ICAO UNITING AVIATION

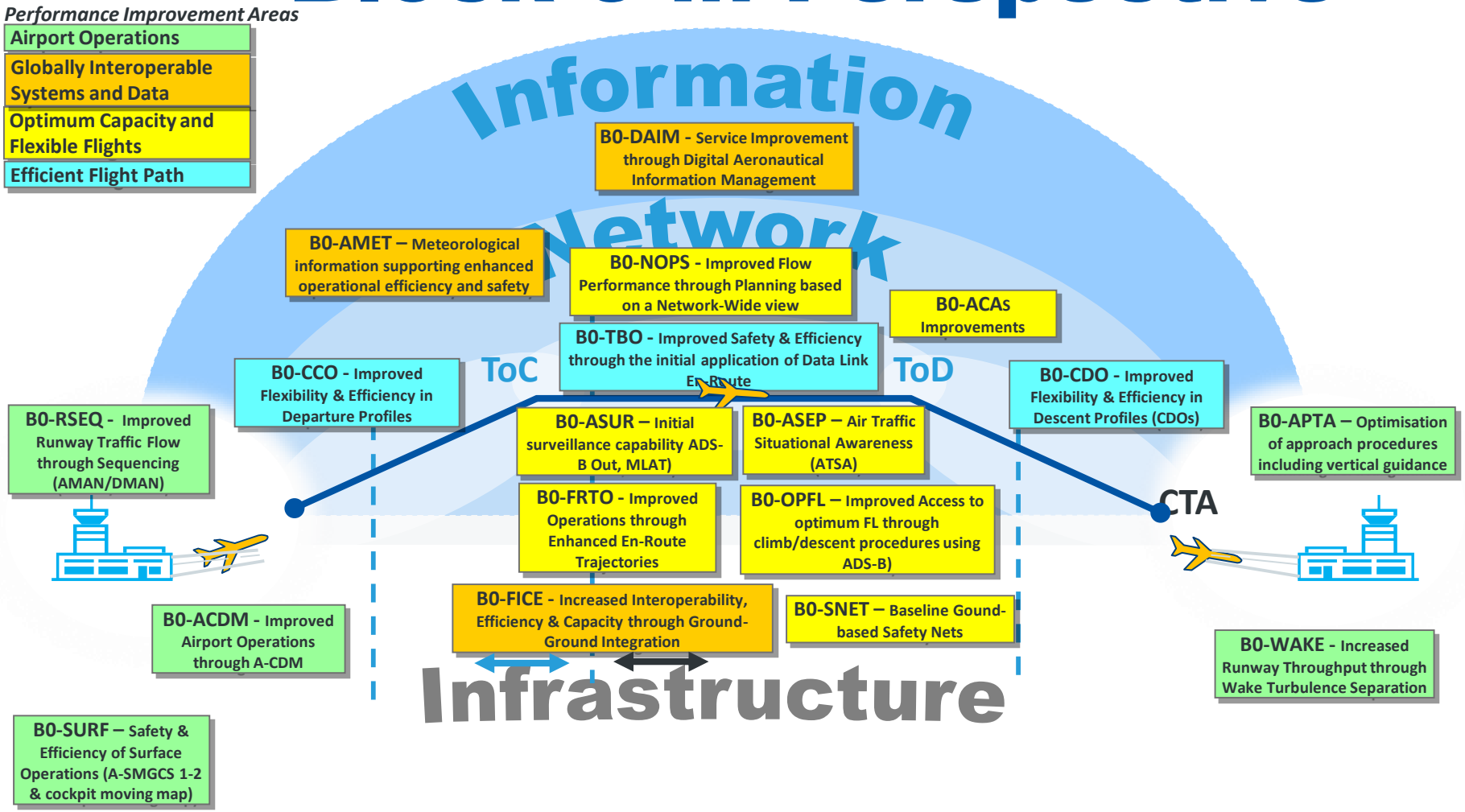
# APIRG/20

**Air Navigation System Implementation Action Plan (aligned with ASBU Methodology)**

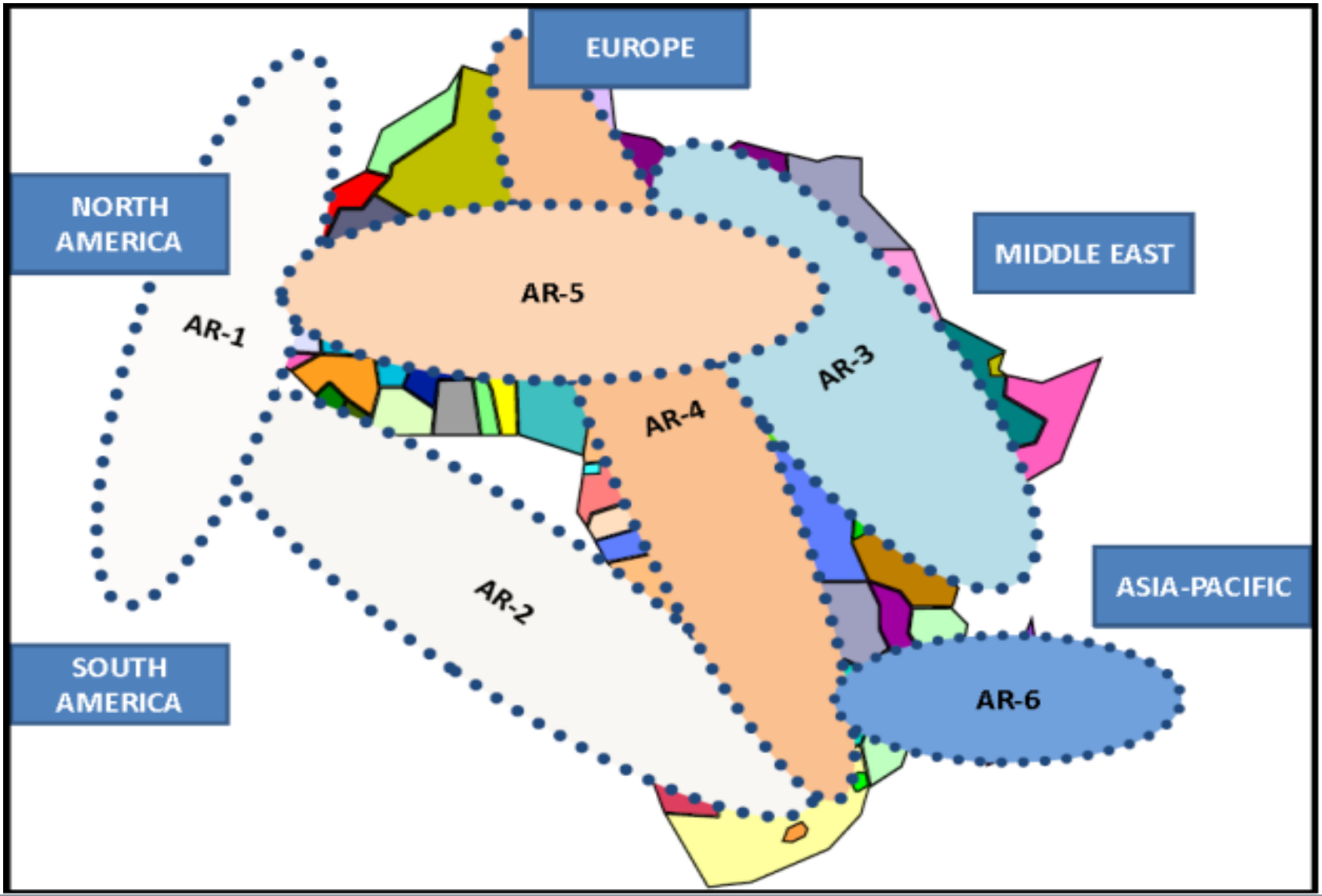
Yamoussoukro, Cote d'Ivoire

30 November – 2 December 2015

# Block 0 in Perspective



# HOMOGENEOUS AREAS AND MAJOR TRAFFIC FLOWS IN THE AFI REGION



# ATM Homogeneous Areas in AFI Region

| Areas of routing (AR) | Traffic Flows | Areas involved | Type of area covered | Remarks |
|---|---|---|---|---|
| Africa-Indian Ocean (AFI) Region | | | | |
| AR1 | Europe — South America (EUR/SAM) (oceanic) | Atlantico [1], Canarias, Casablanca, Dakar Oceanic, Recife, Sal Oceanic | Oceanic en route low density in southern part and oceanic high density in northern part | Major traffic flow EUR/SAM |
| AR2 | Atlantic Ocean interface between the AFI, NAT and SAM Regions | Accra, Dakar, Johannesburg, Luanda, Sal | Oceanic en route low density | Homogeneous ATM area AFI/NAT/SAM |
| AR3 | Europe — Eastern Africa routes including the area of the Indian Ocean | Addis Ababa, Antananarivo, Asmara, Cairo, Dar es-Salaam, Entebbe, Khartoum, Mauritius, Mogadishu, Nairobi, Seychelles, Tripoli | Continental en route/ oceanic low density | Major traffic flow AFI/EUR |
| AR4 | Europe to Southern Africa | Algiers, Beira, Brazzaville, Cape Town, Gaborone, Harare, Johannesburg, Kano, Kinshasa, Lilongwe, Luanda, Lusaka, N'Djamena, Niamey, Tripoli, Tunis, Windhoek | Continental en route low density | Major traffic flow AFI/EUR |
| AR5 | Continental Western Africa including coastal areas | Accra, Addis Ababa, Brazzaville, Dakar, Dar-es-Salaam, Entebbe, Kano, Khartoum, Kinshasa, Nairobi, Ndjamena, Niamey, Roberts | Continental/oceanic low density | Homogeneous area AFI (this is a growing traffic, developing into major traffic flow) |
| AR6 | Trans-Indian | Antananarivo, Bombay [1], Johannesburg Male [1], Mauritius, Melbourne [1], Seychelles | Oceanic high density | Homogeneous ATM area AFI/ASIA |

# Categories of 18 adopted Block 0 Modules are as follows:

- **Essential (E):** These are the ASBU modules that provide substantial contribution towards global interoperability, safety or regularity. The nine (9) Modules for all States of AFI region are FICE, DATM; ACAS, FRTO, APTA, CDO, CCO, AMET and ACDM.
- **Desirable (D):** These are the ASBU modules that, because of their strong business and/or safety case, are recommended for implementation almost everywhere. The four (4) Modules for all States of AFI region are NOPS, ASUR, SNET, and TBO.
- **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 three (3) Modules are OPFL, ASEP and WAKE *(elements and targets to be developed by APIRG).*
- **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.

# Prioritization of Block 0 Modules

## Criteria for priority allocation

- **Priority 1** = Immediate Implementation
- **Priority 2** = Recommended Implementation

# Categorization and prioritization of Block 0 Modules for the AFI Region

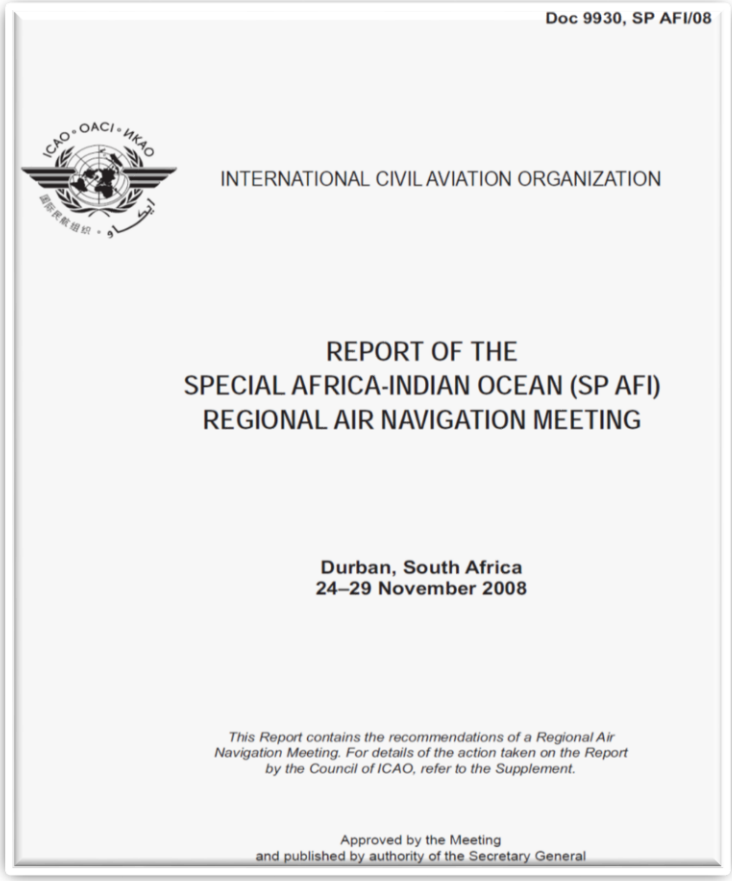
| PIA | Module Description | Module | Category | Priority |
|---|---|---|---|---|
| PIA 1 | Improve Traffic flow through Runway Sequencing (AMAN/DMAN) | B0-RSEQ | O | 2 |
| | Optimization of Approach Procedures including vertical guidance | B0-APTA | E | 1 |
| | Increased Runway Throughput through optimized Wake Turbulence Separation | B0-WAKE | S | 2 |
| | Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) | B0-SURF | O | 2 |
| | Improved Airport Operations through Airport-CDM | B0-ACDM | E | 1 |
| PIA 2 | Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration | B0-FICE | E | 1 |
| | Service Improvement through Digital Aeronautical Information Management | B0-DAIM | E | 1 |
| | Meteorological information supporting enhanced operational efficiency and safety | B0-AMET | E | 1 |

# Categorization and prioritization of Block 0 Modules for the AFI Region

| PIA | Module Description | Module | Category | Priority |
|---|---|---|---|---|
| PIA 3 | Improved Operations through Enhanced En-Route Trajectories | B0-FRTO | E | 1 |
| | Improved Flow Performance through Planning based on a Network-Wide view | B0-NOPS | D | 2 |
| | Initial capability for ground surveillance | B0-ASUR | D | 2 |
| | Air Traffic Situational Awareness(ATSA) | B0- ASEP | S | 2 |
| | Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B | B0- OPFL | S | 2 |
| | ACAS Improvements | B0-ACAS | E | 1 |
| | Increased Effectiveness of Ground-Based Safety Nets | B0-SNET | D | 2 |
| PIA 4 | Improved Flexibility and Efficiency in Descent Profiles (CDO) | B0-CDO | E | 1 |
| | Improved Safety and Efficiency through the initial application of Data Link En-Route | B0-TBO | D | 2 |
| | Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO) | B0-CCO | E | 1 |

# AFI Regional Performance Objectives

- ASBU Workshop.AFI ATM PFFs.docx
- ASBU Workshop.AFI AIM PFFs.docx
- ASBU Workshop.AFI SAR PFFs.docx
- ASBU Workshop.AFI MET PFFs.docx
- ASBU Workshop.AFI AOP PFFs.docx
- ASBU Workshop.AFI CNS PFFs.docx



Doc 9930, SP AFI/08

INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE
SPECIAL AFRICA-INDIAN OCEAN (SP AFI)
REGIONAL AIR NAVIGATION MEETING

**Durban, South Africa**
**24–29 November 2008**

*This Report contains the recommendations of a Regional Air Navigation Meeting. For details of the action taken on the Report by the Council of ICAO, refer to the Supplement.*

Approved by the Meeting
and published by authority of the Secretary General

# AFI Regional Performance Objectives

- **RVSM Implementation (PFF ATM/01)**
- **PBN Implementation (en-route, terminal and approach) (PFFs ATM/02, ATM/03 and ATM/04)**
- **Enhancement of CNS Infrastructure (PFF CNS/01)**
- **Search and Rescue (PFF SAR/01)**
- **Transition from AIS to AIM (PFFs AIM/01 and AIM/02)**
- **Improvement of the provision of Meteorological Services (PFFs MET/01, MET/02)**
- **Improvement of Aerodrome Operations (PFF AGA/01)**

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

| ASBUB0- CDO: Implementation Progress | |
|---|---|
| **Elements** | **Implementation Status (Ground and Air)** |
| 1. CDO | |
| 2. PBN STARs | |

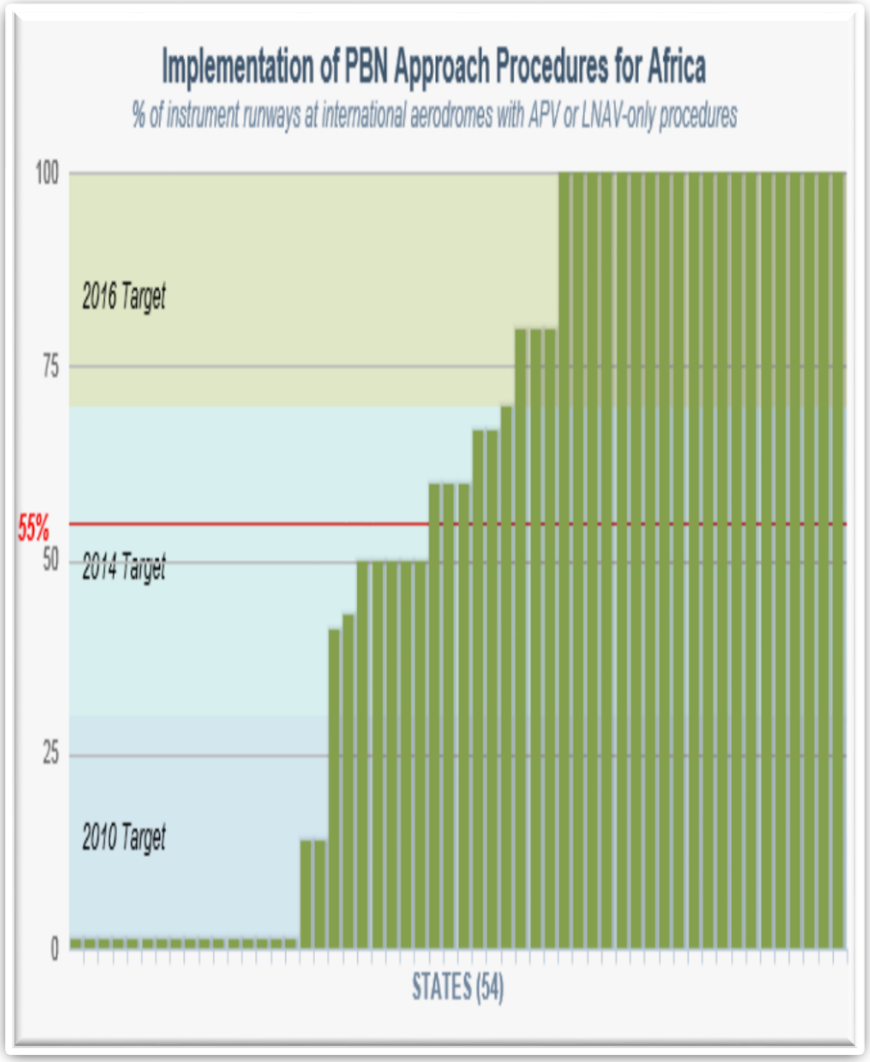
| ASBU B0-CDO: Implementation Roadblocks/Issues | | | | |
|---|---|---|---|---|
| **Elements** | **Implementation Area** | | | |
| | Ground Implementation | Air Implementation | Procedures Availability | Operational Approvals |
| 1. CDO | | | | |
| 2. PBN STARs | | | | |

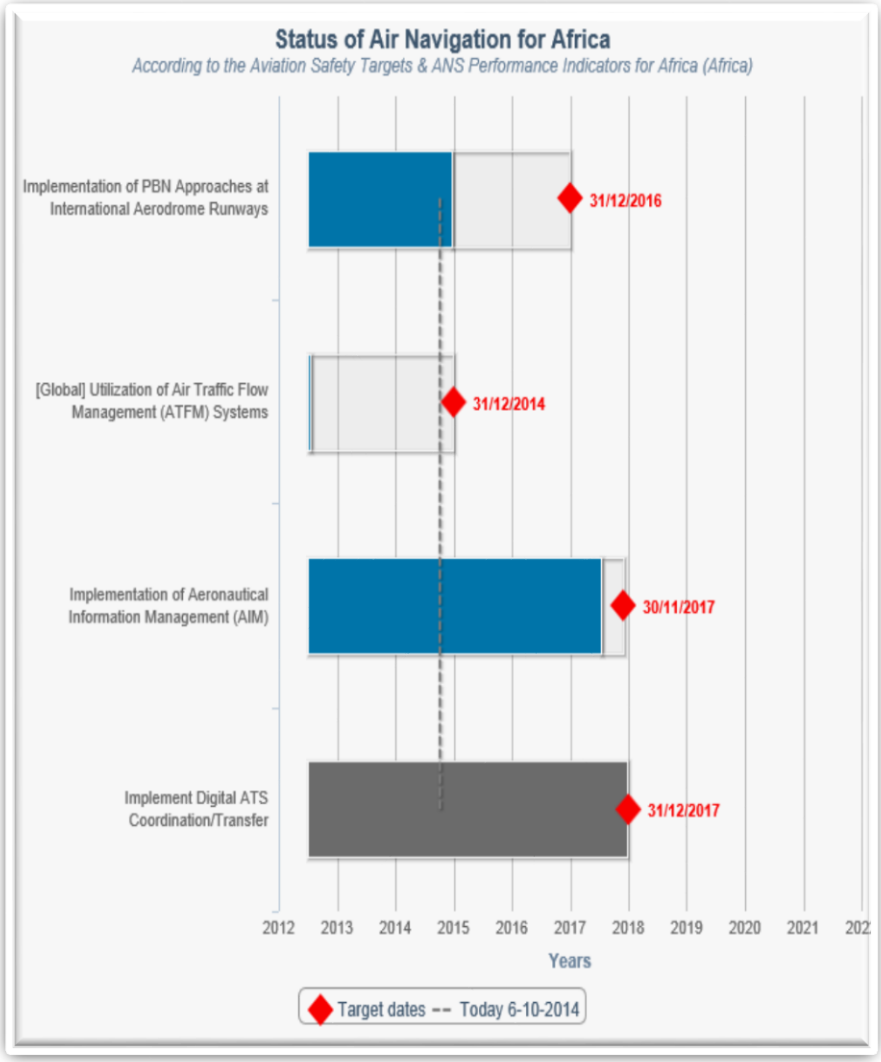
| ASBU B0-CDO: Performance Monitoring and Measurement (Benefits) | |
|---|---|
| **Key Performance Areas** | **Performance Metrics** |
| Access & Equity | Not applicable |
| Capacity | Not applicable |
| Efficiency | Kilograms of fuel saved per flight |
| Environment | Kilograms of $CO_2$ emissions reduced per flight (= KGs fuel saved per flight x 3.157) |
| Safety | Number of controlled flight into terrain (CFIT) incidents/accidents |

| ASBU B0-CDO: Performance Monitoring and Measurement (Implementation) | |
|---|---|
| **Elements** | **Implementation Indicators/Metrics** |
| 1. CDO | Percentage of international aerodromes/TMAs with CDO implemented |
| 2. PBN STARs | Percentage of international aerodromes/TMAs with PBN STARs implemented |

# Air Navigation Dashboard (Africa)

(PBN, ATFM, AIM, Digital ATS Coordination/Transfer)



# Regional Targets - Communications

**ASBU B0-FICE: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. Complete AMHS implementation at States still not counting with this system | December 2015 – Services provider |
| 2. AMHS interconnection | December 2015 – Services provider |
| 3. Implement AIDC/OLDI at some States automated centres | June 2014 – Services provider |
| 4. Implement operational AIDC/OLDI between adjacent ACCs | June 2015 – Services provider |
| 5. Implement the AFI Integrated Telecommunication Network | June2015– Services provider |

# Regional Targets – Communications

**ASBU B0-ASUR: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. Implementation of ADS-B | June 2018 – Users and service provider |
| 2. Implementation of Multilateration | June 2018 – Users and service provider |
| 3. Automation system (Presentation) | June 2017 – Users and service provider |

**ASBU B0-TBO: Planning Targets and Implementation Progress**

| Elements | 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 |

# Regional Targets - Surveillance

ASBU B0-SNET: Planning Targets and Implementation Progress

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. Short Term Conflict Alert (STCA) | June 2014 / Service provider 2013-2018 |
| 2. Area Proximity Warning (APW) | June 2014 / Service provider 2013-2018 |
| 3. Minimum Safe Altitude Warning (MSAW) | June 2014 |
| 4. Dangerous Area Infringement Warning (DAIW) | 2013-2018 |

# Regional Targets - Navigation

## ASBU B0-APTA: Planning Targets and Implementation Progress

| Elements | Targets and Implementation Progress<br><br>(Ground and Air) |
|---|---|
| 1. APV with Baro-VNAV | December 2016 – Service Providers and users |
| 2. APV with SBAS | December 2017 – As per AFI-GNSS Strategy. |
| 3. APV with GBAS | December 2018 – Initial implementation at some States (service providers) |

# Regional Targets - Surveillance

**ASBU B0-SURF: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. Surveillance system for ground surface movement (PSR, SSR, ADS-B or Multilateration) | December 2017 Service provider |
| 2. Surveillance system on board (SSR transponder, ADS-B capacity) | December 2017 Service provider |
| 3. Surveillance system for vehicle | December 2017 Service provider |
| 4. Visual aids for navigation | December 2015 Service provider |
| 5. Wildlife strike hazard reduction | December 2015 Aerodrome operator / Wildlife Committee |
| 6. Display and processing information | December 2017 Service Provider |

# Regional Targets - Surveillance

ASBU B0-SNET: Planning Targets and Implementation Progress

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. Short Term Conflict Alert (STCA) | June 2014 / Service provider 2013-2018 |
| 2. Area Proximity Warning (APW) | June 2014 / Service provider 2013-2018 |
| 3. Minimum Safe Altitude Warning (MSAW) | June 2014 |
| 4. Dangerous Area Infringement Warning (DAIW) | 2013-2018 |

# Regional Targets – Meteorological Information Management

**ASBU B0-AMET: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. WAFS | In process of implementation |
| 2. IAVW | In process of implementation |
| 3. Tropical cyclone watch | In process of implementation |
| 4. Aerodrome warnings | In process of implementation |
| 5. Wind shear warnings and alerts | 50% by December 2014 |
| 6. SIGMET | 80% by December 2014 |
| 7. QMS/MET | 75% by December 2014 |
| 8. Other OPMET Information (METAR, SPECI, TAF) | In process of improvement |

# Regional Targets – Aeronautical Information Management

**ASBU B0-DATM: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| 1. QMS for AIM | December 2014 |
| 2. e-TOD implementation | December 2016 |
| 3. WGS-84 implementation | Implemented |
| 4. AIXM implementation | December 2016 |
| 5. e-AIP implementation | December 2014 |
| 6. Digital NOTAM | December 2017 |

# Regional Targets – Avionics

**ASBU B0-ACAS: Planning Targets and Implementation Progress**

| Elements | Targets and Implementation Progress (Ground and Air) |
|---|---|
| ACAS II (TCAS Version 7.1) | 2013-2018 |

| Targets | Linkage with ASBU | ANS Performance Indicators/Metrics<br>AFI Plan SC/14 _ ANS Performan | Qualitative performance benefits associated with Safety key performance area | Remarks |
|---|---|---|---|---|
| 1-Implement Performance Based Navigation (PBN) | ASBU Module B0-APTA | Number of PBN routes<br><br>Number of International Aerodromes/TMAs with PBN SIDs implemented<br><br>Number of International Aerodromes/TMAs with PBN STARs implemented<br><br>Number of International Aerodromes with Approach Procedures with vertical guidance (APV)<br><br>Number of International Aerodromes with Approach Procedures with lateral guidance (LNAV) | Increased safety through stabilized approach paths Reduced runway safety related accidents/incidents and CFIT<br><br>Increased safety through optimization of airspace use in the vertical and horizontal planes. | Reflected on the AN Dashboard Safety key performance area (KPA) related ASBU Module identified by APIRG/19 |

| Targets | Linkage with ASBU | ANS Performance Indicators/Metrics | Qualitative performance benefits associated with Safety key performance area | Remarks |
|---|---|---|---|---|
| 2-Implement Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO) | ASBU Modules B0-CDO and CCO | Number of International Aerodromes/TMA with CDO implemented<br>Number of International Aerodromes/TMAs with CCO implemented<br>Annual environmental benefits attained (reduced fuel consumption/GHG emissions) | More consistent flight paths and stabilized approach paths. | Safety key performance area (KPA) related ASBU Module identified by APIRG/19 |
| 3-Reduce Aircraft Proximity incidents (AIRPROX) due to ANS deficiencies by 50% | | Number of Aircraft Proximity incidents (AIRPROX) due to ANS<br><br>Number of ACAS Resolution Advisory (RA) events due to ATS deficiencies<br>Number of States with training programmes for ANS personnel implemented on yearly basis | Increased safety through application of standard separation minima between aircraft and improved recurrent ATC training. | Safety key performance area (KPA) related ASBU Module identified by APIRG/19 |

## ANS Performance Indicators/Metrics

| Objectives | Linkage with ASBU | AFI ANS SC/24 ANS Performance In | Qualitative performance benefits associated with Safety key performance area | Remarks |
|---|---|---|---|---|
| 4-Reduce risk of accidents related to ATM safety | | Number of accidents related to ATM safety | ACAS, SLOP, TIBA and IATA IFBP to increase safety in the case of breakdown of separation. | |
| 5-Implement Digital ATS Coordination/ Transfer | ASBU Module B0-FICE | Number of FIRs within which all applicable ACCs have implemented at least one interface to use ATS Inter-facility Data Communications (AIDC) with neighboring ACCs<br>Number of reported incidents related to lack of coordination between ACCs | Improved coordination between ATS units. | Reflected on the AN Dashboard |

| Targets | Linkage with ASBU | ANS Performance Indicators/Metrics AFI Plan SC/14 - ANS Pe | Qualitative performance benefits associated with Safety key performance area | Remarks |
|---|---|---|---|---|
| 6-Establish effective and operational SAR Organization | | Number of States with SAR Organization<br>Number of States with SAR Plans<br>Number of States with SAR Agreements | Better capacity to provide SAR services over own territory and regionally<br>Improved response for near-border events | |
| 7-Implement En-Route Data Link Applications | ASBU Module B0-TBO | Number of FIRs having implemented Data Link (ADS-C/CPDLC, ADS-B) for en-route operations | ADS-C and ADS-B based safety nets support cleared level adherence monitoring, route adherence monitoring, danger area infringement warning and improved search and rescue.<br>CPDLC to reduce occurrences of misunderstandings between air traffic controllers and pilots<br>Solution to stuck microphone situations | Safety key performance area (KPA) related to ASBU Module identified by APIRG/19 |

| Targets | Linkage with ASBU | ANS Performance Indicators/Metrics | Qualitative performance benefits associated with Safety key performance area | Remarks |
|---|---|---|---|---|
| 8-Implement Aeronautical Information Management (AIM) Quality Management System (QMS) | ASBU Module B0-DATM | Number of States with AIM QMS implemented | Reduction in the number of data inconsistencies and inaccuracies | Reflected on the AN Dashboard Safety key performance area (KPA) related to ASBU Module identified by APIRG/19 |
| 9-Implement Aeronautical Meteorology (MET) Quality Management System (QMS) | ASBU Module B0-AMET | Number of States with MET QMS implemented<br><br>Number of incidents/accidents with MET conditions | Reduced MET related incidents/accidents in flight and at international aerodromes | Safety key performance area (KPA) related to ASBU Module identified by APIRG/19 |

# Proposed ANS Targets

**OPERATIONAL TARGETS BY 2020**

- **Reduce the number of loss of separation due to ANS deficiencies by 50%**
- **Reduce the number of accidents related to ATM safety by 50%**
- Reduce The number of uncoordinated flights by 50%

**INSTITUTIONAL TARGETS 100% BY 2018**

***On national level***

- Implement ASBUS
  - Implement Block-0 modules
  - **Establish and update national PBN plans by 2016**
  - **Effectively implement PBN**
  - **Implement CDO/CCO**
- Reduce CO2 Emissions
  - Establish CO2 emissions reduction action plans
  - Implement mitigation measures
- Assess and manage risks
  - **Establish effective and operational SAR organization**
  - Establish aerodrome emergency plans
  - Establish wildlife management systems
  - Establish ANS human resource management system

***On regional level***

- Integrate ANS infrastructures
  - **Implement digital ATS coordination**
  - **Implement en-route data link applications**
  - **Implement ANS QMS**
- Increase harmonization between ANS operations and regulations
  - Implement seamless ANS along Air Traffic Flows (AFI single sky)

# Action by APIRG/20

a) To adopt proposed ANS High Level Targets to be provided to the AFI Plan Steering Committee for further processing with AFCAC and AU

b) To request the Secretariat to provide the status of implementation of ASBU Block 0 Modules in APIRG/20 Report

c) To request the APIRG APCC to oversee on-going work on the establishment of an AFI Performance Monitoring and Reporting mechanism.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Middle East (MID) Office Cairo
Eastern and Southern African (ESAF) Office Nairobi
Asia and Pacific (APAC) Office Bangkok

# Thank You