit boundary and reduced ATCO workload will outweigh the cost of FDPS software changes. The business case is dependent on the environment.

B0-DATM Service Improvement through Digital Aeronautical Information Management

The initial introduction of digital processing and management of information through, aeronautical information service (AIS)/aeronautical information management (AIM) implementation, use of aeronautical exchange model (AIXM), migration to electronic aeronautical information publication (AIP0 and better quality and availability of data.

Applicability

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

Benefits

Environment: Reducing the time necessary to promulgate information concerning airspace status will allow for more effective airspace utilization and allow improvements in trajectory management.

Safety: Reduction in the number of possible inconsistencies. Module allows reducing the number of manual entries and ensures consistency among data through automatic data checking

based on commonly agreed business rules.

Interoperability: Essential contribution to interoperability.

Cost: Reduced costs in terms of data inputs and checks, paper and post, especially when considering the overall data chain, from originators, through AIS to the end users. The business case for the aeronautical information conceptual model (AIXM) has been conducted in Europe and in the United States and has shown to be positive.

The initial investment necessary for the provision of digital AIS data may be reduced through regional cooperation and it remains low compared with the cost of other ATM systems. The transition from paper products to digital data is a critical pre-requisite for the implementation of any current or future ATM or Air Navigation concept that relies on the accuracy, integrity and timeliness of data.

B0-AMET - Meteorological Information Supporting Enhanced Operational Efficiency and Safety

Global, regional and local meteorological information:

a) Forecasts provided by world area forecast centres (WAFCs), volcanic ash advisory centres (VAACs) 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.

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 information supports flexible airspace management, improved situational awareness and collaborative decision-making, and dynamically-optimized flight trajectory planning. 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

Applicability

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

Benefits

Capacity: Optimized use of airspace capacity. Metric: ACC and aerodrome throughput.

Efficiency: Harmonized arriving air traffic (en-route to terminal area to aerodrome) and harmonized departing air traffic (aerodrome to terminal area to en-route) will translate to reduced arrival and departure holding times and thus reduced fuel burn. Metric: Fuel consumption and flight time punctuality.

Environment: Reduced fuel burn through optimized departure and arrival profiling/scheduling. Metric: Fuel burn and emissions.

Safety: Increased situational awareness and improved consistent and collaborative decision making. Metric: Incident occurrences.

Interoperability: Gate-to-gate seamless operations through common access to, and use of, the available WAFS, IAVW and tropical cyclone watch forecast information. Metric: ACC throughput.

Predictability: Decreased variance between the predicted and actual air traffic schedule. Metric: Block time variability, flight-time error/buffer built into schedules.

Participation: Common understanding of operational constraints, capabilities and needs, based on expected (forecast) meteorological conditions. Metric: Collaborative decision-making at the aerodrome and during all phases of flight.

Flexibility: Supports pre-tactical and tactical arrival and departure sequencing and thus dynamic air traffic scheduling. Metric: ACC and aerodrome throughput.

Cost: Reduction in costs through reduced arrival and departure delays (viz. reduced fuel burn). Metric: Fuel consumption and associated costs.

PERFORMANCE IMPROVEMENT AREA 3:
OPTIMUM CAPACITY AND FLEXIBLE FLIGHTS

B0-FRTO Improved Operations through Enhanced En-route Trajectories

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 lengths and fuel burn.

Applicability

Applicable to en-route 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.

Benefits

Access and Equity: Better access to airspace by a reduction of the permanently segregated volumes.

Capacity: The availability of a greater set of routing possibilities allows reducing potential congestion on trunk routes and at busy crossing points. The flexible use of airspace gives greater possibilities to separate flights horizontally. PBN helps to reduce route spacing and aircraft separations. This in turn allows reducing controller workload by flight.

Efficiency: The different elements concur to trajectories closer to the individual optimum by reducing constraints imposed by permanent design. In particular the Module will reduce flight length and related fuel burn and emissions. The potential savings are a significant proportion of the ATM related inefficiencies. The Module will reduce the number of flight diversions and cancellations. It will also better allow avoidance of noise sensitive areas.

Environment: Fuel burn and emissions will be reduced; however, the area where emissions and contrails will be formed may be larger.

Predictability: Improved planning allows stakeholders to anticipate on expected situations and be better prepared.

Flexibility: The various tactical functions allow rapid reaction to changing conditions.

Cost: FUA: In the United Arab Emirates (UAE) over half of the airspace is military. Opening up this airspace could potentially enable yearly savings in the order of 4.9 million litres of fuel and 581 flight hours. In the United States a study for NASA by Datta and Barington showed maximum savings of dynamic use of FUA of $7.8M (1995$).

Flexible routing: Early modelling of flexible routing suggests that airlines operating a 10-hour intercontinental flight can cut flight time by six minutes, reduce fuel burn by as much as 2% and save 3,000 kilograms of CO2 emissions. In the United States RTCA NextGen Task Force Report, it was found that benefits would be about 20% reduction in operational errors; 5-8% productivity increase (near term; growing to 8-14% later); capacity increases (but not quantified).

Annual operator benefit in 2018 of $39,000 per equipped aircraft (2008 dollars) growing to $68,000 per aircraft in 2025 based on the FAA Initial investment Decision. For the high throughput, high capacity benefit case (in 2008 dollars): total operator benefit is $5.7B across programme lifecycle (2014-2032, based on the FAA initial investment decision).

B0-NOPS Improved Flow Performance through Planning based on a Network-wide view

Air traffic flow management (ATFM) is used to manage the flow of traffic in a way that minimizes delays and maximizes the use of the entire airspace. ATFM can regulate traffic flows involving departure slots, smooth flows and manage rates of entry into airspace along traffic axes, manage arrival time at waypoints or flight information region (FIR)/sector boundaries and reroute traffic to avoid saturated areas. ATFM may also be used to address system disruptions including crisis caused by human or natural phenomena.

Applicability: Region or subregion. Benefits

Access and Equity: Improved access by avoiding disruption of air traffic in periods of demand higher than capacity. ATFM processes take care of equitable distribution of delays.

Capacity: Better utilization of available capacity, network-wide; in particular the trust of ATC not being faced by surprise to saturation tends to let it declare/use increased capacity levels; ability to anticipate difficult situations and mitigate them in advance.

Efficiency: Reduced fuel burn due to better anticipation of flow issues; a positive effect to reduce the impact of inefficiencies in the ATM system or to dimension it at a size that would not always justify its costs (balance between cost of delays and cost of unused capacity). Reduced block times and times with engines on.

Environment: Reduced fuel burn as delays are absorbed on the ground, with shut engines; rerouting however generally put flight on a longer distance, but this is generally compensated by other airline operational benefits.

Safety: Reduced occurrences of undesired sector overloads.

Predictability: Increased predictability of schedules as the ATFM algorithms tend to limit the number of large delays.

Participation: Common understanding of operational constraints, capabilities and needs.

Cost: The business case has proven to be positive due to the benefits that flights can obtain in terms of delay reduction.

B0-ASUR Initial Capability for Ground Surveillance

Provides initial capability for lower cost ground surveillance supported by new technologies such as ADS-B OUT and wide area multilateration (MLAT) systems. This capability will be expressed in various ATM services, e.g. traffic information, search and rescue and separation provision.

Applicability

This capability is characterized by being dependent/cooperative (ADS-B OUT) and independent/cooperative (MLAT). The overall performance of ADS-B is affected by avionics performance and compliant equipage rate.

Benefits

Capacity: Typical separation minima are 3 NM or 5 NM enabling a significant increase in traffic density compared to procedural minima. Improved coverage, capacity, velocity vector performance and accuracy can improve ATC performance in both radar and non-radar environments. Terminal area surveillance performance improvements are achieved through high accuracy, better velocity vector and improved coverage.

Efficiency: Availability of optimum flight levels and priority to the equipped aircraft and operators. Reduction of flight delays and more efficient handling of air traffic at FIR boundaries. Reduces workload of air traffic controllers.

Safety: Reduction of the number of major incidents. Support to search and rescue.

Cost: Either comparison between procedural minima and 5 NM separation minima would allow an increase of traffic density in a given airspace; or comparison between installing/renewing SSR Mode S stations using Mode S transponders and installing ADS-B OUT (and/or MLAT systems).

B0-ASEP Air Traffic Situational Awareness (ATSA)

Two air traffic situational awareness (ATSA) applications which will enhance safety and efficiency by providing pilots with the means to enhance traffic situational awareness and achieve quicker visual acquisition of targets:

a) AIRB (basic airborne situational awareness during flight operations).

b) VSA (visual separation on approach).

Applicability

These are cockpit-based applications which do not require any support from the ground hence they can be used by any suitably equipped aircraft. This is dependent upon aircraft being equipped with ADS-B OUT. Avionics availability at low enough costs for GA is not yet available.

Benefits

Efficiency: Improve situational awareness to identify level change opportunities with current separation minima (AIRB) and improve visual acquisition and reduction of missed approaches (VSA).

Safety: Improve situational awareness (AIRB) and reduce the likelihood of wake turbulence encounters (VSA).

Cost: The cost benefit is largely driven by higher flight efficiency and consequent savings in contingency fuel. The benefit analysis of the EUROCONTROL CRISTAL ITP project of the CASCADE Programme and subsequent update had shown that ATSAW AIRB and ITP together are capable of providing the following benefits over North Atlantic:

a) Saving 36 million Euro (50K Euro per aircraft) annually.

b) Reducing carbon dioxide emissions by 160,000 tonnes annually.

The majority of these benefits are attributed to AIRB. Findings will be refined after the completion of the pioneer operations starting in December 2011.

B0-OPFL Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS B)

Enables aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of ITP is significant fuel savings and the uplift of greater payloads.

Applicability

This can be applied to routes in procedural airspaces.

Benefits

Capacity: Improvement in capacity on a given air route.

Efficiency: Increased efficiency on oceanic and potentially continental en-route.

Environment: Reduced emissions.

Safety: A reduction of possible injuries for cabin crew and passengers.

B0-ACAS Airborne Collision Avoidance Systems (ACAS) Improvements

Provides 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.

Applicability

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

Efficiency: ACAS improvement will reduce unnecessary resolution advisory (RA) and then reduce trajectory deviations.

Safety: ACAS increases safety in the case of breakdown of separation.

B0-SNET Increased Effectiveness of Ground-Based Safety Nets

Monitors the operational environment during airborne phases of flight to provide timely alerts on the ground of an increased risk to flight safety. In this case, short-term conflict alert, area proximity warnings and minimum safe altitude warnings are proposed. Ground-based safety nets make an essential contribution to safety and remain required as long as the operational concept remains human centred.

Applicability

Benefits increase as traffic density and complexity increase. Not all ground-based safety nets are relevant for each environment. Deployment of this Module should be accelerated.

Benefits

Safety: Significant reduction of the number of major incidents.

Cost: The business case for this element is entirely made around safety and the application of ALARP (as low as reasonably practicable) in risk management.

Performance Improvement Area 4: Efficient Flight Paths

B0-CDO - Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDOs)

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.

Applicability

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/State/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.

c) Most complex – regional/State/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.

Benefits

Efficiency: Cost savings and environmental benefits through reduced fuel burn. Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted. Reduction in the number of required radio transmissions. Optimal management of the top-of-descent in the en-route airspace.

Safety: More consistent flight paths and stabilized approach paths. Reduction in the incidence of controlled flight into terrain (CFIT). Separation with the surrounding traffic (especially free-routing). Reduction in the number of conflicts.

Predictability: More consistent flight paths and stabilized approach paths. Less need for vectors.

Cost: It is important to consider that CDO benefits are heavily dependent on each specific ATM environment. Nevertheless, if implemented within the ICAO CDO manual framework, it is envisaged that the benefit/cost ratio (BCR) will be positive. After CDO implementation in Los Angeles TMA (KLAX) there was a 50% reduction in radio transmissions and fuel savings averaging 125 pounds per flight (13.7 million pounds/year; 41 million pounds of CO2 emission).

The advantage of PBN to the ANSP is that PBN avoids the need to purchase and deploy

navigation aids for each new route or instrument procedure.

B0-TBO Improved Safety and Efficiency through the Initial Application of Data Link En-route

Implements an initial set of data link applications for surveillance and communications in air traffic control (ATC), supporting flexible routing, reduced separation and improved safety.

Applicability

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.

Benefits

Capacity: Element 1: A better localization of traffic and reduced separations allow increasing the offered capacity.

Element 2: Reduced communication workload and better organization of controller tasks allowing increased sector capacity.

Efficiency: Element 1: Routes/tracks and flights can be separated by reduced minima, allowing flexible routings and vertical profiles closer to the user-preferred ones.

Safety: Element 1: Increased situational awareness; ADS-C based safety nets like cleared level adherence monitoring, route adherence monitoring, danger area infringement warning; and better support to search and rescue.

Element 2: Increased situational awareness; reduced occurrences of misunder-standings; solution to stuck microphone situations.

Flexibility: Element 1: ADS-C permits easier route change.

Cost: Element 1: The business case has proven to be positive due to the benefits that flights can obtain in terms of better flight efficiency (better routes and vertical profiles; better and tactical resolution of conflicts).

To be noted, the need to synchronize ground and airborne deployments to ensure that services are provided by the ground when aircraft are equipped, and that a minimum proportion of flights in the airspace under consideration are suitably equipped.

Element 2: The European business case has proved to be positive due to:

a) the benefits that flights obtain in terms of better flight efficiency (better routes and vertical profiles; better and tactical resolution of conflicts); and

b) reduced controller workload and increased capacity.

A detailed business case has been produced in support of the EU regulation which was solidly positive. To be noted, there is a need to synchronize ground and airborne deployments to ensure that services are provided by the ground when aircraft are equipped, and that a minimum proportion of flights in the airspace under consideration are suitably equipped.

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

Implements continuous climb operations (CCO) 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.

Applicability

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/State/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.

c) Most complex – regional/State/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.

Benefits

Efficiency: Cost savings through reduced fuel burn and efficient aircraft operating profiles. Reduction in the number of required radio transmissions.

Environment: Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted. Environmental benefits through reduced emissions.

Safety: More consistent flight paths. Reduction in the number of required radio transmissions. Lower pilot and air traffic control workload.

Cost: It is important to consider that CCO benefits are heavily dependent on the specific ATM environment. Nevertheless, if implemented within the ICAO CCO manual framework, it is envisaged that the benefit/cost ratio (BCR) will be positive.

APPENDIX E:

ACRONYMS

ACRONYMS

A

ATFCM – Air traffic flow and capacity management

AAR – Airport arrival rate

ABDAA – Airborne detect and avoid algorithms

ACAS – Airborne collision avoidance system ACC – Area control centre

A-CDM – Airport collaborative decision-making

ACM – ATC communications management

ADEXP – ATS data exchange presentation

ADS-B – Automatic dependent surveillance—broadcast

ADS-C – Automatic dependent surveillance—contract

AFIS – Aerodrome flight information service

AFISO Aerodrome flight information service officer

AFTN – Aeronautical fixed telecommunication network

AHMS – Air traffic message handling System

AICM – Aeronautical information conceptual model

AIDC – ATS inter-facility data communications

AIP – Aeronautical information publication

AIRB – Enhanced traffic situational awareness during flight operations

AIRM – ATM information reference model

AIS – Aeronautical information services

AIXM – Aeronautical information exchange model

AMA – Airport movement area

AMAN/DMAN – Arrival/departure management

AMC – ATC microphone check

AMS(R)S – Aeronautical mobile satellite (route) service

ANM – ATFM notification message

ANS – Air navigation services

ANSP – Air navigation services provider

AO – Aerodrome operations/Aircraft operators

AOC – Aeronautical operational control

AOM – Airspace organization management

APANPIRG – Asia/Pacific air navigation planning and implementation regional group

ARNS – Aeronautical radio navigation Service

ARNSS – Aeronautical radio navigation Satellite Service

ARTCCs – Air route traffic control centers

AS – Aircraft surveillance

ASAS – Airborne separation assistance systems

ASDEX – Airport surface detection equipment

ASEP – Airborne separation

ASEP-ITF – Airborne separation in trail follow

ASEP-ITM – Airborne separation in trail merge

ASEP-ITP – Airborne separation in trail procedure

ASM – Airspace management

A-SMGCS – Advanced surface movement guidance and control systems

ASP – Aeronautical surveillance plan

ASPA – Airborne spacing

ASPIRE – Asia and South Pacific initiative to reduce emissions

ATC – Air traffic control

ATCO – Air traffic controller

ATCSCC – Air traffic control system command center

ATFCM – Air traffic flow and capacity management

ATFM – Air traffic flow management

ATMC – Air traffic management control

ATMRPP – Air traffic management requirements and performance panel

ATN – Aeronautical Telecommunication Network

ATOP – Advanced technologies and oceanic procedures

ATSA – Air traffic situational awareness

ATSMHS – Air traffic services message handling services

ATSU – ATS unit

AU – Airspace user

AUO – Airspace user operations

B

Baro-VNAV – Barometric vertical navigation

BCR – Benefit/cost ratio

B-RNAV – Basic area navigation

C

CSPO – Closely spaced parallel operations

CPDLC – Controller-pilot data link communications

CDO – Continuous descent operations

CBA – Cost-benefit analysis

CSPR – Closely spaced parallel runways

CM – Conflict management

CDG – Paris - Charles de Gaulle airport

CDM – Collaborative decision-making

CFMU – Central flow management unit

CDQM – Collaborative departure queue management

CWP – Controller working positions

CAD – Computer aided design

CTA – Control time of arrival

CARATS – Collaborative action for renovation of air traffic systems

CFIT – Controlled flight into terrain

CDTI – Cockpit display of traffic information

CCO – Continuous climb operations

AFI – Caribbean and South American region

COSESNA – Central American civil aviation agency.

D

DAA – Detect and avoid

DCB – Demand capacity balancing

DCL – Departure clearance

DFM Departure flow management

DFS – Deutsche Flugsicherung GmbH

DLIC – Data link communications initiation capability

DMAN – Departure management

DMEAN – Dynamic management of European airspace network

D-OTIS – Data link operational terminal information service

DPI – Departure planning information

D-TAXI – Data link TAXI

E

EAD – European AIS database

e-AIP – Electronic AIP

EGNOS – European GNSS navigation overlay service

ETMS – Enhance air traffic management system

EVS – Enhanced vision systems

F

FABEC Functional Airspace Block Europe Central

FAF/FAP – Final approach fix/final approach point

FANS – Future air navigation systems

FDP – Flight data processing

FDPS – Flight data processing system

FF-ICE – Flight and flow information for the collaborative environment

FIR – Flight information region

FIXM – Flight information exchange model

FMC – Flight management computer

FMS – Flight management system

FMTP – Flight message transfer protocol

FO – Flight object

FPL – Filed flight plan

FPS – Flight planning systems

FPSM – Ground delay program parameters selection model

FRA – Free route airspace

FTS – Fast time simulation

FUA – Flexible use of airspace

FUM – Flight update message

G

GANIS – Global Air Navigation Industry Symposium

GANP – Global air navigation plan

GAT – General air traffic

GBAS – Ground-based augmentation system

GBSAA – Ground based sense and avoid

GEO satellite – Geostationary satellite

GLS – GBAS landing system

GNSS – Global navigation satellite system

GPI – Global plan initiatives

GPS – Global positioning system

GRSS – Global runway safety symposium

GUFI – Globally unique flight identifier

H

HAT – Height above threshold

HMI – Human-machine interface

HUD – Head-up display

I

IDAC – Integrated departure/arrival capability

IDC – Interfacility data communications

IDRP – Integrated departure route planner

IFR – Instrument flight rules

IFSET – ICAO Fuel Savings Estimation Tool

ILS – Instrument landing system

IM – Interval Management

IOP – Implementation and Interoperability

IP – Internetworking protocol

IRR – Internal rate of return

ISRM – Information service reference model

ITP – In-trail-procedure

K

KPA – Key performance areas

L

LARA – Local and sub-regional airspace management support system

LIDAR – Aerial laser scans

LNAV – Lateral navigation

LoA – Letter of agreement

LoC – Letter of coordination

LPV – Lateral precision with vertical guidance OR localizer performance with vertical guidance

LVP – Low visibility procedures

M

MASPS – Minimum aviation system performance standards

MILO – Mixed integer linear optimization

MIT – Miles-in-trail

MLS – Microwave landing system

MLTF – Multilateration task force

MTOW – Maximum take-off weight

N

NADP – Noise abatement departure procedure

NAS – National airspace system

NAT – North Atlantic

NDB – Non-directional radio beacon

NextGen – Next generation air transportation system

NMAC – Near mid-air collision

NOP – Network operations procedures (plan)

NOTAM – Notice to airmen

NPV – Net present value

O

OLDI – On-line data interchange

OPD – Optimized profile descent

OSED – Operational service & environment definition

OTW – Out the window

P

P(NMAC) – Probability of a near mid-air collision

PACOTS – Pacific organized track system

PANS-OPS – Procedures for air navigation services - aircraft operations

PBN - Performance - based navigation

PENS Pan-European Network Service

PETAL – Preliminary EUROCONTROL test of air/ground data link

PIA – Performance improvement area

PRNAV – Precision area navigation

R

RA – Resolution advisory

RAIM – Receiver autonomous integrity monitoring

RAPT – Route availability planning tool

RNAV Area navigation

RNP – Required navigation performance
RPAS – Remotely-piloted aircraft system

RTC – Remote tower centre

S

SARPs – Standards and recommended practices

SASP – Separation and airspace safety panel

SATCOM – Satellite communication

SBAS – Satellite-based augmentation system

SDM – Service delivery management

SESAR – Single European sky ATM research

SEVEN – System-wide enhancements for versatile electronic negotiation

SFO – San Francisco international airport

SIDS – Standard instrument departures

SMAN – Surface management

SMS – Safety management systems

SPRs – Special programme resources

SRMD – Safety risk management document

SSEP – Self-separation

SSR – Secondary surveillance radar

STA – Scheduled time of arrival

STARS – Standard terminal arrivals

STBO – Surface trajectory based operations

SURF – Enhanced traffic situational awareness on the airport surface

SVS – Synthetic visualization systems

SWIM – System-wide information management

T

TBFM – Time-based flow management

TBO – Trajectory-based operations

TCAS – Traffic alert and collision avoidance system

TFM – Traffic flow management

TIS-B – Traffic information service-broadcast

TMA – Trajectory management advisor

TMIs – Traffic management initiatives

TMU - Traffic management unit

TOD – Top of Descent

TRACON – Terminal radar approach control

TS – Traffic synchronization

TSA – Temporary segregated airspace

TSO – Technical standard order

TWR – Aerodrome control tower

U

UA – Unmanned aircraft

UAS – Unmanned aircraft system

UAV – Unmanned aerial vehicle

UDPP – User driven prioritization process

V

VFR – Visual flight rules

VLOS – Visual line of sight

VNAV – Vertical navigation

VOR – Very high frequency (VHF) omnidirectional radio range

VSA – Enhanced visual separation on approach

W

WAAS – Wide area augmentation system

WAF – Weather avoidance field

WGS-84 – World geodetic system - 1984

WIDAO – Wake independent departure and arrival operation

WTMA – Wake turbulence mitigation for arrivals

WTMD – Wake turbulence mitigation for departures

WXXM – Weather exchange model

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