



ICAO

COMPREHENSIVE REGIONAL IMPLEMENTATION PLAN FOR AVIATION SAFETY IN AFRICA (AFI PLAN)

TWENTY-SECOND AFI PLAN STEERING COMMITTEE MEETING *Kampala, Uganda, 15 May 2019*

Agenda Item 3: Report on the 2019 AFI Plan Aviation Infrastructure for Africa Gap Analysis

(Presented by AFI Plan Secretariat)

EXECUTIVE SUMMARY

This paper reports on the 2019 Aviation Infrastructure for Africa Gap Analysis, conducted in response to ICAO Council Decision, C-DEC 24/7, on the implementation of the Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa, and the request of the AFI Plan Steering Committee that the Secretariat prepares an appropriate programme to implement the required actions including the aviation infrastructure gap analysis.

Action: The Steering Committee is invited to:

- a) Note the information contained in this paper;
- b) Refer to the gap analysis Workshop report available at the AFI Plan website: <https://www.icao.int/ESAF/Pages/AvInfra-Africa-GapAnalysis-2019.aspx>
- c) Note the information contained in the aviation infrastructure for Africa gap analysis report (Attachment A to this paper) and consider the recommendations in section 9 therein; and
- d) Provide further instructions and guidance as deemed necessary.

1. INTRODUCTION

1.1 The Third ICAO World Aviation Forum (IWAF/3) held in Nigeria, in November 2017 adopted a Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa. The ICAO Council at its 213th and 214th Sessions in considering the report on the outcomes of the World Aviation Forum decided, under C-DEC 24/7, that activities and actions assigned to ICAO in the Declaration and Plan of Action be implemented under existing arrangements, especially the ICAO Comprehensive Regional Implementation Plan for Aviation Safety in Africa (AFI Plan).

1.2 The AFI Plan Steering Committee thereafter decided, at its 21st meeting that the AFI Plan Secretariat should prepare a programme and implement the required actions indicated in the said ICAO Council Decision. The Gap Analysis exercise covering Airports, Air Navigation Services, and Aircraft fleet capacity and equipage was conducted accordingly, and its outcome validated through a workshop held in Abuja, from 19 to 21 March 2019. The Workshop was attended by the President and Representatives of the ICAO Council, Air Navigation Commission, with 173 delegates from 22 States and various stakeholder organizations.

2. DISCUSSION

2019 AVIATION INFRASTRUCTURE GAP ANALYSIS EXERCISE

2.1. Objectives and Scope:

2.1.1. The objective of the gap analysis was to carry out a State-by-State evaluation and determine the current status of implementation of aviation infrastructure based on global, regional and national requirements, taking in to account existing traffic levels, demand and capacity in the African region. The gap analysis is to serve as basis and provide in puts for the preparation of regional and national aviation Master plans and ensure that the development of aviation infrastructure complies with ICAO Standards and Recommended Practices, and responds adequately to traffic and capacity demands

2.1.2. In this respect, the exercise involved all African countries and covered aspects related to International Airports, Air Navigation Services, and Aircraft fleet capacity and Equipage. It was also conducted within the context of operationalizing the Single African Air Transport Market (SAATM), a flagship project of Agenda 2063 of the African Union.

2.2. Methodology and Process:

2.2.1. **Survey / Data collection** - For the purpose of the exercise, information was gathered through a detailed State survey and complemented with material from the ICAO database and other sources. The survey questionnaire was sent to all African States and responses were received from 26; a response rate of approximately 50%.

2.2.2. **Gap analysis metrics and key high level elements** - A large volume of data and detailed information was required in the survey questionnaire. It was therefore necessary to identify and focus on key high level infrastructure related elements and determine the appropriate parameters to define the gaps in each of these. Similarly, the relevant references and applicable standards/plans were mapped out and used in evaluating level of implementation and measuring the associated gap(s) in a quantifiable manner.

2.2.3. The following key elements and parameters were employed:

- **International Airports** - Certification status, Runway capacity, aircraft parking, Terminal Building capacity (passenger/cargo), Rescue and Firefighting services, MRTDs, security screening equipment, and standby power / Airfield lighting.
- **Air Navigation Services** – PBN, ATS capacity, ATM Master plan,

communications (systems, networks, circuits), navigation and surveillance station, and AIXM (e-AIP, AIS/AIM Transition, e-TODD)

- **Airline fleet, equipment and equipage** – market share (available seat kilometers of local carriers, passengers carried), connectivity (African/non-African destinations served by local airlines, weekly frequencies), capacity (load factors), Aircraft ownership (% /leased)/ Cape Town Convention ratification.

2.2.4. The global and regional requirement references used include the GASP, GANP, GAsEP, ANP, and Decisions and Conclusions of Regional Groups / Plans established by ICAO (APIRG, RASG-AFI, AFI Plan, AFI SECFAL Plan, etc), as well as the safety and security targets for Africa.

2.3. Summary Results:

The tables below provide summaries of the results of the gap analysis in the respective areas:

International Airports
a) 70% - not certified;
b) 35% - inadequate pavement strength;
c) 42% - insufficient emergency plans/perimeter;
d) 20% - inadequate RFFS capacity;
e) 18% - inadequate passenger/cargo terminal capacity
f) 18% - insufficient apron capacities;
g) 17% - electrical power systems deficient;
h) 15% - inadequate airfield lighting systems;
i) 9% - facing runway/taxiway dimension problems;
j) 8% - inadequate screening and MRTD equipment.

Air Navigation Services
a) 35% of international Airports without PBN;
b) 95% of States have no ATM Master plan;
c) 95% of AFTN networks implemented;
d) 15% ATS Message Handling Systems (AMHS) implemented
e) 5% ATS Inter-Facility Data Comms (AIDC) implemented
f) 50% Controller-Pilot Data Communications (CPDLC) coverage;
g) 0% implementation of VHF Data Link;
h) 97% Ground aids/GNSS navigation systems implemented;
i) 3% augmented GNSS (SBAS) implemented
j) 64% SSR-S, 57% ADS-C, 16% ABS-B, 3% MLAT implemented.

Airlines:

- a) Low connectivity - 27% of services among African States;
- b) Direct traffic from SAATM States is mainly to Europe and intra-Africa, while traffic from SAATM to other regions is carried mainly through connecting flights;
- c) In terms of international frequencies, 76% of the intra-Africa market served by African carriers;
- d) In terms of origin-destination passengers, for 14 African States, over 50% of international passengers are carried by African carriers;
- e) Airlines of all African States had an average load factor of 70.8% in 2017 (lower than the world average of 82%).
- f) 27 African States are party to Cape Town Convention

2.4. Key Conclusions and Recommendations:

2.4.1. The gap analysis having built on the outcomes of the Abuja validation Workshop, provided a series of conclusions and recommendations, details of which are outlined in the report. These include, but are not limited to:

That:

1. The development of guidance material by ICAO to assist States and Regions in preparing aviation Master plans be expedited.
2. States and RECs utilize available guidance material from ICAO and the results of the gap analysis to prepare national and regional Aviation Master Plans.
3. APIRG finalizes the development and adoption of the remaining parts of the AFI Air Navigation Plan, and ensure continuous monitoring of aerodrome and air navigation deficiencies.
4. The aviation infrastructure gap assessment methodology be aligned with that of State Safety Programmes on the ICAO iSTARS Online Tool, with overall indicators to give level of progress of States.
5. APIRG and States prioritize air navigation related projects taking due account of prevailing targets, including SAR organization, AIS/AIM and PBN implementation

2.4.2. The following were also identified as Next Steps:

- a) That ICAO puts in place an effective advocacy and top-down approach through CEOs/DGs of CAAs, for accurate and robust data gathering from States;
- b) That the results of the finalized 2019 aviation infrastructure gap analysis be presented to the AFI Plan Steering Committee, ICAO Council, AU, AFCAC, RECs, Partners, etc. for consideration;

- c) Preparation of gap analysis of a long term horizon based on 25-year projections of traffic growth, operational and capacity / regulatory requirements, and demand for aviation professionals;
- d) Determine the funding required to bridge the long term infrastructure gaps and identify appropriate financing mechanisms at State and / or regional level;
- e) States and RECs utilize available guidance material from ICAO and the results of the gap analysis to prepare national and regional Aviation Master Plans; and
- f) Regional programme with specific plans, projects and effective implementation monitoring mechanism be developed to ensure that the identified gaps are properly addressed.

2.5. The report of the Aviation infrastructure for Africa Gap Analysis is presented for consideration by the Steering committee as Attachment A to this Discussion Paper.

-END-



**COMPREHENSIVE REGIONAL
IMPLEMENTATION PLAN FOR AVIATION
SAFETY IN AFRICA (AFI PLAN)**

**AVIATION INFRASTRUCTURE FOR AFRICA
GAP ANALYSIS**

REPORT

Prepared by the AFI Plan Secretary

April 2019

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Nota Bene: In addition to this report, the Report on the AFI Plan Aviation Infrastructure for Africa Gap Analysis Workshop (March 2019) and all related presentations from the ICAO secretariat and Partners are available at the website: <https://www.icao.int/ESAF/Pages/AvInfra-Africa-GapAnalysis-2019.aspx>

1. Introduction

1.1. Background

The Air Transport Context in Africa

1.1.1. The African aviation market has the most potential for growth out of all global regions with a large and increasing population. This potential has not yet been fully translated into strong and uniform air traffic growth within the continent. However, it remains difficult for African States and aviation stakeholders to access funds and/or ensure financing for the modernization and expansion of their infrastructure. At the same time, skills shortages are posing a considerable short-term obstacle to growth, with a lack of adequately aviation professional.

1.1.2. The uncertainty about continuation of air services has an adverse effect on a tourism and travel industry's inward investment and the opportunity for inbound tourism, and thus the actual loss of a service could have a much greater cost. In this context, increasing the use of aviation as a development tool supports the ICAO aspirational goal of No constraints of infrastructure, capacity, technology and financial resources for aviation development, as well as the realization of the African Union (AU) Agenda 2063 and the United Nations 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs).

Role of Air Transport

1.1.3. Connecting Africa through air transport is crucial for the free movement of goods, people and services. The air transport sector is an important creator of direct and indirect jobs in the industry and critical skills on the continent. It contributes positively to other auxiliary sectors such as tourism. The air transport services are important for Africa's connectivity with the rest of the world and, in this regard, fostering the African air transport market through air transport liberalisation has been one of the driving forces of regional integration on the continent.

Road to African Liberalization

1.1.4. African Member States agreed to liberalise the intra-African air transport services when on 7 October 1988 the Yamoussoukro Declaration was adopted. In 2000, the AU Assembly adopted the Yamoussoukro Decision (YD) relating to the implementation of the Yamoussoukro Declaration made by the Ministers. The YD provides:

- the full liberalisation of intra-African air transport services in terms of market access, the free exercise of third, fourth and fifth freedom traffic rights for scheduled and freight air services by eligible airlines
- the full liberalisation of frequencies, tariffs and capacity;

1.1.5. The framework for Air transport liberalization in Africa which is the Yamoussoukro Decision has evolved towards the establishment of a Single African Air Transport Market (SAATM) under the leadership of the African Union and AFCAC as the designated Executing Agency. A prioritized Action Plan was established for the implementation of SAATM, and AFCAC has developed measurable performance indicators to evaluate the implementation of SAATM. There is a need to strengthen the advocacy and promotion efforts to subscribe to and build the necessary capacity for the implementation of SAATM by Member States.

1.2. Outcomes of the Third ICAO World Aviation Forum (IWAF/3)

1.2.1. The Third ICAO World Aviation Forum (IWAF/3) that was hosted in November 2017 by the Government of the Federal Republic of Nigeria in cooperation with African Union Commission (AUC), African Development Bank (AfDB) and New Partnership for Africa's Development (NEPAD) Planning and Coordination Agency (now the African Union Development Agency (AUDA)), brought together Ministers, high-level decision-makers, financial institutions and international organizations responsible for transport and infrastructure, finance, economy, tourism and sustainable development to explore the benefits of the aviation sector to the social, economic development and prosperity. Furthermore, the forum aimed to facilitate funding and mobilization of financing required to accelerate the implementation of international civil aviation global standards and policies, as well as the ICAO Global Plans for aviation. The Forum tackled existing and future financing challenges facing quality aviation infrastructure and capacity development, especially in Africa.

Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa

1.2.2. The Concluding Communiqué of the IWAF/3 included a Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa, which was adopted within the framework of the Lomé Plan of Action (2017 –2019) of the AU adopted at the First Ordinary Session of the AU Specialized Technical Committee (STC) on Transport, Transcontinental and Interregional Infrastructure, Energy and Tourism, in Lomé, Togo on 17 March 2017 and endorsed at the Thirty-First Ordinary Session of the AU Executive Council through Decision EX.CL/Dec. 970 (XXXI). The Declaration called upon African States and African Regional Economic Communities (RECs) to take a set of specific actions, in cooperation and coordination with the AUC, NPCA, AfDB, UNECA, AFCAC, the African Airlines Association (AFRAA) and international partners.

1.2.3. With the launching of the Single African Air Transport Market and in consistency with the Declaration a prioritized action plan in which gap analysis for aviation infrastructure continued to feature, was adopted through the AU, AFCAC and AfDB to support its realization.

ICAO Follow Up Work

1.2.4. The ICAO Council at its 213th and 214th Sessions considered, among other things, the calls of the Declaration and decided that ICAO's activities and actions indicated in the Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa be implemented under existing arrangements, especially under the ICAO Comprehensive Regional Implementation Plan for Aviation Safety in Africa (AFI Plan) as a specific identifiable programme with timelines.

1.2.5. The AFI Plan Steering Committee at its 21st meeting held in Niamey, Niger in 17 July 2018 decided that the AFI Plan Secretariat should prepare an appropriate programme with timelines to implement the required actions including gap analysis indicated under the ICAO Council Decision on the Implementation of the Declaration and Framework for a Plan of Action for Development of Aviation Infrastructure in Africa.

1.2.6. During the 13th Air Navigation Conference (AN-Conf/13) held in Montréal, Canada, from 9 to 19 October, 2018, African States under AFCAC, presented the WP/220 on the Implementation of a plan of action for development of aviation infrastructure in Africa. The Conference supported the initiative and requested that ICAO supports the implementation of an action plan under the Comprehensive Regional Implementation for Aviation Safety in Africa (AFI Plan).

2. Conduct of the Aviation Infrastructure for Africa Gap Analysis (2019)

2.1. Global and Regional Requirements

2.1.1. The Gap Analysis was conducted against relevant global and regional requirements as contained in the following reference documents and frameworks:

- a) The Global Aviation Safety Plan (GASP, ICAO Doc 1004);
- b) The Global Air Navigation Plan (GANP, ICAO Doc 9750);
- c) The Global Aviation Security Plan (GASeP, ICAO Doc 10118)
- d) The AFI Air Navigation Plan (ANP, ICAO Doc 7474);

- e) The Revised Abuja Safety Targets (as revised in 2018);
- f) The AFI Air Navigation Targets (as revised in 2018);
- g) The Windhoek Declaration and Targets for Security and Facilitation (adopted in 2015);
- h) The Planning, Implementation and Monitoring mechanisms through Regional Groups established by ICAO, including:
 - o the AFI Planning and Implementation Regional Group (APIRG);
 - o the AFI Regional Aviation Safety Group (RASG-AFI);
 - o the AFI Comprehensive Regional Implementation Plan for aviation Safety in Africa (AFI Plan); and
 - o the AFI Comprehensive Regional Implementation Plan for Security in Africa (AFI SECFAL Plan).

2.1.2. The overall purpose of the Global Plans is to guide the harmonized development of regional and State planning, supported by regional activities coordinated by the established regional groups. The Global Plans seek to assist States and regions in their respective policies, planning and implementation by:

- a) establishing the global priorities and Global Plan objectives;
- b) providing a planning framework, timelines and guidance material; and
- c) presenting implementation strategies and a global aviation roadmap to address the procedures and methods to achieve the Global Plan objectives and set specific priorities at both State and regional levels as well as the role of industry partners.

2.1.3. The figure 1 below summarizes the relationship between the global, regional and national planning frameworks.

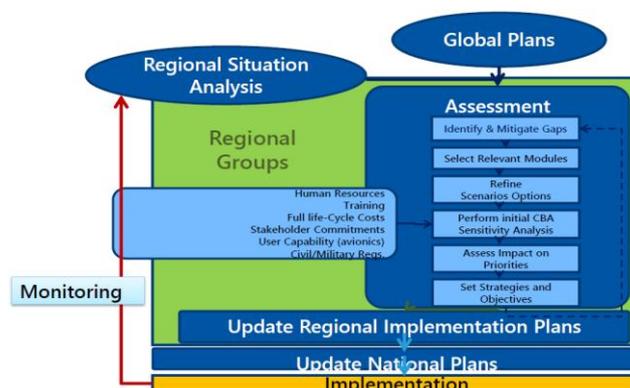


Figure 1: Relationship between the global, regional and national planning frameworks

2.2. ICAO and United Nations 2030 Agenda Sustainable Development Goals (SDGs)

2.2.1. ICAO Assembly Resolution A39-25 urges Member States to enhance their air transport systems by effectively implementing SARPs and policies while at the same time including and elevating the priority of the aviation sector into their national development plans supported by robust air transport sector strategic plans and civil aviation master plans, thereby leading to the attainment of the United Nations Sustainable Development Goals (UN SDGs).

2.2.2. The Thirteenth ICAO Air Navigation Conference (October 2018) specifically recommended that States:

- a) establish a defined connection between their air navigation and safety plans, as well as other relevant national plans;
- b) include clear references to the UN SDGs in their air navigation and safety plans, as well as in other relevant national plans, with the objective of showcasing the contribution of aviation to the UN SDGs and national economies;
- c) engage with States to promote the importance of aviation development, taking into consideration environmental and socio-economic aspects, and to include aviation within their relevant national plans, and, as necessary, national budgeting, which might be vital to unlocking funding for aviation needs; and
- d) develop guidance for States to include aviation within their relevant national plans taking into consideration global and regional planning.

2.2.3. The GANP which was developed in collaboration with and for the benefit of all stakeholders, is a key contributor to the achievement of ICAO's Strategic Objectives and has an important role to play in supporting the United Nations 2030 Agenda for Sustainable Development. A key goal that relates to the GANP is Sustainable Development Goal (SDG) 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

2.2.4. Need for Guidance for National Aviation Planning Framework

2.2.5. A clearly-defined relationship between national development plan, national transportation policy, national aviation policy, civil aviation master plan (CAMP), as well as its underlying plans and programmes, is essential to enable the prioritization and optimum allocation of resources to aviation. Good governance is required to reconcile objectives and needs with resources and responsibilities in the face of competing/conflicting priorities, as well as cooperation and compatible decision-making among transport authorities and other ministries in charge of finance, economic planning, environment, energy, trade and tourism, etc.

2.2.6. Currently, ICAO is developing Guidance material intended to assist States with the development and implementation of their National Aviation Planning Frameworks, using a common language to align National Aviation Planning Framework concepts in the GANP, GASP and GAsEP. The ICAO Global Aviation Training (GAT) will develop related training programmes and workshops in the future to assist with implementation. Separate guidance (Manual on Business Cases, Cost Benefit Analyses, Economic Impact Analyses, and Cost Effectiveness Analyses, as well as Aviation Satellite Account) will also be published in 2019 ICAO cost benefit analysis application for financing decisions for airport and air navigation projects will be released in 2019 as part of the ICAO Civil Aviation Data Solutions (iCADS).

2.3. Objectives and Scope of the Aviation Infrastructure for Africa Gap Analysis

2.3.1. The overall objective of the aviation infrastructure gap analysis was to formulate a strategy to

implement one of the key activities and actions set forth in the Framework for a Plan of Action, for which ICAO has been assigned as a lead agency. Such a gap analysis is expected to serve as key input to develop regional and national aviation infrastructure programmes and master plans based on determined quality strategic infrastructure requirements and in line with the level of predicted traffic growth and ICAO Global plans.

2.4. Aviation Infrastructure for Africa Gap Analysis – Survey

2.4.1. Survey Strategy and Process

2.4.1.1. In line with the objective of the gap analysis, a preliminary survey on aviation infrastructure in Africa covering Airports, Air Navigation Services and Air Operators with respect to fleet capacity was conducted by the ICAO Secretariat. The questionnaires used for the survey are provided as **Appendices A, B and C** to this report. The data obtained from the survey were supplemented by additional information from various stakeholders.

2.4.1.2. The survey strategy and process is summarized in the **figure 2** below:

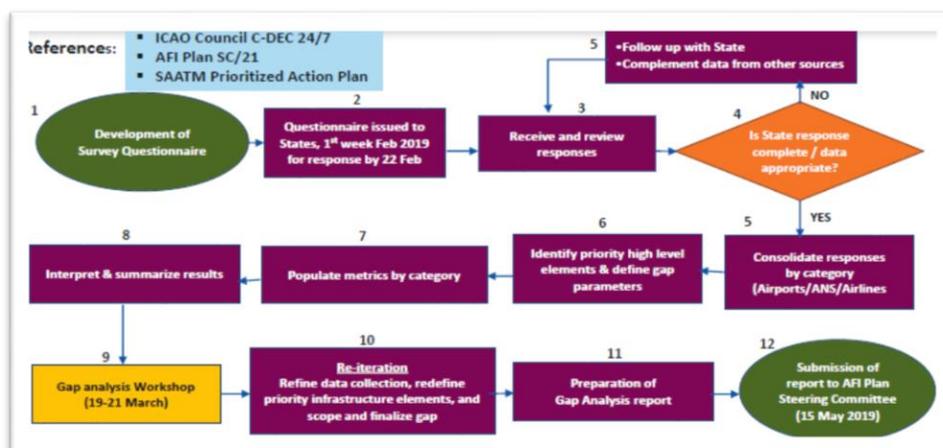
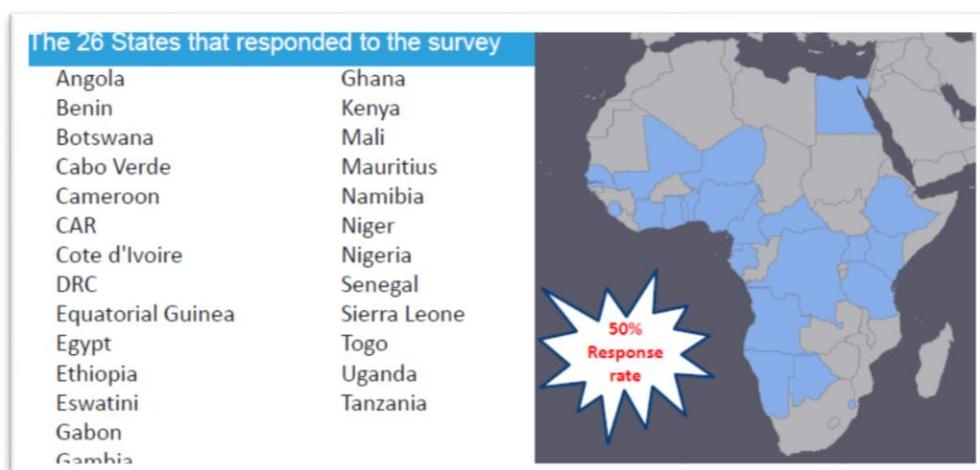


Figure 2 : Survey Methodology and Process

2.4.1.3. The survey questionnaire was sent to all African States, out of which 26 States (50%) responded. The 26 States that responded to the survey questionnaire are listed and shown below:



2.5. Gap analysis Data Processing

Key High Level Priority Infrastructure Items

2.5.1. The Gap analysis was conducted based on responses to the survey which were received from 26 Member States. These responses were of varying degrees of detail. To the extent possible, additional data and information from the ICAO database and other available sources was utilized in the case of non-respondent African States to fill-in other missing details. Due to the large volume of data and detailed information covered by the survey, it was considered necessary, in analyzing the gaps, to identify and focus on key high level infrastructure related items and determine the appropriate parameters to define the gaps.

Airports (AGA)

- 1) Certification (certified VS not certified) – Yes or No
- 2) Runway/Taxiway (RWY /TWY) Capacity
 - ✓ RWY /TWY Dimensions - (length/width versus annual number of movements of each type of aircrafts using the runway) – Adequate or Non adequate
 - ✓ Pavement Strength - (Pavement Classification Number (PCN) versus annual number of movements of each type of aircraft using the runway) - Adequate or Non adequate
 - ✓ RWY/TWY numbers - (Aerodrome traffic density versus Actual runways/taxiways layout) - Adequate or Non adequate
- 3) Apron Capacity - (Aerodrome traffic density versus Actual number of parking positions) - Adequate or Non adequate
- 4) Passenger Terminal Capacity - (Annual passengers traffic (taking into account peak hours) versus Terminal design capacity) – Passengers Terminal occupancy rate
- 5) CRG Terminal Capacity - (Annual cargo traffic (taking into account peak hours) VS Terminal design capacity) – Cargo Terminal occupancy rate
- 6) Aerodrome RFFS - (Actual aerodrome RFFS category versus annual number of movements of each type of aircrafts using the aerodrome) - Adequate or Non adequate
- 7) Machine readable travel documents (MRTD) - (Annual passenger traffic (taking into account peak hours), versus number of available equipment) - Percentage of lacking equipment
- 8) Passenger/Personnel/Bag Screening Equipment - (Annual passenger traffic (taking into account peak hours), number of access gates for workers, versus number of available equipment) – Percentage of lacking equipment
- 9) Cargo Screening Equipment - ((Annual cargo traffic (taking into account peak hours) versus number of available equipment) – Percentage of lacking equipment
- 10) Perimeter fences & emergency operational centre (EOC) and Mobile command post - (exist or not) - Yes or No
- 11) Electrical power supply systems - (Approach category of the runway versus existing electrical power system) - Adequate or Non adequate

- 12) Airfield Lighting / Visual Aids for navigation - (Approach category of the runway versus existing runway lighting system) - Adequate or Non adequate

Air Navigation Services (ANS)

Air Traffic Management (ATM)

- 1) Air traffic services (ATS) Units Capacity: # of aircraft per hour per Declared Capacity
- 2) ATM Master Plan: % of qualified number of required ATCOs; % of Class A-D Airspace implemented in accordance with APIRG strategy;
- 3) PBN Plan: % of Robust National PBN Plan; % of PBN Airspace; # PBN Routes implemented;
- 4) Standard instrument departure procedures /Standard arrival procedures (SIDs/STARs): % of instrument runways with PBN SIDS/STARs;
- 5) Continuous climb operations (CCO)/Continuous descent operations (CDO): % of instrument runways with PBN CCO/CDO.

Communications, Navigation and Surveillance (CNS)

- 1) Aeronautical fixed telecommunication network (AFTN), ATS Message Handling System (AMHS), Air traffic services Direct speech (ATS/DS), ATS Inter-Facility Data Communication (AIDC), Voice over Internet Protocol (VoIP), Operational meteorological (OPMET) data: # % Required and regionally planned circuits (with regard to the AFI Regional Air Navigation Plan -AFI ANP) but not yet implemented;
- 2) Very High Frequency (VHF) & High Frequency (HF) communications, Controller-Pilot Data Link Communications (CPDLC), VHF and HF Data Link (VDL & HF DL) communications: # % Required and regionally planned route coverage (with regard to the AFI Regional Air Navigation Plan -AFI ANP) but not yet implemented; and
- 3) Navigation and Surveillance: # % Required and regionally planned Stations (with regard to the AFI Regional Air Navigation Plan -AFI ANP) but not yet implemented.

Aeronautical Information Management (AIM)

- Aeronautical Information Exchange Model (AIXM) Based e-AIP, AIS/AIM Transition, Electronic Terrain and Obstacle Data (e-TOD): # % Required and regionally planned Actions plans (with regard to the AFI Regional Air Navigation Plan -AFI ANP) but not yet implemented developed / implemented.

Aeronautical Meteorology (MET)

- 1) Availability of operational meteorological (OPMET) data
- 2) Volcanic Ash Contingency Plans

Airlines

Market share of the State/African Airlines

- 1) Available Seat Kilometers (ASK) by the State Airline as a percentage of the total capacity available to the State market
- 2) Share of passengers carried by the State airlines as a percentage of the total
- 3) Share of passengers carried by the African airlines as a percentage of the total

Connectivity

- 4) Number of International Destinations /States Served by Airlines certificated by the State
- 5) Number of African Destinations/States Served by the Airlines certificated by the State
- 6) Total Number of weekly international schedule Services by local and foreign airlines
Summer/Winter
- 7) Total Number of weekly international schedule Services by local airlines
- 8) Total Number of weekly international schedule Services by African airlines
- 9) Total Number of weekly international schedule Services by other airlines

Capacity Utilization of Airlines

- Load factor of an Airline (Load factor of an Airline (Available Seat Kilometres/Revenue per Passenger Kilometres (ASK/RPK))

Aircraft ownership

- Percentage of leased aircraft from the total fleet

2.6. Aviation Infrastructure for Africa Gap Analysis Workshop

2.6.1. The results of the Infrastructure Gap analysis as relates to the present demand were presented to the three-day Workshop which was organized by the AFI Plan in Abuja, Nigeria from 19 to 21 March 2019, in collaboration with the Government of the Federal Republic of Nigeria through the Federal Ministry of Aviation.

2.6.2. Relevant stakeholders and partners from the African Union Commission (AUC), African Civil Aviation Commission (AFCAC), Regional Economic Communities (RECs), Partner States, Industry, Financial institutions, international experts and academia and ICAO Council members, who have a wealth of knowledge based on past experiences from elsewhere were invited to participate in the Workshop.

2.6.3. The Workshop offered an opportunity to share information, experiences and assist in formulating the objectives, scope and methodology of the regional and national aviation infrastructure programmes as well as development of a civil aviation master plan for Africa. It also served as a platform to increase familiarization with the requirements of Global and Regional plans in relation to quality aviation infrastructure, explore data collection aspects and the methodology for detailed gap analysis, and share information on the development of Aviation Master Plans.

2.6.4. During the sharing experiences on similar Aviation Gap Analysis exercises conducted in different regions by various stakeholders including States, the following key issues were highlighted:

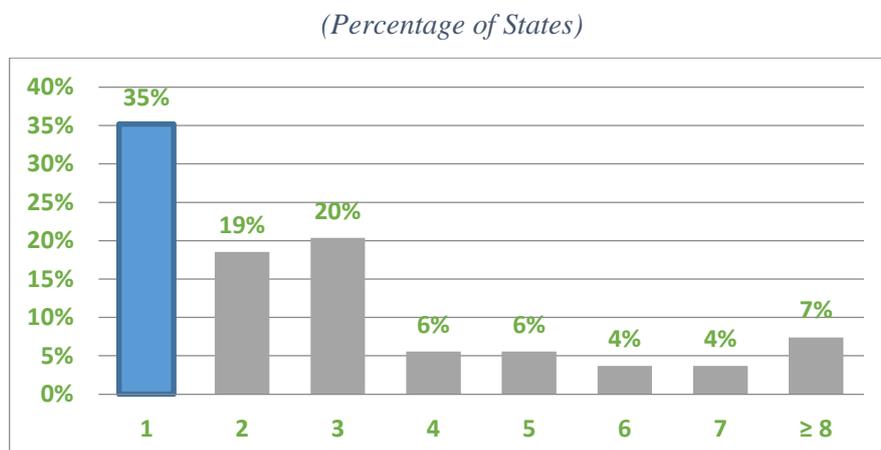
- a) Development of national and regional Civil Aviation Master Plans (CAMPs) is key to addressing gaps in infrastructure and as such, it was recommended that States should promote the importance of aviation development, noting that aviation contributes significantly to national, regional and global economy;
- b) The scope of aviation infrastructure projects is very large and thus, a long timeframe from planning to completion should be observed, usually with multiple adjustments to the original plan along the way;
- c) Civil Aviation Master Plans should be clearly linked to ICAO’s Global and Regional plans, as well as the national development framework;
- d) Identified infrastructure gaps, as well as their causes, should be quantified and included in the Civil Aviation Master Plan; and
- e) Given the limited availability of resources and funds, investments to close the identified infrastructure gaps should be made in order of priority and urgency, also taking into account value for money (VFM).

2.6.5. The report of the AFI Plan Aviation Infrastructure for Africa Gap Analysis Workshop is available on the ICAO website.

3. Main results of the GAP Analysis

3.1. Aerodrome and Ground Aids

3.1.1. In accordance with the regional air navigation plan, there are 182 International Aerodromes in Africa. The graph below provides the percentage of States having a given number of international aerodromes (from 1 through 8), and shows that 35% of States have only one international aerodrome, and 7% of States have more than 8 international aerodromes.



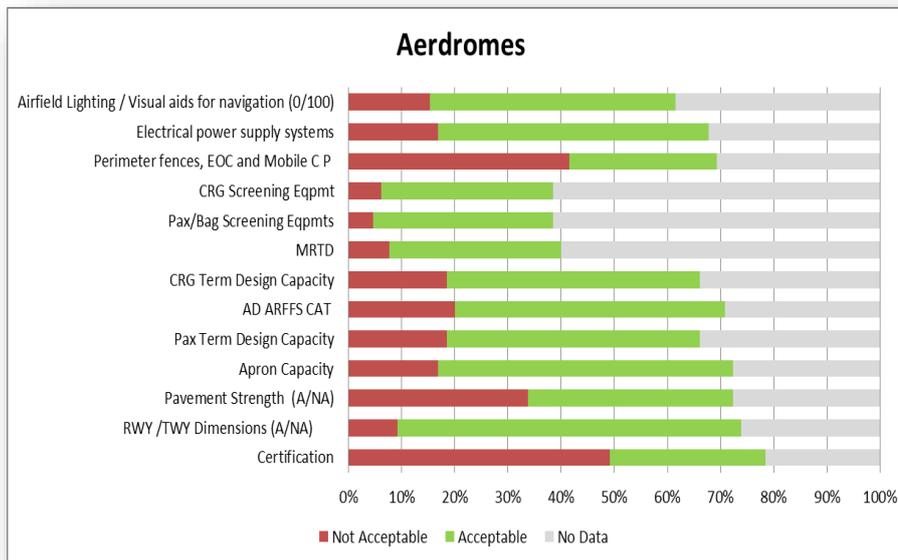
Graph 1: Number of international aerodromes per States

3.1.2. The implementation gaps in the area of Aerodromes are summarized as follows:

- a) 72% of international Airports are not certified;
- b) 35% have insufficient pavement strength with regard to intended use;
- c) 42% have insufficient emergency plans and perimeter fencing;
- d) 20% have insufficient aerodrome rescue and firefighting services capacity;
- e) 18% have insufficient passenger and cargo terminal capacities;
- f) 18% have insufficient apron capacities;
- g) 17% have electrical power systems deficiencies;
- h) 15% have insufficient airfield lighting systems;
- i) 9% are facing runways and taxiways dimensions’ problems; and
- j) 8% have insufficient screening and MRTD equipment.

3.1.3. A graphical representation of the identified implementation gaps related to aerodromes is provided below:

Graph2: Implementation gaps related to aerodromes

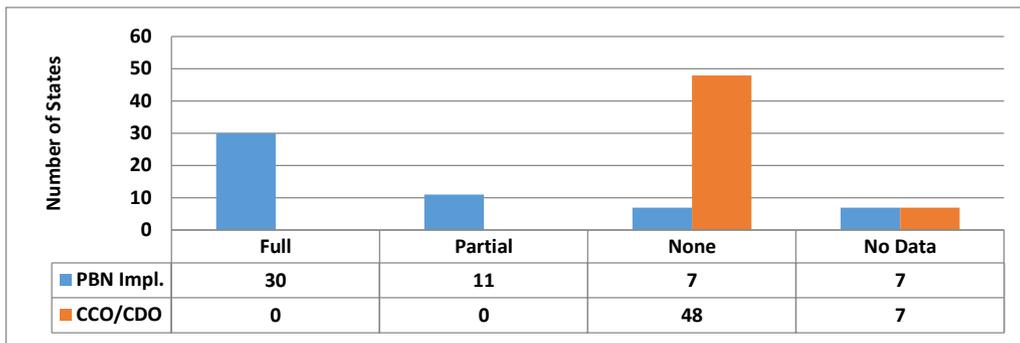


3.2. Air Navigation Services

3.2.1. The implementation gaps in the area of air navigation services are summarized as follows:

- a) **Air Traffic Management – Performance Based Navigation (PBN).**

- About 35% of international aerodromes have no PBN approaches while additional 11% have only visual approach procedures;
- About 95% of States have not established ATM Master Plans with airspace, Concept of Operations (CONOPS), and ATS Units Capacity; and
- Implementation of continuous climb operations (CCO) and continuous descent operations (CDO) procedures has not started to take full advantage of PBN approach procedures.

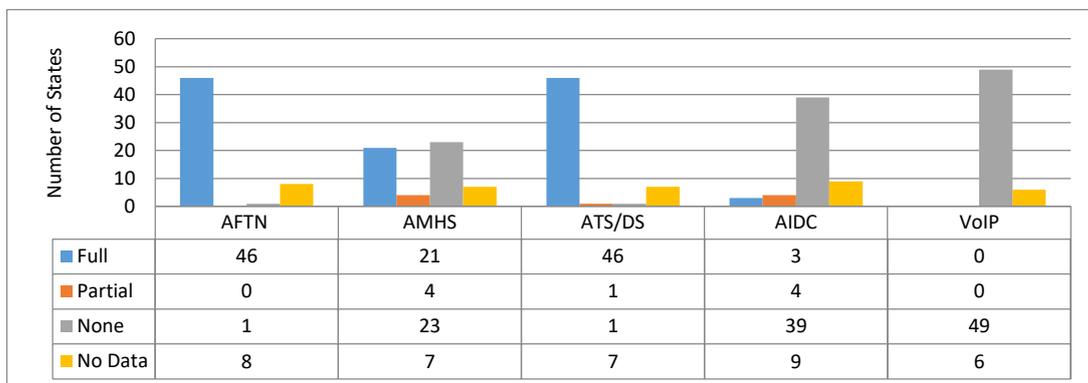


Graph 3: Status of implementation of PBN and CCO/CDO procedures

b) **Communications:**

1) **Aeronautical Fixed Service**

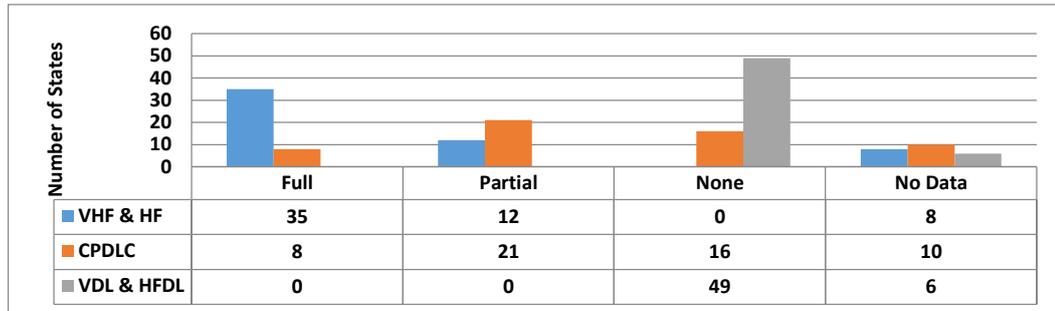
- High rate (more than 95%) of implementation of aeronautical fixed telecommunication network (AFTN) requirements;
- Low level (less than 15% implementation of Air Traffic Services Message Handling Systems (AMHS) and related interconnections;
- Very low level (less than 5%) ATS Inter-Facility Data Communications (AIDC) procedures,
- No implementation of Voice over Internet Protocol (VoIP);



Graph 4: Status of implementation of aeronautical fixed services

2) Aeronautical Mobile Service

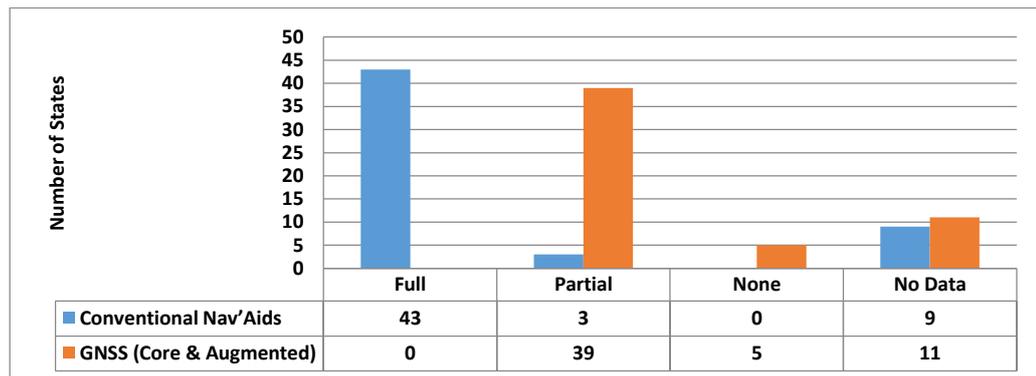
- Very High Frequency (VHF) and High Frequency (HF) radio coverage with a combined implementation level above 94% and increasing Controller-Pilot Data Communications (CPDLC) coverage about 50%; and
- No implementation of VHF and HF data link (VDL and HF DL).



Graph 5: Status of implementation of aeronautical mobile service

c) Aeronautical Radionavigation Service

- Conventional radio navigation aids (VHF omnidirectional range (VOR), distance measuring equipment (DME), instrument landing system (ILS)) and global navigation satellite system (GNSS) core constellations have a good stage of implementation above 97% in the region; and
- Less than 3% of low level implementation of augmented GNSS (satellite-based augmentation system (SBAS), ground-based augmentation system (GBAS)) is identified. GNSS services are currently provided through aircraft-based augmented systems (ABAS).

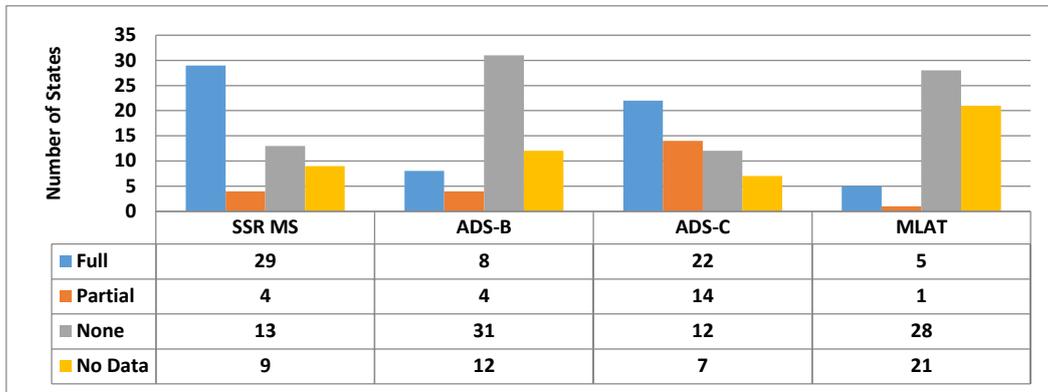


Graph 6: Status of implementation of radio navigation services

d) Aeronautical Surveillance:

- Progress in implementing Secondary Surveillance Radar (SSR) Mode S and Automatic Dependent Surveillance Contract (ADS-C) with implementation level rate of 64% and 57% respectively; and

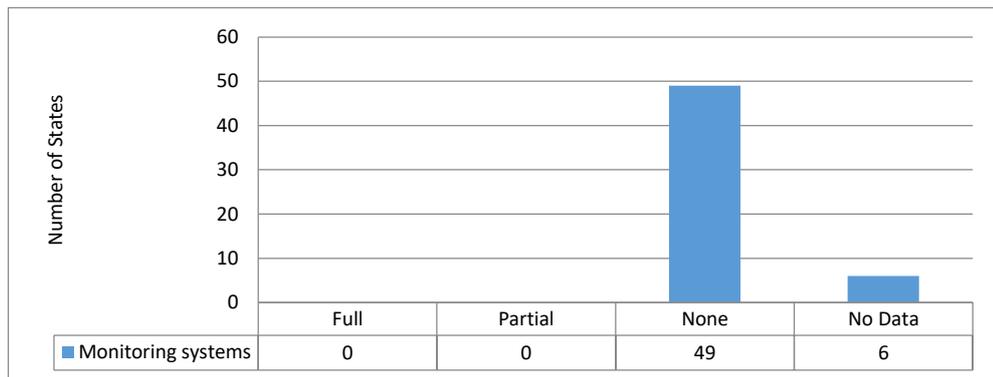
- Low pace of implementation of Automatic Dependent Surveillance Broadcast (ADS-B) with 16 % and Multilateration (MLAT) 3% implementation across the AFI Flight Information Regions.



Graph 7: Status of implementation of aeronautical surveillance

e) **Frequency spectrum management:**

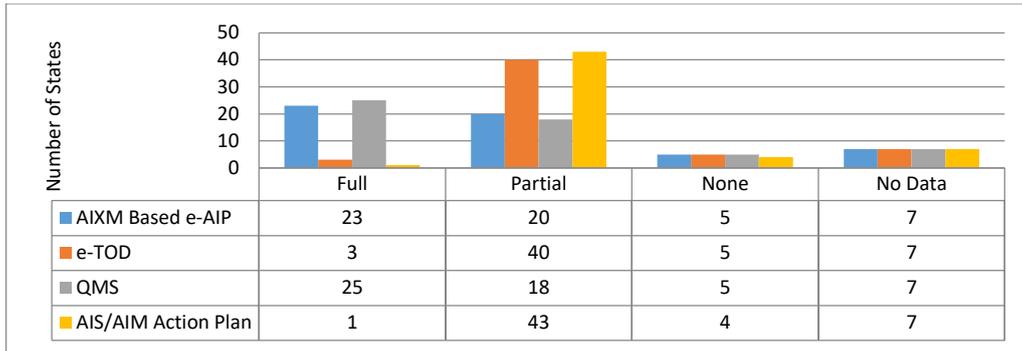
- Spectrum monitoring and reporting systems are not implemented by States although increasing number of harmful interferences to aviation are experienced in the Region.



Graph 8: Status of implementation of frequency spectrum monitoring and reporting systems

f) **Aeronautical Information Management:**

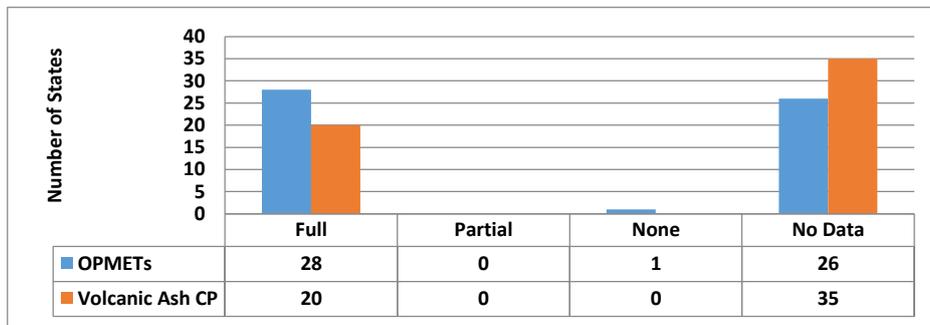
- Progress was registered in aeronautical information exchange model (AIXM) - based electronic Aeronautical Information Publications (e-AIP) 78% of States; and electronic terrain and obstacle data (e-TOD) implementation 70% of States.
- 80% of States also developed Aeronautical information service (AIS)/Aeronautical information management (AIM) Transition Plans;



Graph 9: Status of implementation of aeronautical information service

g) **Aeronautical Meteorology:**

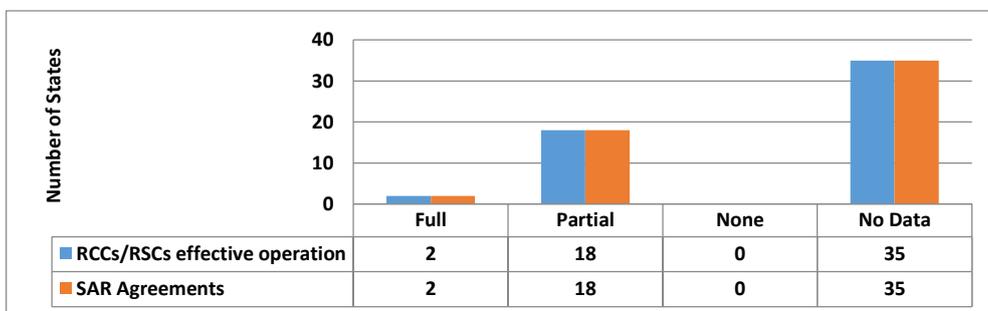
- The availability rate of OPMETs increased to 97% over time, while
- Implementation of Volcanic Ash contingency procedures is at a very low stage of about 36%.



Graph 10: Status of implementation of OPMET exchanges and Volcanic Ash Contingency Plans

h) **Search and Rescue:**

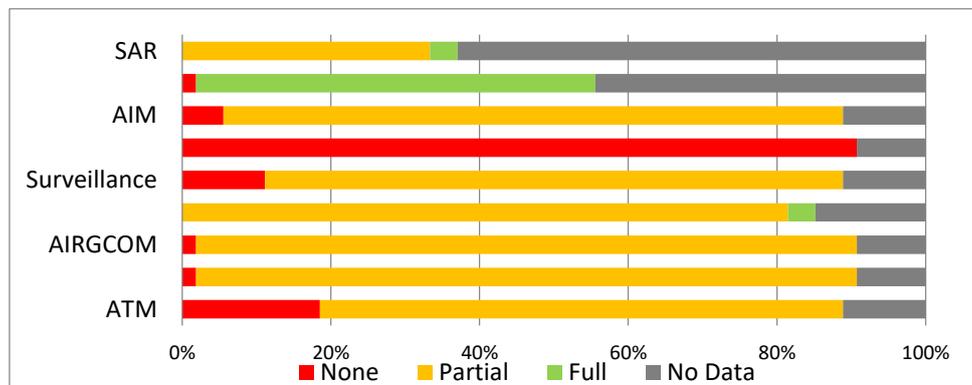
- Effective implementation of Rescue Coordination Centre (RCCs) or Rescue Secondary Centers (RSCs) and signature of effective search and rescue (SAR) agreements have a low level of implementation which is below 10% of States in the region.



Status of implementation of Search and Rescue

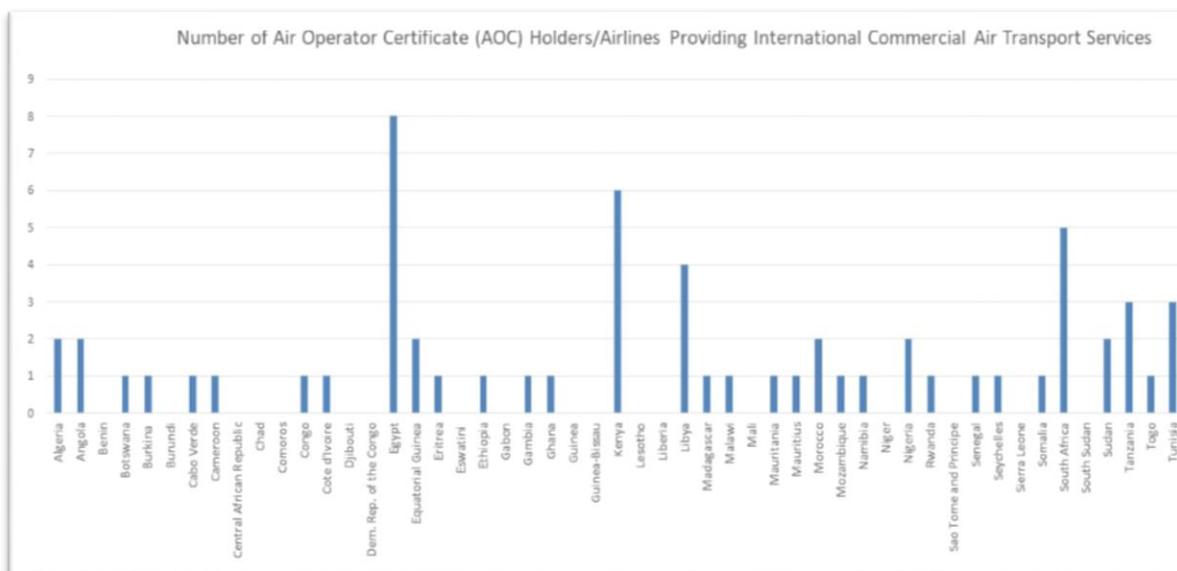
3.2.2. A graphical representation of the identified gaps implementation gaps related to Air navigation services is provided below:

Graph 11: Summary of Air Navigation Implementation Gaps

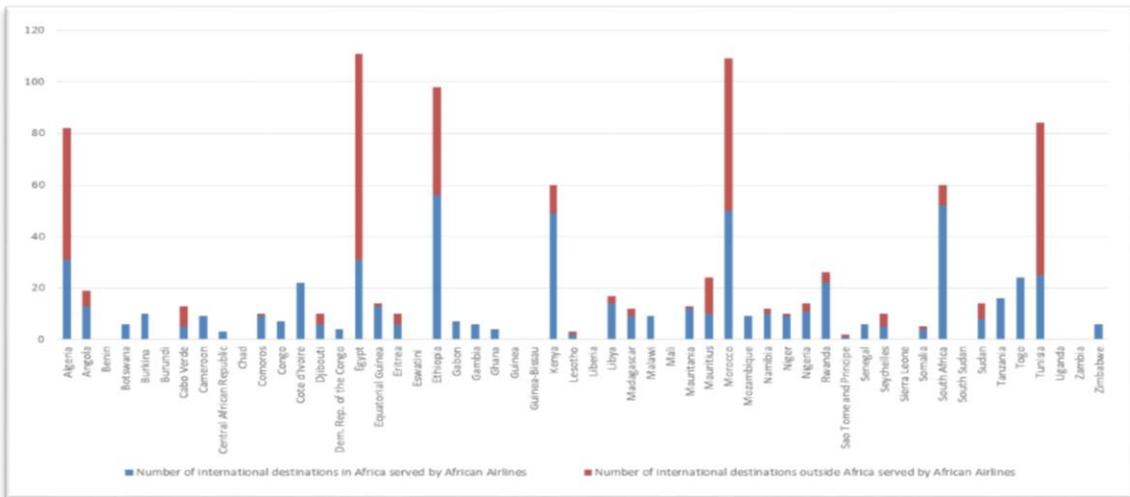


3.3. Airlines

3.3.1. The graphs below provide the number of air operator certificate holders providing international commercial air transport services in Africa; and the number of international destinations served by African Airlines in 2018.



Graph 12: Number of air operator certificate holders providing international commercial air transport services in Africa



Graph 13: Number of international destinations served by African Airlines in 2018

3.3.2. A graphical representation of the identified gaps implementation gaps related to Air transport operations is provided below:

- Low connectivity which accounts only 27% of services among African States. Though some guarantee a potential for evaluation of direct routes, Passengers took connecting flights;
- Direct traffic from single African Air Transport Market (SAATM) States is mainly to Europe and intra-Africa, while traffic from SAATM to other regions is carried mainly through connecting flights;
- The 76% of the intra-Africa market is served by African carriers;
- For 14 African States, over 50% of international passengers are carried by African carriers;
- Airlines of all African States have an average load factor of 70.8% in 2017 (lower than the world average of 82%); and
- 27 African States are party to Cape Town Convention.

4. Recommendations

Recommendation 1: ICAO guidance for aviation infrastructure master planning

That ICAO expedite the work related to the development of guidance material to assist States and Regions in developing master plans for the aviation sector to address the implementation of ICAO SARPs and Strategic Objectives, and support the United Nations 2030 Agenda for Sustainable Development Goals.

Recommendation 2: State's Civil aviation master planning

That States and RECs utilize available guidance material from ICAO and the results of the gap analysis to prepare national and regional Aviation Master Plans.

That a State's civil aviation master plan (CAMP) should be linked – inter alia - with the following:

- a) United Nations SDGs ;
- b) National/regional infrastructure programmes ;
- c) Economic cooperation and international assistance platforms;
- d) ICAO Global Plans and their regional components;
- e) ICAO air transport policies (User charges, taxation etc.) ;
- f) State's aviation-related plans (eg. State safety programme, Action plan on CO₂ emission reduction activities); and
- g) Multi-modal and urban planning initiatives.

A data-driven approach should be taken based on:

- a) Gap analysis
- b) Business cases, Cost-Benefit, Economic impact, and Cost Effectiveness Analyses
- c) Aviation Satellite Account (aviation GDP measurement)
- d) Sources of financing may include:
- e) Government financing
- f) Foreign sources (bilateral institutions, development banks, etc.)
- g) Debt/bond/equity financing
- h) Public-Private Partnership (PPP)
- i) Use of non-aeronautical revenues

That the components of a State's CAMP should include:

- a) Economic factors (GDP, special characteristics)
- b) Forecasts/trend
- c) Aviation infrastructure
- d) Safety
- e) Security
- f) Environment and other social issues

Recommendation 3: Finalization of the AFI Regional Air Navigation Plan (ANP) in three Volumes

That

- a) the APIRG finalize the development and adoption of Volume II and Volume III of the AFI Air Navigation Plan, and ensure continuous monitoring of aerodrome and air navigation deficiencies in accordance with the Uniform Methodology for the Identification, Assessment and Reporting of Air Navigation Deficiencies approved by the ICAO Council on 30 November 2001; and
- b) the ICAO Regional Offices expedite the operationalization of the AFI Air Navigation Deficiency Data Base (AANDD)

Recommendation 4: Aviation infrastructure Gap Analysis – Priority Areas

That the following key priority areas with regard to infrastructure are related to air navigation services as well as aerodromes:

- a) With respect to aerodromes, the priority areas are:
 1. Certification
 2. Runway

3. Apron and Terminal
 4. Security
 5. Emergency Planning
 6. Lighting
- b) With regard to air navigation services, the priority areas are:
1. ATM
 2. PBN
 3. Ground/Ground Communications
 4. Air/Ground Communications
 5. Navigation
 6. Surveillance
 7. Spectrum
 8. AIS/AIM
 9. MET
 10. SAR

The methodology for assessment of the infrastructure gap should be similar to the gap analysis related to state safety programmes available on the iSTARS Online Tool, based on a set of components which need to be implemented; and indicators should be created to assess the infrastructure gap, with an overall indicator for each State / Region as a level of progress within the gap analysis.

Recommendation 5: Regional/National Infrastructure Development Projects

That the AFI Planning and Implementation Regional Group develop programmes with specific plans, projects and effective implementation monitoring mechanisms to ensure that the aerodromes and air navigation infrastructure gaps identified under the AFI Plan Aviation for Africa Gap Analysis are properly addressed through available funding and assistance mechanisms.

Recommendation 6: Priorities for Aerodromes related projects

That APIRG and States should prioritize aerodrome related key items using the following priority groups:

Priority Group 1

- a) Lightings and visual aids
- b) Electrical power supply
- c) Perimeter fence
- d) Passenger/Bag screening
- e) Aerodrome Rescue and Fire Fighting Service (ARFFS)
- f) Apron capacity
- g) Pavement strength
- h) Runway/Taxiway (RWY/TWY) dimensions
- i) Certification of aerodromes

Priority Group 2

- a) Cargo screening
- b) Machine Readable Travel Documents (MRTDs)

- c) Cargo terminal design capacity
- d) Passenger terminal design capacity

Recommendation 7: Priorities for Air Navigation Services related projects

That APIRG and States should prioritize air navigation related projects taking due account of the set targets, including to:

- a) establish an effective and operational SAR organization (2019)
- b) develop and implement the transition from AIS to AIM (2020)
- c) Implement PBN procedures for all instrument runways (2020: 70%; 2025: 100%)
- d) progressively reduce the rate of aircraft proximity (AIRPROX) occurrences in their managed airspaces by at least 50% annually from Dec. 2017 baseline, in order to attain and maintain a level of zero (0) AIRPROX by correspondingly reducing errors in the following contributive factors:
 - 1. Co-ordination between ATS Units (50%);
 - 2. Airspace Organization and ATC Procedures (50%);
 - 3. Mobile Communications (50%);
 - 4. Poor Crew Discipline on board aircraft (50%)
- e) Establish seamless Air Navigation Services in the AFI Region by end of 2024
- f) Implement ASBU Block 0 Modules (2018)
- g) Develop and implement a National Plan for the reduction of CO₂ emissions due to international civil aviation (2022)
- h) Ensure that their ANSPs effectively participate in the African ANSP Peer Review Programme (2020)

Recommendation 8: Priorities for Airlines

That ICAO continue to support AFCAC in promoting the single African Air Transport Market (SAATM) and improve connectivity within the Continent.

That African States are encouraged to ratify the Cape Town Convention in order to facilitate airlines’ fleet enhancement and/or acquisition under this international legal instrument.

Recommendation 9: Considerations for Future Gap Analysis Surveys

That, based on experience gained through the Aviation Infrastructure for Africa Gap Analysis (2019), the following areas should be conducted in future gap analyses:

- a) Coordinate appropriately with their aviation industry to ensure proper collection of data;
- b) Effective advocacy and top-down approach through CEOs/DGs of CAAs, for accurate and robust data gathering from States;
- c) Evaluation of National Policies and Regulations;

- d) Human resources and training of personnel;
- e) Connecting time, cargo data, and average fleet utilization, etc.;
- f) Strengthening and expansion of the existing Maintenance and Repairs Organizations (MROs);
- g) Human resources development, training and retention of aviation professionals;
- h) Longer term aviation infrastructure gap analysis exercise should be conducted based on 25-year projections of traffic growth, operational and capacity / regulatory requirements, and demand for aviation professionals; and
- i) Determine the funding required to bridge the long term infrastructure gaps and identify appropriate financing mechanisms at State and / or regional level.

5. Conclusion

5.1. The IWAF/3 Declaration and Framework for development of an Aviation Infrastructure for Africa

called upon African States and African Regional Economic Communities (RECs) to take specific actions, in cooperation and coordination with the AUC, NPCA, AfDB, UNECA, AFCAC, the African Airlines Association (AFRAA) and international partners to:

- a) develop aviation infrastructure programmes and plans at national/regional levels based on a robust business case analysis, commensurate with the level of predicted traffic growth, and consistent with the ICAO Global Plans;
- b) align and integrate national and/or regional aviation infrastructure programmes and plans with an appropriately-balanced development of transport modes, including multi-modal and urban planning initiatives, and also link them with national and/or regional development plans and budgets;
- c) include the aviation sector in the overall planning, development and implementation of continental infrastructure programs and projects under the integrated, corridor development and spatial development approach of infrastructure development for bankability, effectiveness, maximum development impacts, sustainability and for the industrialisation of the continent;
- d) ensure the inclusion of major aviation infrastructure projects in the PIDA Priority Action Plan (PAP) for 2020 – 2030 and forging-African economic cooperation and international assistance platforms such as the Tokyo International Conference on African Development (TICAD);
- e) promote cooperation and compatible decision-making among transport authorities and other ministries in charge of related portfolios, including finance, economic planning, energy, environment, trade and tourism;
- f) consolidate planning and development efforts for aviation, tourism and trade infrastructure, whenever possible, while harmonizing regulatory frameworks and balancing the benefits of these economic sectors;
- g) determine strategic infrastructure targets that are consistent with the ICAO Global Plans by conducting gap-analyses between forecasted demand and current capacity and according to national and regional needs;
- h) balance long-term uncertainty for infrastructure investment with the need to adjust to short-term priorities and funding constraints for successful project delivery;
- i) establish project monitoring and evaluation frameworks using a data-driven approach;

- j) build capacity of soft infrastructure, especially within the framework of the MoveAfrica initiative, as investment in quality aviation infrastructure development requires simultaneous enhancement in human capacity and is completely dependent on each other;
- k) identify and develop skills required for the preparation of aviation-related PIDA-PAP projects through the establishment and implementation of capacity building strategies, taking advantage of the existing intra-African training capacity and the assistance of partners, such as TICAD; and
- l) review national legislation and procedures to fulfil States' safety, security and economic oversight obligations and enhance their oversight capabilities and capacity of regional and sub-regional oversight mechanisms to effectively implement ICAO's Standards and Recommended Practices (SARPs).

5.2. The Aviation Infrastructure for Africa Gap Analysis conducted by the AFI Plan Secretariat is an important step towards the identification and development of programmes and plans at national/regional levels based on a robust business case analysis, commensurate with the level of predicted traffic growth, and consistent with the ICAO Global Plans.

5.3. This report will be presented to the next meeting of the APIRG tentatively scheduled by end of July 2019, for the development of regional projects based on the initial work of its auxiliary bodies. The projects to be developed by APIRG form a solid basis to engage ICAO partners, international/regional institutions and aviation stakeholders through mechanisms such as the ICAO No Country Left Behind Initiative, the PIDA Priority Action Plan (PAP) for 2020 – 2030, the Tokyo International Conference on African Development (TICAD) and other economic cooperation and international assistance platforms.

- END -

Appendices

STATE:.....

**AVIATION INFRASTRUCTURE GAP ANALYSIS
FOR AFRICA
SURVEY QUESTIONNAIRE**

FEBRUARY 2019

Appendix A
AVIATION INFRASTRUCTURE GAP ANALYSIS FOR AFRICA
SECTION A: INTERNATIONAL AERODROMES

NAME OF THE INTERNATIONAL AERODROME:.....
REPORTING ENTITY:.....

Abbreviations

Lighting aids

- PA - Precision approach lighting system, Category I, II or III shown by an "x" if the aid is the same category as the runway type or if it is different by the numeral 1, 2 or 3 against the runway to be served, to indicate the type of system.
- SA - Simple approach lighting system, shown by an "x" against the runway to be served.
- VA - Visual approach slope indicator system, shown by an "L" or a "S" against the runway to be served. The letter "L" indicates that the system is PAPI or T-VASIS (AT-VASIS) and the letter "S" indicates that the system is PAPI (APAPI).
- RWY - Runway edge, threshold and runway end lighting. An "x" indicates that these aids are provided.
- CLL - Runway centre line lighting, shown by an "x" against the runway to be served.
- TDZ - Runway touchdown zone lighting, shown by an "x" against the runway to be served.
- TE - Taxiway edge lighting. An "x" indicates that the aid is provided. This requirement pertains to the entire aerodrome and only one entry is made when planning requirements for more than one runway are shown.
- TC - Taxiway centre line lighting. An "x" indicates that this is provided for the particular runway with which the entry is associated.
- STB - Stop bars. An "x" indicates that stop bars are provided for the runway with which the entry is associated.

Marking aids

- DES - Runway designation marking, shown by an "x" against the runway to be served.
- CLM - Runway centre line marking. An "x" indicates that the aid is provided.
- THR - Runway threshold marking, shown by an "x" against the runway to be served.
- TDZ - Runway touchdown zone marking, shown by an "x" against the runway to be served.
- SST - Runway side stripe marking. An "x" indicates that the aid is provided.
- AMG - Aiming point marking, shown by an "x" against the runway to be served.
- TWY - Taxiway centre line and, where required, edge marking. An "x" indicates that the aid is provided.
- HLD - Runway holding position marking shown by an "x" against the runway to be served. The pattern of the marking should conform to the provisions of Annex 14, Volume I

Runway visual range (RVR)

- TDZ - Observations should be provided representative of the touchdown zone.
- MID - Observations should be provided representative of the middle of the runway.
- END - Observations should be provided representative of the end portion of the runway.

A1-General information/Annual traffic

	2014	2015	2016	2017	2018
Total Passengers					
Cargo (Tonnes)					
Aircraft Movements					

A2-Airport Master Plan

Master Plan developed (Yes/No)	Year Date :	Responsible Entity

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A3-Airport certification status

Certified (Y/N)	Year Date :	Certifying Authority

A4-Airport Facilities

Design capacity Passenger Terminal	Design capacity Cargo Terminal	Fuel Supply

A5-Runways (RWY)

RWY number	Year of construction or its last overlay	Ref. code	Rwy type	Largest type of aircraft expected	length	Width	PCN/year of assessment	Pavement condition	Transverse slopes – (min and max)	Rwy surface condition / friction

Other comments:

A6-Shoulders/Strips/RESAs/OLS/Drainage

Rwy number	Rwy shoulders			Rwy strips			RESAS dimensions		OLS		Drainage system
	Width	Strength	Surface condition	Width	Strength	Surface condition	Clear and graded	Not	Existing	Not	

Other comments:

A7-Taxiways

Identification	Taxiway shoulders			Taxiway strips			Pavement surface condition	PCN / Year of assessment
	Width	Strength	Surface condition	Width	Strength	Surface condition		

--	--	--	--	--	--	--	--	--

Other comments:

A8-Apron

Number of parking positions	
Isolated aircraft parking position (yes/No)	
Pavement surface condition	
PCN / Year of assessment	
Apron lighting	

Other comments:

A9-Lighting and PAPI

Rwy / Twy	Type of Rwy	Lighting aids									Status/Year of installation	Electrical system status (cables, ...)	Operational status
		P A	S A	V A	RW Y	CL L	TD Z	T E	T C	ST D			

Other comments:

A10-Markings

Rwy / Twy	Type of Rwy	Markings								Status/Year of installation	Status
		DES	CLM	THR	TDZ	SST	AMG	TWY	HLD		

Other comments:

A11-MET equipment

RVR			Wind speed and direction indicators		Air Temperature and humidity		ceilometer
TDZ	MID	END	TDZ	MID	TDZ	END	900 – 1200m from TDZ

Other comments: Wind shear detection equipment at 1000 to 1500m from the TDZ if required through on occurrence study.

A12-Electrical power supply systems for air navigation facilities

Electrical load of technical facilities in KVA (ATC, Nav aids, Airfield, etc)	
---	--

Status of the primary power supply	
------------------------------------	--

		Year of installation	Operational status
Status of the secondary power supply	Generator 1		
	Generator 2		
	UPS		

Electric power supply connections status	
--	--

Time interval between failure of the primary source of power and the complete restoration of the services	
---	--

Other comments:

A13-Rescue and firefighting services and equipment

RFF category (Protection level)	Response time (seconds)

A14-Vehicles

Vehic le	Year of purchase	Operatio nal status	Spares availabil ity	Water capaci ty	Foam type/capa city	Complement ary agents	Accelerat ion	Top speed	Dischar ge rate	communica tion

Other comments:

A15-Fire station

Location	Vehicle housing	Accommodation for personnel and related equipment							Watchrooms	General aspects	Communications and alarm systems	Appropriate storage
		Locker room	Mess room	Washroom	Drying room	Offices	Training facilities	Fitness facilities				

Other comments:

A16-Water supply and other facilities and equipment

RFF personnel PPE	
Water supply system	
Emergency access roads	
Rescue equipment carried on RFF vehicles	
Ambulances	
Other rescue equipment	
Communication and alarm system	

Other comments:

A17-RFF personnel

Number per shift	
Total number	
Trainings completed (Levels and numbers)	

Other comments:

A18-Other infrastructures, equipment, ...

EOC	
Mobile Command post	
Communication system for aerodrome emergencies	
Perimeter fences	
Emergency equipment for aerodromes surrounded by difficult environments	
Access roads for RFFS	
Security perimeter control roads	
Removal of disabled aircraft plan/equipment	

Other comments:

A19-Wildlife Strike Hazard Control and Reduction

Wildlife strike hazard programme	Equipment	Personnel	Risk assessment	Procedures	Trainings

Other comments:

A20-Preventive Maintenance Capacity Programmes

	Programmes	Personnel	Training	spares
Civil				
Electrical				
Mechanical				

Other comments:

A21-Aviation Fuel

Number of suppliers	Total capacity	Annual fuel throughput

A22-Aircraft Maintenance/Repair Capacity

Name of AMO(s)	Category			
	A	B	C	D

Other comments:

A23-Ground Handling

Ground Service Providers	Ground Services												Security measures		
	Organization and Management		Load Control		Passenger and Bag Handling		Aircraft Handling and Loading		Aircraft Ground Movements		Cargo and Mail Handling				
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Other comments:

Other general comments:

Appendix B
AVIATION INFRASTRUCTURE GAP ANALYSIS FOR AFRICA
SECTION B: AIR NAVIGATION SERVICES

REPORTING ENTITY:.....

AIR TRAFFIC MANAGEMENT (ATM)

B1-AIR TRAFFIC SERVICES (ATS)

ATS Unit(s)	Working Hours	Number of Controllers	Equipment (Complete/Incomplete)		Airspace Classification	Contingency Plan	Number of flights per day
			Yes	No			
TWR							
APP							
ACC							
FIC							

B2-PERFORMANCE BASED NAVIGATION (PBN)

PBN Plan		LNAV		LNAV/VNAV		LPV		RNP AR		PBN SID/STAR	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No

COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

B3-AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN) PLAN

EXPLANATION OF THE TABLE

Column

- 1 The AFTN Centres/Stations of each State are listed alphabetically. Each circuit appears twice in the table. The categories of these facilities are as follows:
M - Main AFTN COM Centre
T - Tributary AFTN COM Centre
S - AFTN Station
- 2 Category of circuit:
M - Main trunk circuit connecting Main AFTN communication centres.
T - Tributary circuit connecting Main AFTN communication centre and Tributary AFTN Communications Centre.
S - AFTN circuit connecting an AFTN Station to an AFTN Communication Centre.
- 3 Type of circuit provided:
LTT/a - Landline teletypewriter, analogue (e.g. cable, microwave)
LTT/d - Landline teletypewriter, digital (e.g. cable, microwave)
LDD/a - Landline data circuit, analogue (e.g. cable, microwave)
LDD/d - Landline data circuit, digital (e.g. cable, microwave)
SAT/a/d - Satellite link, with /a for analogue or /d for digital
- 4 Circuit signalling speed in bits/s.
- 5 Circuit protocols
- 6 Data transfer code (syntax):
ITA-2 - International Telegraph Alphabet No. 2 (5-unit Baudot code).
IA-5 - International Alphabet No. 5 (ICAO 7-unit code).
CBI - Code and Byte Independency (ATN compliant).
- 7 Remarks

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	2	3	4	5	6	7

B4- REQUIRED ATN INFRASTRUCTURE ROUTING PLAN

EXPLANATION OF THE TABLE

Column

- 1 Name of the Administration and Location of the ATN Router
- 2 Type of Router (in end systems (ES) of the Administration shown in column 1)
- 3 Type of Interconnection:
Inter-Regional: Connection between different Regions/ domains
Intra-Regional: Connection within a Region/ domain.
- 4 Connected Router: List of the Administration and location of the ATN routers to be connected with the router shown in column 1.
- 5 Bandwidth: Link Speed expressed in bits per second (bps)
- 6 Network Protocol: If Internet Protocol Suite is used, indicate version of IP (IPv4 or IPv6)
- 7 Via: The media used to implement the interconnection of the routers. (in case of IP service bought from a service provider, indicate VPN)
- 8 Remarks

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remarks
1	2	3	4	5	6	7	8

B5-ATS DIRECT SPEECH CIRCUITS PLAN

EXPLANATION OF THE TABLE

Column

- 1 and 2 Circuit terminal stations are listed alphabetically by the Terminal I.
- 3 A — indicates ATS requirement for the establishment of voice communication within 15 seconds.
D — indicates requirements for instantaneous communications.
- 4 Type of service specified:
LTF — landline telephone (landline, cable, UHF, VHF, satellite).
RTF — radiotelephone.
SAT— Aeronautical Satellite VSAT Digital Line
- 5 Type of circuits; Direct (DIR) or Switched (SW).
D — indicates a direct circuit connecting Terminals I and II.
S — indicates that a direct circuit does not exist and that the connection is established via switching at the switching centre(s) indicated in column 6.

6 Location of switching centre(s). Alternate routing location, if available, is indicated in brackets.
 7 Remarks

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			REMARKS
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	
1	2	3	4	5	6	7

B6-HF-VHF NETWORK DESIGNATORS

EXPLANATION OF THE TABLE

Column

- 1 Name of station, preceded by its location indicator.
- 2 Network designators assigned to the facility providing HF radiotelephony en-route communications (selected from the provisions of the allotment plan in Appendix S27 to the ITU Radio Regulations).

Name of station preceded by its Location indicator and its function	VHF	HF En route/
1	2	

B7-NAVIGATION AIDS

EXPLANATION OF THE TABLE

Column

- 1 Name of the State/Territory, city and aerodrome and, for en-route and terminal area aids, the location of the facility.
- 2 Type of runway:
NINST — non-instrument
NPA — non-precision approach runway
PA1 — precision approach runway,
Category I PA2 — precision approach runway, Category II
- 3 The function served by the aids shown in columns 4 to 8 :

A/L — approach and landing
E — en-route
T — terminal
- 9 The distance and altitude to which signal protection of the VOR or VOR/DME is required, indicated in nautical miles (NM) and in hundreds of feet, or recommended rated coverage of NDB expressed in nautical miles.
- 10, 11 To be developed.
GNSS — global navigation satellite system (including GBAS and SBAS).
GBAS (ground-based augmentation system) implementation planned to be used in precision approach and landing CAT I, CAT II, CAT III.
SBAS (satellite-based augmentation system) planned to be used for route navigation, for terminal, for non-precision approach and landing. An “X” indicates service availability; exact location of installation will be determined.

Station/Territory	Rwy type	Function	ILS	L	DME	VOR	NDB	Coverag e	GNSS		Remarks
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12

B8-ATS Surveillance systems

EXPLANATION OF THE TABLE

Column

- 1 Name of State/Territory and location of radar head facility or FIR
- 2 Area of routing
- 3 Air traffic services unit served by the facility or FIR
- 4 Primary surveillance radar
- 5 Coverage of primary surveillance radar in nautical miles
- 6 Secondary surveillance radar and modes, namely Modes A, C or S
- 7 Coverage of secondary surveillance radar in nautical miles
- 8 Automatic dependent surveillance broadcast (under development)
- 9 Automatic dependent surveillance contract
- 10 Remarks

Note.— The following codes are used in columns 4, 6, 8, 9 and 10:

I — Required and implemented

Column 6

I — implementation using conventional

SSR MI — implementation using monopulse SSR

X — Required but implementation status not determined

N — Required but not implemented

A — Existing facility provided to supplement or substitute the requirement

F — Future plan

<-Year — Planned commissioning year to be used as appropriate in conjunction with “F” and “N”

>Year — Planned commissioning year to be used as appropriate in conjunction with “A” and “I”

State/Territory and Location	AR	ATS unit served	PS R	Cove- rage (NM)	SSR (Modes A,C or S)	Coverage (NM)	ADS- B	ADS- C	Rem arks
1	2	3	4	5	6	7	8	9	10

B9- SSR II CODES
EXPLANATION OF
THE TABLE

Column

1. Name of State/Territory
2. Abbreviations for the State

3. Location of radar head facility
4. Surveillance sensor
5. Interrogator Identification Code

COUNTRY	ABBR.	LOCATION	SERVICE	II CODE
1	2	3	4	5

B10-ATM AUTOMATION SYSTEMS
EXPLANATION OF THE TABLE

Column

- 1 Name of State/Territory and location of radar head facility or FIR
- 2 Area of routing

- 3 Air traffic services unit served by the ATS automation systems. The abbreviations for this column are:

AACC — Area approach control centre SMC — Surface movement control
ACC — Area control TCU — Terminal control unit APP — Approach control
TMA — Terminal control area EC — En-route centre
TWR — Tower control
FIS — Flight information service
- 4 Surveillance sensor linked to the ATS automation systems. Four-letter FIR identifier, enclosed in brackets, shall be shown for sensors outside the FIR.
- 5 Radar data processing system
- 6 Fight data processing system
- 7 Minimum safe altitude warning system
- 8 Automatic dependent surveillance
- 9 Controller-pilot data link communications
- 10 ATS inter-facility data link communications
- 11 Processing area of the radar data processing system in (nautical miles)²
- 12 Number of ATS positions
- 13 Remarks

Note.— The following codes are used in columns 5 to

- 12:
- I — Required and implemented.
 - X — Required but implementation status not determined
 - N — Required but not implemented
 - A — Existing facility provided to supplement or substitute the requirement
 - F — Future plan
 - <-Year — Planned commissioning year to be used as appropriate in conjunction with “F” and “N”
 - >-Year — Planned decommissioning year to be used as appropriate in conjunction with “A” and “I”

State/Territory and location	AR	ATS unit served	Data source	RDPS	FDPS	MSAW	ADS-C	CPDLC	AIDC	PA/RDPS (NM)	NPOS	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13

METEOROLOGY (MET)
B11-METEOROLOGICAL WATCH OFFICES
EXPLANATION OF THE TABLE

Column

- 1 Name of the State where meteorological service is required
- 2 Name of the flight information region (FIR) or control area (CTA) where meteorological service is required
Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a State wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.
- 3 ICAO location indicator of the FIR or CTA
- 4 Name of the meteorological watch office (MWO) responsible for the provision of meteorological service for the FIR or CTA
Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a State wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.
- 5 ICAO location indicator of the responsible MWO
- 6 Requirement for SIGMET information (excluding for volcanic ash and for tropical cyclones) to be provided by the MWO for the FIR or CTA concerned, where:
Y – Yes, required
N – No, not required
- 7 Requirement for SIGMET information for volcanic ash to be provided by the MWO for the FIR or CTA concerned, where:
Y – Yes, required
N – No, not required
- 8 Requirement for SIGMET information for tropical cyclone to be provided by the MWO for the FIR or CTA concerned, where:
Y – Yes, required
N – No, not required
- 9 Requirement for AIRMET information to be provided by the MWO for the FIR or CTA concerned, where:
Y – Yes, required
N – No, not required

State	FIR or CTA where meteorological service is required	ICAO Location indicator	MWO responsible for the provision of MET service to FIR / CTA	ICAO Location indicator	SIGMET	SIGMET - WA	SIGMET - WC	AIRMET
1	2	3	4	5	6	7	8	9

B12-AERODROME METEOROLOGICAL OFFICES

EXPLANATION OF THE TABLE

Column

- 1 Name of the State where meteorological service is required
- 2 Name of the AOP aerodrome where meteorological service is required
Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a State wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.
- 3 ICAO location indicator of the AOP aerodrome
- 4 Designation of AOP aerodrome:
RG - international general aviation, regular use
RS - international scheduled air transport, regular use
RNS - international non-scheduled air transport, regular use
AS - international scheduled air transport, alternate use
ANS - international non-scheduled air transport, alternate use
- 5 Name of the aerodrome meteorological office responsible for the provision of meteorological service
Note: The name is extracted from the ICAO Location Indicators (Doc 7910) updated quarterly. If a State wishes to change the name appearing in Doc 7910 and this table, ICAO should be notified officially.
- 6 ICAO location indicator of the responsible aerodrome meteorological office
- 7 Requirement for METAR/SPECI from the aerodrome concerned, where:
Y – Yes, required
N – No, not required
- 8 Requirement for information on the state of the runway provided by the appropriate airport authority to be included as supplementary information in METAR/SPECI from the aerodrome concerned, where:
Y – Yes, required
N – No, not required
- 9 Requirement for trend forecast to be appended to METAR/SPECI from the aerodrome concerned, where
Y – Yes, required
N – No, not required
- 10 Requirement for TAF from the aerodrome concerned, where
C - Requirement for 9-hour validity aerodrome forecasts in TAF code (9H)
T - Requirement for 18/24-hour validity aerodrome forecasts in TAF code (18/24H)
X - Requirement for 30-hour validity aerodrome forecasts in TAF code (30H)
N – No, not required
- 11 Requirement for maximum and minimum temperature (expected to occur during the period of validity of the TAF) to be included in TAF from the aerodrome concerned, where:
Y – Yes, required
N – No, not required
- 12 Availability of METAR/SPECI and TAF from the aerodrome concerned, where:
F – Full availability : OPMET information as listed issued for the aerodrome all through the 24-hour period
P – Partial availability: OPMET information as listed not issued for the aerodrome for the entire 24-hour period

State	Name of and RCC/RSC	SPOC	Details of rescue facilities	SAR Agreements	Remarks
1	2	3	4	5	6

SEARCH AND RESCUE (SAR)

B13-SEARCH AND RESCUE FACILITIES

EXPLANATION OF THE TABLE

Column

- 1 State
- 2 Name of the Rescue Coordination Centre (RCC) and Rescue Sub-Centre (RSC).
- 3 SAR points of contact (SPOC). Name of the SPOC.
- 4 Details of rescue facilities
- 5 SAR Agreements
- 6 Remarks. Supplementary information such as the type of RCC (e.g. maritime or aviation or joint).

AERONAUTICAL INFORMATION MANAGEMENT (AIM)

B14-RESPONSIBILITY FOR THE PROVISION OF AIS/AIM FACILITIES AND SERVICES

EXPLANATION OF THE TABLE

Column:

- 1 Name of the State or territory
- 2 Designated international NOTAM Office (NOF)
- 3 Designated State for AIP production
- 4 Designated State for aeronautical charts (MAP) production
- 5 Designated State for the provision of the authoritative Integrated Aeronautical Information Database (IAID)
- 6 Designated State for the provision of pre-flight information services
- 7 Remarks — additional information, as appropriate.

State	NOF	AIP	MAP	IAID	Pre-flight briefing	Remarks
1	2	3	4	5	6	7

B15-PRODUCTION RESPONSIBILITY FOR SHEETS OF THE WORLD AERONAUTICAL CHART - ICAO 1:1 000 000 OR AERONAUTICAL CHART — ICAO 1: 500 000

State	Sheet number(s)	Remarks
1	2	3

B16-AIS/AIM TRANSITION

Phase	Status			
	Planning	Developing	In Progress	Completed
Phase 1				
Phase 2				
Phase 3				

B16-AVIATION SYSTEM BLOCK UPGRADES (ASBUs)

Block 0 Modules	Need Analysis of Modules				Implementation Status			
	Not Started	In Progress	Need	N/A	Planning	Developing	Partially Implemented	Implemented
B0-ACAS								
B0-ACDM								
B0-AMET								
B0-APTA								
B0-CCO								
B0-CDO								
B0-DATM								
B0-FICE								
B0-FICE								
B0-FRTO								
B0-NOPS								
B0-RSEQ								
B0-SNET								
B0-TBO								
B0-WAKE								

Appendix C

AVIATION INFRASTRUCTURE GAP ANALYSIS FOR AFRICA

SECTION C: AIRCRAFT FLEET AND EQUIPAGE

REPORTING ENTITY:.....

C1-AIRCRAFT FEET CAPACITY / TYPES OF AIRCRAFT

Airlines	Number of aircraft	Types of aircraft
Airline A		AAA, BBB, etc
Airline B		
Airline C		
Airline D		

C2-AVIONIC EQUIPAGE

1. OPERATIONAL APPROVALS

Type of approval	Number of aircraft
Oceanic In-Trail Climb/Descent Procedure (ITP)	
Reduced Vertical Separation Minimum (RVSM)	
Performance Based Navigation (PBN)	
Extended Diversion Time Operations (EDTO)	
Extended Operations (ETOPS)	

2. COMMUNICATIONS

Equipment	Number of aircraft
VHF (25kHz)	
VHF (8.33kHz)	
CPDLC	
ACARS	
Iridium cockpit voice	
Inmarsat cockpit voice	
ARINC data link	
ELT (TSO-C91a)	
ELT (TSO-C126)	
HF	
HFDL	

3. NAVIGATION

Equipment	Number of aircraft
VOR	
DME	
ILS	
INS/IRU	
RNAV	

Equipment	Number of aircraft
RNAV 1	
RNAV 5 / B-RNAV	
RNP < 0.3	
RNP 1 / P-RNAV	
RNP 2	
RNP 4	
RNP APCH	
RNP AR APCH	
APV Baro VNAV	
LPV (SBAS)	
FMS RTA	
FMS RF	
FMS FRT	
GNSS	
GBAS	
MMR (Multimode receiver)	

4. SURVEILLANCE

Equipage	Number of aircraft
ADS-C	
ADS-B OUT	
ADS-B IN	
MODE S ELS	
MODE S EHS	
FMS WPR	