The AFI ANS Summit | FRAMEWORK

PART 1- TERMS OF REFERENCE FOR THE ANS SUMMIT PREPARATION

1. Introduction

1.1 The Africa-Indian Ocean Planning and Implementation Regional Group (APIRG) called, through conclusions 22/35 and 26/24, for the improvement in seamless air traffic flow in the AFI region and the conduct of the AFI ANS summit. The objective of the summit is to endorse the AFI Master ANS Strategy for the region, which if implemented, will ensure a single, seamless African sky.

1.2 The successful conduct of the ANS summit will strongly rely on the effective preparedness of the materials required for its delivery. To achieve the objective of the summit, a framework has been established to ensure effective delivery through an organizational structure, SMART objectives, defined strategies and well-identified deliverables set in the TORs of the Steering Committee of the ANS Summit.

2. Structure

2.1 The Organizational structure for the preparation of the ANS Summit includes the PRCC, the Secretariat and multidisciplinary project Teams in all ANS related domains (AOP, AIS, ATM, CNS, MET, PANS-OPS, SAR).

2.2 Members of Project teams are provided by existing projects under the AASPG AAO and IIM Sub-groups.

2.3 New members can be nominated by the States, Organizations or Industry as deemed necessary in compliance with the provisions of the AASPG Procedural Handbook.

3. Objective

3.1.1 Identify, develop and deliver well-structured bankable projects documents;

3.1.2 Develop and deliver project generic documents to be customized by the States as needed; and

3.1.3 Develop and deliver the ANS Master document named “THE AFI ANS PROJECTS CATALOGUE” including all expected deliverables.

4. Scope

4.1 The preparatory activities of the ANS Summit will be conducted within the framework of related APIRG conclusions and decisions as well as the AASPG Procedural Handbook.

5. Deliverables

5.1 Fundable projects identified and endorsed

5.2 Project specifications in each technical area developed and validated;

5.3 Projects templates for each ANS related area with clear scope, objectives, timelines, and funding strategy for synergistical implementation developed and validated.

5.4 Draft projects catalogue including eligible, planned and ongoing projects developed and validated.

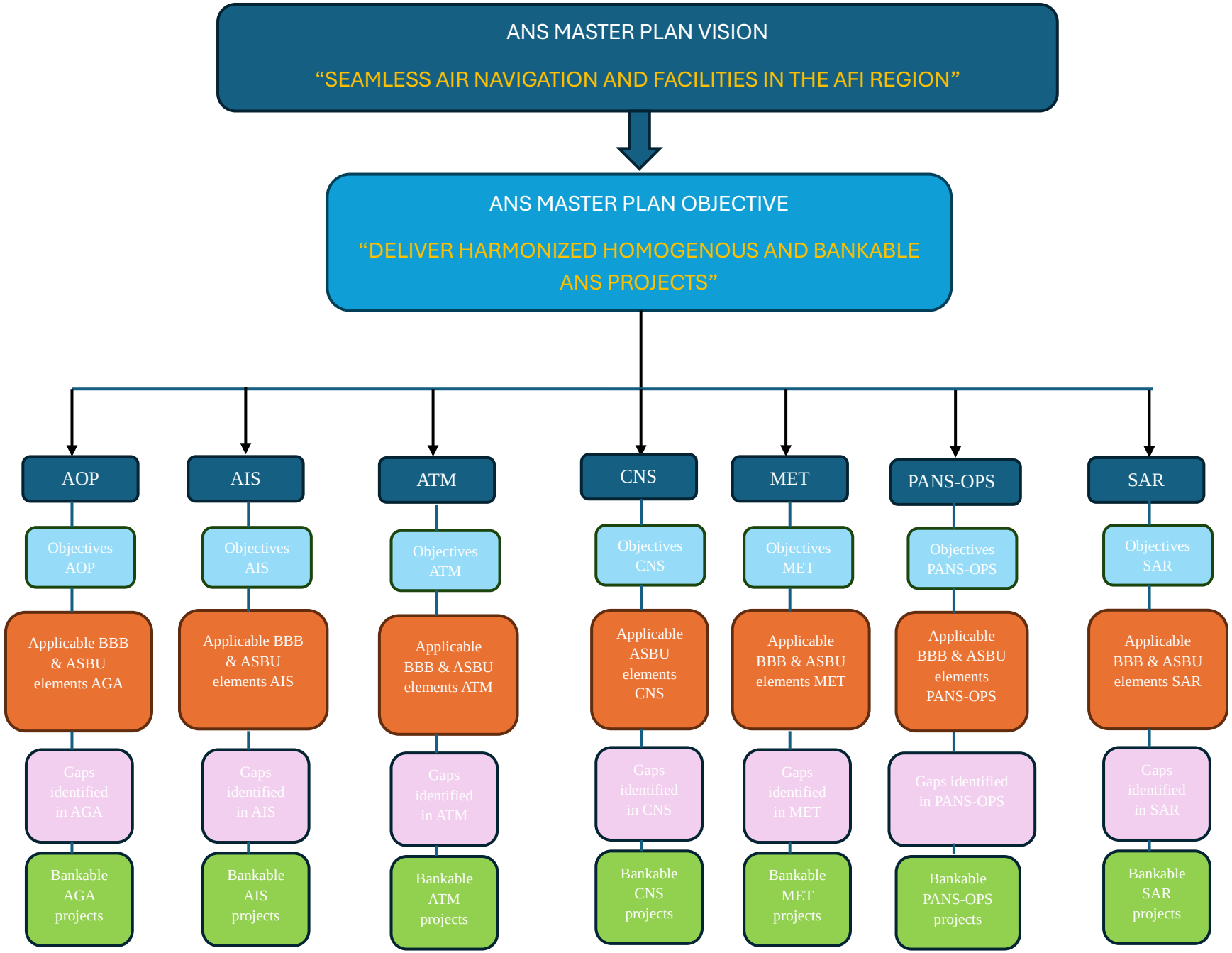
5.5 Implementation plan(s) of the ANS Master Strategy in the short term, medium term, and long term as applicable, with clear objectives and timelines for each State, to ensure harmonized ANS for Africa developed and validated.

5.6 AFI ANS Master Strategy developed and endorsed by African States.

6. Working arrangements

6.1 The PRCC, the Secretariat and the Project Teams will carry out their work as per the procedures defined by the AASPG Handbook.

PART 2- TECHNICAL SPECIFICATIONS OF THE ANS MASTER PLAN



2.1 Technical specification in AOP

2.1.1 Objectives

Streamline and enhance operational efficiency of aerodrome operational planning and infrastructure.

2.1.2 Rationale

Aerodrome operations encompass various critical activities such as aircraft handling, passenger services, security, and maintenance. Developing a strategic plan for the Aerodrome Operational Planning is essential for ensuring efficient, compliant, and sustainable operations. It provides a structured approach to managing resources and achieving long-term growth. By aligning the aerodrome's activities with its strategic goals, the plan ensures a cohesive and proactive approach to addressing current challenges and future opportunities, thereby contributing significantly to the vision of a seamless and integrated African and Indian Ocean airspace and airports.

2.1.3 Target areas in AOP

XXXXX

2.1.4 ASBU Applicable elements in AOP

XXXXX

2.1.5 Gaps identified in Aerodrome infrastructure and services

XXXXX

2.1.6 Recommended projects

XXXXX

AOP Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1							
Project 2							
Project 3							
Project 4							

2.2 Technical specification in AIM

2.2.1 Objectives

Evolve into generic Information Management which is the full implementation of System Wide Information Management.

2.2.2 Rationale

Information Management will fully include AIM while also encompassing all other ATM information management functions not already incorporated in AIM. The vision is seamless provision of digital AFI AIM.

2.2.3 Target areas in AIM

XXXXX

2.2.4 ASBU Applicable elements in AIM

XXXXX

2.2.5 Gaps identified in Aeronautical information infrastructure and services

XXXXX

2.2.6 Recommended projects

XXXXX

AIM Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1							
Project 2							
Project 3							
Project 4							

2.3 Technical specification in ATM

2.3.1 Objectives

ATM 1.1 **Optimize and harmonize airspace organization and management**.
ATM 1.2 **Improve and harmonize air traffic services**
ATM 1.3 **Implement coordinated regional air traffic flow management**

2.3.2 Rationale

To address the emerging challenges and threats and to exploit opportunities within the dynamic field of aviation and emerging technological trends to benefit social development and economic progress within Africa. The goal is to have a safe, secure, efficient, inter-operable and sustainable air navigation system. Developments should limit the impact of aviation on climate change utilizing agreed performance-based standards with interoperable and scalable systems.

a) ***Airspace organization:*** All airspace is organized in a flexible and dynamic way. Dynamic, four-dimensional, user-preferred trajectories are accommodated, and the air traffic services (ATS) route structure is mainly performance-based.

b) ***Airspace management:*** A special process should be adopted to balance the needs of different airspace users.

c) ***Traffic synchronization (TS):*** TS will be made on the day of operation and fully integrated with demand-capacity balancing and conflict management. Arriving traffic will be sequenced by very narrow timeslots being part of the dynamic trajectory. Sequencing between flights can be delegated to a flight deck to optimize runway throughput.

d) Airspace user operations: An integrated part of ATM where real-time data is always available. Aircraft capabilities allow user-preferred 4-D trajectories.

e) ***Conflict management (CM)***: CM will have a negotiated trajectory approved well in advance. It should be conflict-free, meaning no further separation provision should be needed (strategic deconfliction). Requirements for separation provision will be primarily handled by the airspace users.

f) ***Service delivery management***: The future role of ATC will move from a managerial role to a more monitoring one, where airspace users will assume an increased ATM role.

g) ***Aerodrome operations***: Airport infrastructure per se is not an ATM component but airport capacity has a direct bearing on ATM capacity, at least when the former is strained.

h) ***Demand-capacity balancing***: ATFM should be considered as a part of a centralized flow management unit. Balancing will be made for the entire AFI airspace. Technical support tools have enabled the airspace to be used equitably by all users.

2.3.3 Target areas in ATM

- *Target Area 1: Safety (Improve or maintain safety)*

- *Target Area 2: Capacity (Improve En-route Airspace and terminal area capacity, reduce delay)*
- *Target Area 3: Efficiency (Reduce Flight time/distance, improve Vertical efficiency, reduce Fuel burn)*
- *Target Area 4: Environment (Maintain or improve environmental sustainability of aviation)*
- *Target Area 5: Access and equity (Improve access and equity)*
- *Target Area 6: Flexibility (Improve flexibility of air navigation system)*

2.3.4 ASBU Applicable elements in ATM

CSEP - Cooperative Separation

- CSEP-B1/3 - Performance Based Longitudinal Separation Minima
- CSEP-B1/4 - Performance Based Lateral Separation Minima

FRTO - Improved operations through enhanced en-route trajectories

- FRTO-B0/1 - Direct routing (DCT)
- FRTO-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)
- FRTO-B0/4 - Basic conflict detection and conformance monitoring
- FRTO-B1/1 - Free Route Airspace (FRA)
- FRTO-B1/2 - Required Navigation Performance (RNP) routes
- FRTO-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data
- FRTO-B1/4 - Dynamic sectorization
- FRTO-B1/5 - Enhanced Conflict Detection Tools and Conformance Monitoring
- FRTO-B2/3 - Large Scale Cross Border Free Route Airspace (FRA)

NOPS - Network Operations

- NOPS-B0/1 - Initial integration of collaborative airspace management with air traffic flow management
- NOPS-B0/2 - Collaborative Network Flight Updates
- NOPS-B0/3 - Network Operation Planning basic features
- NOPS-B0/5 - Dynamic ATFM slot allocation
- NOPS-B1/1 - Short Term ATFM measures

- NOPS-B1/2 - Enhanced Network Operations Planning
- NOPS-B1/5 - Full integration of airspace management with air traffic flow management
- NOPS-B2/3 - Collaborative Network Operation Planning
- NOPS-B2/6 - ATFM adapted for cross-border Free Route Airspace (FRA)

SNET - Ground-based Safety Nets

- SNET-B0/1 - Short Term Conflict Alert (STCA)
- SNET-B0/2 - Minimum Safe Altitude Warning (MSAW)
- SNET-B0/3 - Area Proximity Warning (APW)
- SNET-B0/4 - Approach Path Monitoring (APM)
- SNET-B1/1 - Enhanced STCA with aircraft parameters
- SNET-B1/2 - Enhanced STCA in complex TMAs

TBO - Trajectory-based operations

- TBO-B0/1 - Introduction of time-based management within a flow centric approach.
- TBO-B1/1 - Initial Integration of time-based decision-making processes

2.3.5 Gaps identified in Air traffic management

- Outdated regional air traffic flow network
- Unharmonized airspace organization with discrepancies in airspace classification
- High number of special use airspace near major ATS routes and airports, including high ceiling prohibited areas and danger areas
- Low level of implementation of Flexible Use of Airspace.
- High number of conventional ATS routes in small volumes of airspace with low percentage of utilization.
- Discrepancies in PBN route implementation in continental and remote continental airspace.
- Discrepancies in the types of ATS provided as well as horizontal separations applied in FIRs. Implementation of surveillance service is significant in the region, however a considerable number of ATS units are still providing procedural air traffic control or flight information services despite being surrounded by ATS units providing ATC surveillance service.

- Discrepancies in ATC training and competency
- Non-resilient ATM system due to frequent ATM contingency situations and lack of robust ATM contingency plans
- Inconsistent implementation of alert service
- Low implementation of ATFM for domestic or cross-border operations
- Ineffective oversight of ATM operations

2.3.6 Recommended projects

The following list of projects may be considered to address the gaps identified in ATM and to achieve the objectives set.

ATM Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1	Airspace optimization and modernization						
Project 2	Reduced and harmonised of longitudinal separations in remote and oceanic airspace						
Project 3	FUA implementation						
Project 4	Cross-border ATFM implementation						

Project 5	Cross-border FRA implementation						
Project 6	Air Traffic Services upgrade and harmonization						
Project 7	ATC training harmonization and upgrade						
Project 8	ATM Oversight enhancement						

2.4 Technical specification in CNS

2.4.1 Objectives

CNS1.1 **Improve aeronautical communication through gradual migration performance-based communication and space-based communication**.

CNS 1.2 **Improve navigation through safe migration to Performance-based navigation.**

CNS1.3 **Increase interoperability of surveillance systems.**

2.4.2 Rationale

XXXXX.

2.5 Technical specification in CNS

2.4.3 Objectives

CNS1.1 **Improve aeronautical communication through gradual migration performance-based communication and space-based communication**.

CNS 1.2 **Improve navigation through safe migration to Performance-based navigation.**
CNS1.3 **Increase interoperability of surveillance systems.**

2.4.4 Rational

The AFI ANS summit framework is rooted in the goal of achieving a seamless, harmonized, and interoperable air traffic management system across the Africa-Indian Ocean (AFI) region.

Foundation of Air Navigation: CNS systems are the backbone of safe and efficient air traffic operations. Without robust CNS infrastructure, seamless ATM is impossible.

Modernization & Rationalization: Many AFI States operate legacy systems. Promoting rationalization and upgrading CNS infrastructure to align with ICAO standards and future traffic growth projections will be very crucial.

Integration Across Regions: CNS strategies must be harmonized across Regional Economic Communities (RECs) to ensure consistent service quality and coverage, eliminate duplication and fragmentation in CNS systems to improve cost-efficiency and service delivery, and strengthens partnership among States, ANSPs, and regional economic communities.

2.4.5 Target areas in CNS

The target areas in CNS (Communication, Navigation, and Surveillance) for the AFI (Africa and Indian Ocean) region are defined in ICAO's AFI CNS/ATM Implementation Plan and the AFI eANP (electronic Air Navigation Plan). These targets aim to modernize infrastructure, enhance interoperability, and improve safety and efficiency across the region.

The key CNS Target Areas for the AFI Region are as follows:

Aeronautical Fixed Telecommunications Network (AFTN)

- Complete implementation and rationalization of AFTN circuits.
- Transition to ATN (Aeronautical Telecommunication Network) for digital messaging.

ATS Direct Speech Circuits (ATS/DS)

- Full implementation of voice communication circuits between adjacent ATS units.
- Upgrade to VoIP-based systems for improved reliability.

VHF and HF Communication Coverage

- Extension of VHF coverage at all operationally significant altitudes
- Optimization and coordination of HF networks for en-route communications

Navigation Aids

- Implementation and maintenance of VOR/DME stations, ILS at key airports and GNSS-based navigation (including PBN routes), including the transition from conventional to Performance-Based Navigation (PBN)

Surveillance Systems

- Progressive implementation of Secondary Surveillance Radar (SSR), Mode S transponders, ADS-B (Automatic Dependent Surveillance – Broadcast), Multilateration (MLAT) in terminal areas, and Coordination of SSR Mode S II code and 24-bit address assignments.

ATM Automation and Data Interoperability

- Deployment of ATM automation systems at ACCs and major airports
- Integration with SWIM and digital AIM systems

2.4.6 ASBU Applicable elements in CNS

The Aviation System Block Upgrades (ASBU) framework identifies several applicable elements in the CNS (Communication, Navigation, and Surveillance) domain for the AFI (Africa and Indian Ocean) region, as outlined in ICAO's Global Air Navigation Plan (GANP) and the AFI Air Navigation Report2.

Applicable ASBU Elements in CNS for AFI

Communication Systems

ASBU Element	Description	Status

COMI-B0/1	ATS Inter-facility data communication (AIDC)	Partially implemented
COMI-B1/1	Ground-ground digital communication via ATN/AMHS	Recommended for full implementation
COMS-B0/1	ATS voice communication via ATS/DS circuits	Ongoing upgrades to VoIP
COMS-B1/1	ATS voice over IP (VoIP)	Priority for modernization

Navigation Systems

ASBU Element	Description	Status
NAVS-B0/1	GNSS-based navigation (PBN)	Widely applicable and expanding
NAVS-B1/1	GNSS augmentation (SBAS/GBAS)	Under feasibility studies
NAVS-B1/2	GNSS integrity monitoring	Recommended for national deployment

Surveillance Systems

ASBU Element	Description	Status
ASUR-B0/1	ADS-B Out (Broadcast)	Deployment underway in several FIRs
ASUR-B1/1	ADS-C (Contract) and integration with ATM	Recommended for oceanic airspace
ASUR-B1/2	Mode S SSR and Multilateration	Priority for terminal areas
ASUR-B1/3	Surveillance data sharing	Encouraged for regional harmonization

Strategic Priorities

- ADS-B and GNSS are considered high-priority enablers for surveillance and navigation modernization.
- VoIP and AMHS are key to improving communication reliability and interoperability.

- SBAS feasibility is being explored to support GNSS augmentation across AFI.

2.4.7 Gaps identified in Communication, Navigation, Surveillance

Based on the latest reports from ICAO and regional partners, several critical gaps have been identified in the CNS (Communication, Navigation, and Surveillance) domain across the AFI (Africa and Indian Ocean) region. These gaps hinder the region's ability to provide seamless, safe, and efficient air navigation services.

Key CNS Gaps Identified in the AFI Region

Communication Gaps

- Limited VHF coverage in remote and oceanic areas, especially at lower flight levels
- Inadequate HF communication quality and reliability in some FIRs
- Incomplete implementation of ATS Direct Speech (ATS/DS) circuits
- Slow transition to digital communication systems (e.g., ATN/AMHS, VoIP)

Navigation Gaps

- Aging and poorly maintained ground-based navigation aids (e.g., VOR, DME, NDB)
- Limited GNSS augmentation infrastructure, such as SBAS (Satellite-Based Augmentation System)
- Inconsistent implementation of Performance-Based Navigation (PBN) procedures
- Lack of national GNSS monitoring and integrity systems.

Surveillance Gaps

- Sparse radar coverage, especially in central and western Africa
- Limited deployment of ADS-B ground stations, particularly in remote and oceanic airspace
- Lack of Mode S SSR and Multi-lateration systems in many terminal areas
- Uncoordinated assignment of 24-bit aircraft addresses and SSR Mode S II codes.

CNS Planning and Integration Gaps

- Fragmented CNS infrastructure planning across States and FIRs
- Limited regional data sharing and surveillance integration
- Insufficient CNS automation and interoperability with ATM systems
- Lack of national CNS implementation plans in several States

2.4.8 Recommended projects

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CNS Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1	GNSS monitoring and integrity systems at national and regional levels	NAVS- B0/1 B0/1 B0/4 B1/1 B1/2	To ensure the reliability, accuracy, and safety of satellite=based navigation services-	XX Month(s)	Requirements & Planning Documents, System Design & Technical Specification, Implementation Deliverables, Testing & Validation, Operational Tool & Training, and Final Project Documentations.	USD XXX	Consultant
Project 2							
Project 3							
Project 4							

2.6 Technical specification in MET

2.5.1 Objectives

MET1.1: **Improve aerodromes meteorological wind shear warnings and alerts**
MET1.2: **Improve quality and the availability of operational meteorological information at aerodromes**
MET1.3: **Implement quality management system for aeronautical meteorological services**
MET1.4: **Implementation of the SADIS API system for the provision of WAFS gridded forecasts and data**
MET1.5: **Implementation of the IWXXM and provision of meteorological information in digital format**

2.5.2 Rational

- Around 33% of WACAF States stand with capacity of ensuring the implementation of BBBs less than 55%.
- Number States are facing persistent OPMET availability challenges at their aerodromes.
- Lack of compliance of the IWXXM requirements and low level of implementation of SADIS API.
- 21% of WACAF States are yet to implement a quality management system for MET.

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2.5.3 Target areas in MET

- Capacity: Optimized usage of airspace and aerodrome capacity due to MET support
- Efficiency: Reduced arrival/departure time, thus reduced fuel burn due to MET support
- Environment: Reduced emission due to reduced fuel burn due to MET support
- Flexibility: Supports pre-tactical and tactical arrival and departure sequencing through MET support

Safety: Reduced incidents/accidents in flight and at international aerodromes due to MET support

2.5.4 ASBU Applicable elements in MET

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- AMET-B0/1 Meteorological observations products
- AMET-B0/2 Meteorological forecast and warning products
- AMET-B0/3 Climatological and historical meteorological products
- AMET-B0/4 Dissemination of meteorological products
- AMET-B1/1 Meteorological observations information
- AMET-B1/2 Meteorological forecast and warning information

- AMET-B1/3 Climatological and historical meteorological information
- AMET-B1/4 Dissemination of meteorological information

2.5.5 Gaps identified in Aeronautical meteorology

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- In WACAF Region: 16% (5 States) reported VOLMET broadcast fully implemented, while 26% (8 States) have not implemented yet and 34% (11 States) reported not applicable. 23% (7 States) have not provided data.
- Status of the World Area Forecast System (WAFS): 49% States (28 WACAF States) have implemented the WAFS services, while 11% (6 States reported not implemented and 14% in progress. 5% (3 States) planned the implementation while 21% (12 States) didn't provide data.
- WACAF average of implementation AMET-B0 elements is around 66,75%, while the level of compliance with IWXXM requirements is less than 39%.

2.5.6 Recommended projects

To address the performance issues outlined above, State subject matter experts identified the following MET projects.

MET Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1							
Project 2							
Project 3							
Project 4							

2.7 Technical specification in PANS-OPS

2.6.1 Objectives

PANS-OPS1.1 **Advance PBN procedures implementation in the AFI Region**.

PANS-OPS1.2 **Improve and harmonize PBN Route network in AFI.**

PANS-OPS1.3 **Improve maintenance of flight procedures.**

2.6.2 Rational

PBN offers significant benefits, but successful implementation requires addressing challenges and capitalizing on opportunities available for the provision of PANS-OPS services. Improving the development of competence for the provision of PANS-OPS services is therefore crucial for ensuring safe and efficient implementation of the ASBU elements in accordance with global vision. The Regional Vision therefore is to advance PBN implementation in Africa, fostering collaboration among Civil Aviation Authorities (CAAs), air navigation service providers (ANSPs), and other stakeholders. Realization of this will ensure that PANS-OPS procedures are universally understood, rigorously followed, and contribute to the highest levels of flight safety.

2.6.3 Target areas in PANS-OPS

- *Target Area 1: Safety (Improve or maintain safety)*
- *Target Area 2: Efficiency (reduce Flight time/distance, improve Vertical efficiency, reduce Fuel burn)*
- *Target Area 3: Environment (Maintain or improve environmental sustainability of aviation)*
- *Target Area 4: Access and equity (Improve access and equity)*
- *Target Area 5: Flexibility (Improve flexibility of air navigation system)*

2.6.4 ASBU Applicable elements in PANS-OPS

APTA - Improve arrival and departure operations

- APTA-B0/1 - PBN Approaches (with basic capabilities)
- APTA-B0/2 - PBN SID and STAR procedures (with basic capabilities)
- APTA-B0/4 - CDO (Basic)
- APTA-B0/5 - CCO (Basic)
- APTA-B0/6 - PBN Helicopter Point in Space (PinS) Operations
- APTA-B1/1 - PBN Approaches (with advanced capabilities)
- APTA-B1/2 - PBN SID and STAR procedures (with advanced capabilities)
- APTA-B1/4 - CDO (Advanced)

- APTA-B1/5 - CCO (Advanced)

2.6.5 Gaps identified in PANS-OPS

- Very low level of PBN CCO/CDO (16.3%)
- PBN SID (40.4%) is still low
- PBN STAR (54.7%) is showing fairly good progress but still below the minimum regional target (75%)
- High number of SSCs in instrument flight procedure design maintenance and approval
- Low number of qualified IFP designers and approvers.

2.6.6 Recommended projects

The following projects can be implemented to improve flight procedure design, maintenance and approval in the AFI region.

PANS-OPS Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1	Departure and arrival trajectories optimization at international airports						
Project 2	Safety enhancement of Instrument Flight Procedure						
Project 3	Capacity building in						

	IFP design and approval						
Project 4							

2.8 Technical specification in SAR

2.7.1 Objectives

SAR1.1 **Increase regional collaboration in Search and Rescue**.
SAR1.2 **Increase and foster joint SAR Exercises.**
SAR1.3 **Improve access to SAR information.**

2.7.2 Rational

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2.7.3 Target areas in SAR

- *Target Area 1: Safety (Improve or maintain safety)*

2.7.4 ASBU Applicable elements in SAR

GADS - Global Aeronautical Distress and Safety System (GADSS)

- GADS-B1/1 - Aircraft Tracking
- GADS-B1/2 - Operational Control Directory
- GADS-B2/1 - Location of an aircraft in Distress
- GADS-B2/2 - Distress tracking information management
- GADS-B2/3 - Post Flight Localization
- GADS-B2/4 - Flight Data Recovery

2.7.5 Gaps identified in Search and Rescue

- Low level of SAR agreement signed between States (38%)
- Low level of suitably qualified RCC/RSC staff (29%)
- Low level of large-scale SAR Exercise conducted (20%)
- Ineffective SAR Oversight (31%)
- Lack or insufficient SAR facilities
- Low level of subscription of RCC/RSC to the ICAO Operational control directory
- Low cooperation between Aeronautical and maritime SAR where applicable

2.7.6 Recommended projects

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SAR Project #	Project title	ASBU elements delivered	Project objectives	Project duration	Project deliverables	Project estimated unit cost	Assigned Project Team
Project 1	Multistate SAR agreement						
Project 2	RCC/RSC efficiency enhancement						
Project 3	National SAR oversight enhancement						
Project 4	Establishment of JRCC/JRSC						