

# AGENCE NATIONALE DE L'AVIATION CIVILE DU SENEGAL

# 1. Characteristics of the industry

In Senegal, Dakar Intl Airport Leopold Sedar SENGHOR is the main international airport, for which the current growth of Air Traffic is about 4 to 5%. Dakar ACC has the responsibility to provide air navigation services within Dakar FIR and Dakar Oceanic FIR where the major traffic flow is defined as the corridor Europe/South America.

- The economical growth expected, with the great development of the tourism in the country in the near future will have an great impact on the Air Traffic growth which is projected around 7%. In addition, the creation of a new national airline will increase the domestic Air Traffic.
- However, Dakar Intl Airport has just one single runway for the medium and heavy aircraft. The runway occupancy is too long because there is no rapid exit.

- The airport is located in an urban area and the protection areas of the approach segments are occupied by buildings and houses. This situation doesn't allow further extensions of the airport. That's why the government has planned to build a new airport and to transfer the activities of Dakar Intl Airport to the new airport.
- Meanwhile, the challenges are to maintain a satisfied level of safety and efficiency for the aerodrome operations in Dakar Intl Airport.



# **THE AIR NAVIGATION SERVICE PROVIDER**

- Senegal is a member state of ASECNA. In this regard, the air navigation services are provided by ASCECNA which is a regional organization with 17 African States members plus France.
- ASECNA is an autonomous multinational entity governed politically by a committee of ministers and technically by a Board of Directors General of Civil Aviation Authority of the members states.

- Indeed, the political issues such as the appointment of a new DG and the strategic guidelines are carried out by the Committee of ministers. The DG of ASECNA reports to the Board of Directors General.
- The ASECNA member's states have put together their national airspace in order to create a minimum of FIRs which facilitate the creation of seamlessness and homogenous airspace. This kind of organization guaranties also a great level of harmonization and interoperability of the infrastructure installed in the states.

# **MAJOR STAKEHOLDERS/PART NERS**



- ANACS as the Civil Aviation Authority
- ASECNA as the Air Navigation Services Provider
- Agence des Aéroports du Sénégal (ADS), as the aerodrome operator
- AIBD, new airport operator
- HAALSS,
- ARMEE SENEGALAISE
- ARMEE FRANCAISE
- AERO CLUB
- SENEGALAIR

Regular airlines	Aircraft types
South African Airways	A343/A346/B737-800/B747-400
Nouvelle Air Ivoire	B737-500/A321
Mérídiana Fly	A330-200
Iberia	A319/A320/A321/A340
Turkish Airlines	A330-200/A340

Tunis Air	A320/ A319
Brussels Airlines	A333
Virgin Nigeria	B737/ E90
Air Algérie	B738
Ethiopian Airlines	B757
Royal Air Maroc	B738/B767/B763
Delta Airlines	B757-200
Mauritania Airways	B737-700/ ATR -42

Air Mali	MD 87
Afriqiyah Airways	A319
Tap Portugal	A321
Air Traffic Gambia	D0228
Kenya Airways	B737/B767

Air Europa

B737-800

Arik Wings of Nigeria

B737-700/CRJ 900

Air Burkina

MD87

Tacv

D4CBT

Air France	B777-300
Emirates	A 340-300
Elysian Airlines	Umbraer 120-Beechcraft 1900D

<b>CHARTERS</b>	<b>Aircrafts Types</b>
AIR MED	A320/A321
CORSAIR	B747-400
HELLO LTD	MD 90
XL Airways	B737-800

<b>Cargos</b>	<b>Aircrafts types</b>
<b>LUFTHANSA CARGO</b>	<b>M1F</b>

# 4. Problem definition



**The capacity of the airport is limited due to the runway occupancy which is too long. There is congestion in Dakar Oceanic FIR during certain period of the day (mainly night time). The aircraft could not obtain the preferred flight levels. Much of the time, so they have to change their routes.**

**One of the main concerns of Dakar Intl Airport, is the concentration of birds. The Airport Operator has to implement a program of bird strike to establish a successful program of bird hazard.**

# Performance Based Air Navigation Plan

Present a high level strategy for the development of navigation applications to be implemented in Senegal in the short term (2008-2012) and medium term (2013-2016 and will aim to:

- A. Enhance safety by using the approach procedures in three-dimensional (3D) with a guiding path to the runway, thus reducing the risk of impact with the ground without losing control.

- C. Improve access to airports and airspace at any time and the opportunity to meet the environmental constraints and obstacle clearance.
- D. Improve reliability and reduce delays by defining more precise procedures for the FMS.
- E. Improve the efficiency and flexibility by allowing more operators to use preferential flight paths across the air space and all flight levels.
- F. Reduce workload and improve the efficiency of air traffic controllers

## Air traffic routes:

Through the optimization of ATS routes, making them as direct as possible

- In terminal areas (arrivals and departures), in:
- Establishing an effective link between the areas en-route and TMA;
- Increasing the capacity of aerodromes operating with a single runway;

- Reducing the workload of the controller;
- Defining safe paths arrival and departure.

## **On approach, in:**

- Providing an effective link between the areas en-route and TMA;
- Increasing the operation in the configuration of a single runway;
- Reducing the workload of the controller;
- Reducing the minimum operating airfields;
- By providing redundancy to landing aids.

# **CURRENT STATUS**

## **CNS / ATM**



# **COMMUNICATION INFRASTRUCTURE**

- CPDLC Connections (FIR G000)
- VHF coverage in the Dakar area described below
- CTR Dakar, Dakar TMA (lower airspace)
- UTA Dakar, UTA Dakar Oceanic, all ATS routes in the upper airspace



Designation	Call signs	Frequencies
TWR	DAKAR TWR	118,1 MHZ
ACC	DAKAR CONTRÔLE	120,5 MHZ 129,5 MHZ 2854 3452 5565 6535 KHZ 6673 8861 11291 13315 KHZ 13357 7955 KHZ

Remote VSAT installed in  
TAMBACOUNDA (129.5)

# NAVIGATION AND LANDING AIDS

Aids	Frequencies	Geographic Coordinates
VOR/DME	YF 113,1 MHZ CH78X	14°44'41, 017°28'29,2" W 4" N 41
ILS/LLZ	110,3 MHZ	14°45'30,94" N 017°28'52,63" W
ALD/DME. P	335,0 MHZ CH40X	14°43'44,11" N 017°28'42,54" W
L SDS	323 KHZ	14°43' N 17°29W

# INFRASTRUCTURE MONITORING

- ADS-C (FIR G000)
- Secondary RADAR for surveillance  
antenna position coordinates: N 14 °  
44 '57"W 017 ° 29' 14.52"

# • Procedures

## ▪ Dakar Airport

### ❖ Precision Procedures

❖ Apton ILS 36 S 36 VOR-DME-IL

❖ - Non precision Procedures

❖ Apton-VOR-DME VOR 36 36 18 VOR DME  
BONVI-VOR- 18

❖ The "SDR" 18

# Visual landing approach for Instrument Landing

## - GNSS-RNAV

TMA Procedures for arrival and departure SID  
RNAV / GNSS RWY 36 RNAV SID / GNSS RWY  
18 RNAV / GNSS PONTI RWY 36 RNAV /  
GNSS RWY 18 KIRN

# STATUS OF IMPLEMENTATION OF RNAV IN SENEGAL

ATS ROUTES, SIDS, STARS AND RNAV APPROACHES

Dakar Airport

TMA Procedures for arrival and departure

- GNSS-RNAV

RWY 18 RNAV / GNSS PONTI RWY 36 RNAV / GNSS  
KIRN SID RWY 18 RNAV / GNSS RWY 36 RNAV SID /  
GNSS

# RNAV Route Comments

- UM 372 CASABLANCA / BULIS / CONAKRY
- UM 725 TIMMOUNI / TAMIL / DAKAR
- UM 974 DAKAR / Mopti / NIAMEY
- A 741 (RNP10) PORTO SANTO / FORTALEZA
- A 857 (RNP10) Lanzarote / F. OF NORONHO
- A 866 (RNP10) GOMER / MASSORO
- A 873 (RNP10) Amilcar Cabral / NATAL
- UM 122 AGADIR / BULIS / BAMAKO
- UB 623 (RNP10) Amilcar Cabral / F.DE NORONHO
- UL 435 JOHANNESBO URG / ATLANTA
- UM 108 TIMOUN / BAMAKO

# STRATEGY IMPLEMENTATION

- **short-term strategy (2008-2012)**

The short-term strategy will focus on accelerating the implementation and proliferation of RNAV and RNP. The continued introduction of RNAV and RNP not only provides benefits and savings to users, but it will also encourage the equipment of aircraft.

## **En-route**

For the airspace and corridors requiring structured routes to manage traffic flow, Senegal in synergy with ASECNA, consider the implementation of RNAV<sub>5</sub>/RNP<sub>5</sub> where it is operationally justified.



## **TERMINAL AREAS (ARRIVALS / DEPARTURES)**

RNAV reduces conflicts between traffic flow by strengthening the flight paths. SID and STAR RNAV-1/RNP-1 Basic improve safety, capacity and flight efficiency. It also reduces communication errors.

### **APPROACH**

The application of RNP APCH will be implemented at the international airport of Dakar.

### **TARGET DATES FOR IMPLEMENTATION FOR THE SHORT TERM**

- RNP APCH (with Baro-VNAV) Dakar (priority is given to airports with operational benefits)
- Review of existing conventional routes and RNAV for a transition to RNAV-5 (RNAV-10) in 2012, where it is operationally justified

## **MEDIUM-TERM STRATEGY (2013-2016)**

In the medium term, the growing demand of air transport will continue.

The medium term will benefit from these enhanced capabilities of flights using RNAV and RNP, with a proportional increase in benefits such as efficient flight profiles in fuel economy, better access to airspace and airports, more capacity and reduced delays

## **TERMINAL AREA (ARRIVALS / DEPARTURES)**

During this period, the RNP-1 will become a basic requirement for flights arriving or departing from major airports. This will ensure the necessary flow and accessibility, as well as reducing the workload of the controller, while maintaining safety standards.

# APPROACH

In the medium term priorities for implementation of instrument approaches are still based on RNP APCH and RNP AR APCH and full implementation is scheduled for the end of this period.

## TARGET DATES FOR IMPLEMENTATION FOR THE MEDIUM TERM

- RNP APCH (with Baro-VNAV) or APV to 100% of instrument runways in 2016.
- SID / STAR RNAV-1 or RNP-1 for 100% of international airports in 2016.
- SID / STAR RNAV-1 or RNP-1 for 90% of domestic airports with heavy traffic or there are operational advantages.
- Implementation of RNAV / RNP additional as needed.

## LONG-TERM STRATEGY (2017 AND BEYOND)

The environment in the long term will be characterized by continued growth of air transport and an increase in the complexity of air traffic.

Senegal and the key players will then need an operational concept that leverages the full capacity of the aircraft during this period.

# Training

Training will be provided to staff of ANACS, ASECNA, aircraft operators, airports by accredited training centers.

# 6-Performance Framework Form





# 7- Risk Management

ANACS knows that there are risks in operating PBN, as mixed operation of aircraft with or without RNP equipped, and the availability of the satellites. To make the transition to PBN, ANACS will consider the following safety principles for the implementation:

- .



- During the period of coexistence, the conventional navigation systems will be retained to provide services to aircraft not equipped with PBN;
- Safety assessments will be conducted as well as safety inspections and a contingency plan to ensure safe operation
- Monitoring of the operation will be performed, including the classification of the operations, aircraft performance. Navigation errors and corrective measures will be formulated

**Workshop on the development of national performance  
framework of air navigation systems  
Nairobi, - 6-10 December 2010**

**(Presented by SENEGAL)**

**1. Characteristics of the industry**

In Senegal, Dakar Intl Airport Leopold Sedar SENGHOR is the main international airport, for which the current growth of Air Traffic is about 4 to 5%. Dakar ACC has the responsibility to provide air navigation services within Dakar FIR and Dakar Oceanic FIR where the major traffic flow is defined as the corridor Europe/South America.

The economical growth expected, with the great development of the tourism in the country in the near future will have an great impact on the Air Traffic growth which is projected around 7%. In addition, the creation of a new national airline will increase the domestic Air Traffic.

However, Dakar Intl Airport has just one single runway for the medium and heavy aircraft. The runway occupancy is too long because there is no rapid exit.

The airport is located in an urban area and the protection areas of the approach segments are occupied by buildings and houses. This situation doesn't allow further extensions of the airport. That's why the government has planned to build a new airport and to transfer the activities of Dakar Intl Airport to the new airport.

Meanwhile, the challenges are to maintain a satisfied level of safety and efficiency for the aerodrome operations in Dakar Intl Airport.

**2. The air navigation service provider**

Senegal is a member state of ASECNA. In this regard, the air navigation services are provided by ASCECNA which is a regional organization with 17 African States members plus France.

ASECNA is an autonomous multinational entity governed politically by a committee of ministers and technically by a Board of Directors General of Civil Aviation Authority of the members states.

Indeed, the political issues such as the appointment of a new DG and the strategic guidelines are carried out by the Committee of ministers. The DG of ASECNA reports to the Board of Directors General.

The ASECNA member's states have put together their national airspace in order to create a minimum of FIRs which facilitate the creation of seamlessness and homogenous airspace. This kind of organization guaranties also a great level of harmonization and interoperability of the infrastructure installed in the states.

### 3. Major stakeholders/partners

ANACS as the Civil Aviation Authority

ASECNA as the Air Navigation Services Provider

Agence des Aéroports du Sénégal (ADS), as the aerodrome operator

AIBD, new airport operator

HAALSS,

ARMEE SENEGALAISE

ARMEE FRANCAISE

AERO CLUB

SENEGALAIR

<b>Regular airlines</b>	<b>Aircraft types</b>
South African Airways	A343/A346/B737-800/B747-400
Nouvelle Air Ivoire	B737-500/A321
Méridiana Fly	A330-200
Iberia	A319/A320/A321/A340
Turkish Airlines	A330-200/A340
Tunis Air	A320/ A319
Brussels Airlines	A333
Virgin Nigeria	B737/ E90
Air Algérie	B738
Ethiopian Airlines	B757

Royal Air Maroc	B738/B767/B763
Delta Airlines	B757-200
Mauritania Airways	B737-700/ ATR -42
Air Mali	MD 87
Afriqiyah Airways	A319
Tap Portugal	A321
Air Traffic Gambia	D0228
Kenya Airways	B737/B767
Air Europa	B737-800
Arik Wings of Nigeria	B737-700/CRG 900
Air Burkina	MD87
Tacv	D4CBT
Air France	B777-300
Emirates	A 340-300
Elysian Airlines	Umbraer 120-Beechcraft 1900D

<b>CHARTERS</b>	<b>Aircrafts Types</b>
AIR MED	A320/A321
CORSAIR	B747-400
HELLO LTD	MD 90
XL Airways	B737-800

<b>Cargos</b>	<b>Aircrafts types</b>
AIR FRANCE	B747
LUFTHANSA CARGO	MD11F

#### **4. Problem definition**

The capacity of the airport is limited due to the runway occupancy which is too long. There is congestion in Dakar Oceanic FIR during certain period of the day (mainly night time). The aircraft could not obtain the preferred flight levels. Much of the time, so they have to change their routes.

One of the main concerns of Dakar Intl Airport, is the concentration of birds. The Airport Operator has to implement a program of bird strike to establish a successful program of bird hazard.

#### **5. Performance Based Air Navigation Plan**

A. Present a high level strategy for the development of navigation applications to be implemented in Senegal in the short term (2008-2012) and medium term (2013-2016) and will aim to:

B. Enhance safety by using the approach procedures in three-dimensional (3D) with a guiding path to the runway, thus reducing the risk of impact with the ground without losing control.

2

C. Improve access to airports and airspace at any time and the opportunity to meet the environmental constraints and obstacle clearance.

D. Improve reliability and reduce delays by defining more precise procedures for the FMS.

E. Improve the efficiency and flexibility by allowing more operators to use preferential flight paths across the air space and all flight levels.

F. Reduce workload and improve the efficiency of air traffic controllers.

- Air traffic routes:

o through the optimization of ATS routes, making them as direct as possible

-

- In terminal areas (arrivals and departures), in:

o Establishing an effective link between the areas en-route and TMA;

o Increasing the capacity of aerodromes operating with a single runway;

o Reducing the workload of the controller;

o Defining safe paths arrival and departure.

- On approach, in:

o Providing an effective link between the areas en-route and TMA;

o Increasing the operation in the configuration of a single runway;

o Reducing the workload of the controller;

o Reducing the minimum operating airfields;

o By providing redundancy to landing aids.

## 5-1 CURRENT STATUS CNS / ATM

### 5-1-1 COMMUNICATION INFRASTRUCTURE

- CPDLC Connections (FIR GOOO)

- VHF coverage in the Dakar area described below

- CTR Dakar, Dakar TMA (lower airspace)

- UTA Dakar, UTA Dakar Oceanic, all ATS routes in the upper airspace

<b>Designation</b>	<b>Call signs</b>	<b>Frequencies</b>
--------------------	-------------------	--------------------

<b>TWR</b>	<b>DAKAR TWR</b>	118,1 MHZ
<b>ACC</b>	<b>DAKAR CONTROL</b>	120,5 MHZ 129,5 MHZ 2854 3452 5565 6535 KHZ 6673 8861 11291 13315 KHZ 13357 7955 KHZ

Remote VSAT installed in TAMBACOUNDA (129,5)

#### 5 -1 to 2 NAVIGATION AND LANDING AIDS

<b>Aids</b>	<b>Frequencies</b>	<b>Geographic Coordinates</b>
<b>VOR/DME</b>	YF 113,1 MHZ CH78X	14°44'41, 017°28'29,2" W 4" N 41
<b>ILS/LLZ</b>	110,3 MHZ	14°45'30,94" N 017°28'52,63" W
<b>ALD/DME. P</b>	335,0 MHZ CH40X	14°43'44,11" N 017°28'42,54" W
<b>L SDS</b>	323 KHZ	14°43' N 17°29W

#### 5-1-3 INFRASTRUCTURE MONITORING

ADS-C (FIR GOOO)

Secondary RADAR for surveillance antenna position coordinates: N 14 ° 44 '57"W 017° 29' 14.52"

#### 5-2 Procedures

Dakar Airport

- Precision Procedures

Apton ILS 36 S 36 VOR-DME-IL

- Non precision Procedures

Apton-VOR-DME VOR 36 36 18 VOR DME BONVI-VOR- 18

The "SDR" 18

## Visual landing approach for Instrument Landing

- GNSS-RNAV

TMA Procedures for arrival and departure SID RNAV / GNSS RWY 36 RNAV SID / GNSS RWY 18 RNAV / GNSS PONTI RWY 36 RNAV / GNSS RWY 18 KIRN

## 5-3 status of implementation of RNAV IN SENEGAL

### ATS ROUTES, SIDS, STARS AND RNAV APPROACHES

Dakar Airport

TMA Procedures for arrival and departure

- GNSS-RNAV

RWY 18 RNAV / GNSS PONTI RWY 36 RNAV / GNSS KIRN SID RWY 18 RNAV / GNSS RWY 36 RNAV SID / GNSS

RNAV Route Comments

UM 372 CASABLANCA / BULIS / CONAKRY

UM 725 TIMMOUNI / TAMIL / DAKAR

UM 974 DAKAR / Mopti / NIAMEY

A 741 (RNP10) PORTO SANTO / FORTALEZA

A 857 (RNP10) Lanzarote / F. OF NORONHO

A 866 (RNP10) GOMER / MASSORO

A 873 (RNP10) Amilcar Cabral / NATAL

UM 122 AGADIR / BULIS / BAMAKO

UB 623 (RNP10) Amilcar Cabral / F.DE NORONHO

UL 435 JOHANNESBO URG / ATLANTA

UM 108 TIMOUN / BAMAKO

## 5-4 STRATEGY IMPLEMENTATION



short-term strategy (2008-2012)

The short-term strategy will focus on accelerating the implementation and proliferation of RNAV and RNP. The continued introduction of RNAV and RNP not only provides benefits and savings to users, but it will also encourage the equipment of aircraft.

En-route

For the airspace and corridors requiring structured routes to manage traffic flow, Senegal in synergy with ASECNA, consider the implementation of RNAV5/RNP5 where it is operationally justified.

TERMINAL AREAS (ARRIVALS / DEPARTURES)

RNAV reduces conflicts between traffic flow by strengthening the flight paths. SID and STAR RNAV-1/RNP-1 Basic improve safety, capacity and flight efficiency. It also reduces communication errors.

APPROACH

The application of RNP APCH will be implemented at the international airport of Dakar.

TARGET DATES FOR IMPLEMENTATION FOR THE SHORT TERM

- RNP APCH (with Baro-VNAV) Dakar (priority is given to airports with operational benefits)
- Review of existing conventional routes and RNAV for a transition to RNAV-5 (RNAV-10) in 2012, where it is operationally justified.

MEDIUM-TERM STRATEGY (2013-2016)

In the medium term, the growing demand of air transport will continue.

The medium term will benefit from these enhanced capabilities of flights using RNAV and RNP, with a proportional increase in benefits such as efficient flight profiles in fuel economy, better access to airspace and airports, more capacity and reduced delays.

TERMINAL AREA (ARRIVALS / DEPARTURES)

During this period, the RNP-1 will become a basic requirement for flights arriving or departing from major airports. This will ensure the necessary flow and accessibility, as well as reducing the workload of the controller, while maintaining safety standards.

APPROACH

In the medium term priorities for implementation of instrument approaches are still based on RNP APCH and RNP AR APCH and full implementation is scheduled for the end of this period.

**TARGET DATES FOR IMPLEMENTATION FOR THE MEDIUM TERM**

- RNP APCH (with Baro-VNAV) or APV to 100% of instrument runways in 2016.
- SID / STAR RNAV-1 or RNP-1 for 100% of international airports in 2016.
- SID / STAR RNAV-1 or RNP-1 for 90% of domestic airports with heavy traffic or there are operational advantages.
- Implementation of RNAV / RNP additional as needed.

**LONG-TERM STRATEGY (2017 AND BEYOND)**

The environment in the long term will be characterized by continued growth of air transport and an increase in the complexity of air traffic.

Senegal and the key players will then need an operational concept that leverages the full capacity of the aircraft during this period.

**5-5 Training**

Training will be provided to staff of ANACS, ASECNA, aircraft operators, airports by accredited training centers.

**6-Performance Framework Form**

**PERFORMANCE FRAMEWORK FORMS FOR EFFICINCY**

<p><b>STRATEGIC OPERATIONAL IMPROVEMENT/ NATIONAL PERFORMANCE OBJECTIVE – 1</b></p> <p><b>ENHANCE CAPACITY AND EFFICIENCY OF ENROUTE AIRSPACE DAKAR OCEANIC</b></p>	
<p><b>Performance Benefits</b></p>	
<b>Safety</b>	<p>1. Safety level maintained or improved</p>

<b>Environment</b>	1. Reduced emissions through shorter flights and use of optimum routes/trajectories			
<b>Capacity</b>	1. Increased capacity through creation of new RNAV routes and better utilization airspace resources			
<b>Cost effectiveness</b>	1. Fuel cost reduction through availability of more optimized routes/trajectories; and 2. Ability of aircraft to conduct flight more closely to preferred trajectories			
<b>Performance Measurement</b>				
<b>Metrics</b>	1. Number of PBN routes implemented			
	2. Number of changes of routes and flight levels requested by flight crews			
	3. Number of aircraft entering Dakar Oceanic			
<i>Strategy</i> <b>Medium term (2010 - 2015)</b>				
<b>ATM Operational Concept Components</b>	<b>Projects/Tasks</b>	<b>Timeframe Start/End</b>	<b>Responsibility</b>	<b>Status (as of ...)</b>
	1. <b>Analyze the en-route ATS route structure and implement identifiable improvements such as RNAV routes</b>	Dec 2010 /Apr 2011	Brazil, Cap Verde, Senegal and Spain	
	2. <b>Reduce horizontal</b>	Oct 2011	Brazil, Cap Verde,	

	<b>separation between aircraft through RNAV 5</b>		Senegal, Spain and ICAO	
	<b>3. Creation of additional RNAV routes</b>	Oct 2011	Brazil, Cap Verde, Senegal and Spain	
	<b>4. Improve data and voice communications</b>	Sep 2011	Brazil, Cap Verde, Senegal and Spain	
	<b>5. Implementation of GNSS</b>	Feb 2012	ICAO	
	<b>6. Enhance situational awareness</b>	Sep 2011	Brazil, Cap Verde, Senegal and Spain	
	<b>7. Enhance preparation and availability and issuance of SIGMETs</b>	Sep 2011	Brazil, Cap Verde, Senegal and Spain	
	<b>8. Timely distribution, reception, and use of information prepared by WAFS, IAVW and ITCW</b>	Sep 2011	Brazil, Cap Verde, Senegal and Spain	
<b>Risk</b>	Risk factors: lack of training of air traffic controllers on new routes network, delay in aircraft equipage; delay in the updating of the letters of procedures			

<b>Management</b>	between ACCs
	Risk mitigation: Identification of the needs of training; involvement of aircraft operators and ACC managers in the decision making
<b>Linkage to GPIs</b>	GPI/5: performance-based navigation; GPI/7: dynamic and flexible ATS route management; GPI/8: collaborative airspace design and management; GPI/9: situational awareness; GPI/12: FMS-based arrival procedures; GPI/17 Data link applications; GPI/18 Aeronautical information; GPI/19 Meteorological systems and GPI/22 Communication infrastructure.

<b>STRATEGIC OPERATIONAL IMPROVEMENT/ NATIONAL PERFORMANCE OBJECTIVE</b>	
<b>IMPROVE SAFETY AND ENHANCE CAPACITY AND EFFICIENCY OF DAKAR INTL AIRPORT</b>	
<b>Performance Benefits</b>	
<b>Safety</b>	<ol style="list-style-type: none"> <li>1. Safety level maintained or improved</li> <li>2. Minimize the consequences in case of runway excursion</li> </ol>
<b>Environment</b>	<ol style="list-style-type: none"> <li>1. Reduced emissions through shorter runway occupancy time and taxi time</li> </ol>
<b>Capacity</b>	<ol style="list-style-type: none"> <li>1. Increased aerodrome capacity through better utilization airside infrastructure</li> </ol>
<b>Cost</b>	<ol style="list-style-type: none"> <li>1. Potential cost reduction through shorter ground</li> </ol>

<b>effectiveness</b>	movements			
<b>Performance Measurement</b>				
<b>Metrics</b>	1. Number of operations per hour			
	2. Arrival/departure delay i.e. minutes per flight			
	3. Number of bird strikes			
	4. volume of fuel burn per operations			
<i>Strategy</i> <b>Medium term (2010 - 2015)</b>				
<b>ATM Operational Concept Components</b>	<b>Projects/Tasks</b>	<b>Timeframe Start/End</b>	<b>Responsibility</b>	<b>Status (as of ...)</b>
<b>AOM, DCB, TS and CM</b>	<b>1.Improve surface movement and guidance control systems through more new indicators on ground</b>	Jun 2011	CAA, ASECNA and Airport Operator	
	<b>2.Maximize runway capacity in all weather operations</b>		Airport Operator, CAA and ASECNA	
	<b>3.Improve demand and capacity</b>	Oct 2011	Airport Operator,	

	<b>balancing through ATFM process</b>		CAA and ASECNA	
	<b>4. Enhance situational awareness</b>	Apr 2011	Airport Operator, Aircraft operators, CAA and ASECNA	
	<b>5. Implement automation of weather systems at aerodromes</b>	Oct 2011	Airport Operator, CAA and ASECNA	
	<b>6. Wind shear and aerodrome weather warning</b>	Dec 2011	Airport Operator, CAA and ASECNA	
	<b>7. Aerodrome ground lighting</b>	Jun 2011	Airport Operator, CAA and ASECNA	
	<b>8. Rapid exit runway</b>	Dec 2011	Airport Operator, CAA and ASECNA	
	<b>9. Improved signage</b>	Jun 2011	Airport Operator, CAA and ASECNA	
	<b>10. Use of LEDs for</b>	Dec 2011	Airport Operator,	

	<b>runway lighting</b>		CAA and ASECNA	
<b>Supporting tools</b>	1. Technology evaluation and gap analysis			
	2. Safety case and safety analysis			
	3. Business case and cost benefit analysis			
<b>ATM Community members</b>	Aerodrome operator, Airspace providers, Airspace users, ATM service providers, ATM support industry, Regulatory authorities and ICAO			
<b>ATM Community expectations</b>	1. Right of access to ATM resources and equity for all users			
	2. Capacity to meet peak demands, while minimizing restrictions			
	3. Cost effective air navigation services			
	4. Minimize environmental impact			
	5. Flexibility in adapting flight trajectories			
	6. Technical and operational interoperability and harmonization			
	7. Consistent and dependable levels of service			
	8. Safety is highest priority			
<b>Project Output</b>	National performance plan for implementation of air navigation system elements that are operationally suitable, technically feasible and economically viable.			
<b>Project Outcome</b>	Improved Safety, enhanced capacity and efficiency of Dakar Airport operations.			
<b>Risk Management</b>	Risk factors: lack of funding; delay in the ongoing works			
	Risk mitigation: identification different funding sources; involvement of the company managers that are carrying out the works in the decision making			
<b>Linkage to GPIs</b>	GPI/9: situational awareness; GPI/13: Aerodrome design and management; GPI/14: Runway operations; GPI/15: Matching IMC and VMC operating capacity; GPI/17: Data link applications; GPI/18: Aeronautical			



	information; GPI/19: Meteorological systems; GPI/21: Navigation systems; and GPI/22: Communication infrastructure.
--	--

<b>STRATEGIC OPERATIONAL IMPROVEMENT/ NATIONAL PERFORMANCE OBJECTIVE</b>	
<b>ENHANCE EFFICIENCY OF AERONAUTICAL INFORMATION SERVICE</b>	
<b>Performance Benefits</b>	
<b>Safety</b>	1. Safety level maintained or improved
<b>Environment</b>	1. Reduced emissions through direct trajectories
<b>Efficiency</b>	1. accuracy of aeronautical data 2. Improved availability and integrity of aeronautical data
<b>Cost effectiveness</b>	1. Reduced navigation errors
<b>Performance Measurement</b>	
<b>Metrics</b>	1. Number of navigation errors
	4. volume of fuel burn per operations
<b>Strategy</b> <b>Medium term (2010 - 2015)</b>	

<b>ATM Operational Concept Components</b>	<b>Projects/Tasks</b>	<b>Timeframe Start/End</b>	<b>Responsibility</b>	<b>Status (as of ...)</b>
<b>AOM, DCB, TS and CM</b>	<b>1. Determine the near operational improvements</b>	Dec 2010 - Apr 2011	ASECNA, CAA, aerodrome operators, airspace users	
	<b>2. Implementation of digital NOTAM</b>	2012	ASECNA, CAA, APIRG and ICAO	
	<b>3. Migration to WGS-84</b>	Immediately	ASECNA, aerodrome operators	
	<b>4. Implement eTod for Area 3 (Area 4 not required)</b>	immediately	ASECNA, aerodrome operators	
	<b>5. Quality of management of AIS unit</b>	Apr 2011	ASECNA	
	<b>6. Transition AIS to AIM</b>	2012	ASECNA	
	<b>7. Automation of AIS</b>	Dec 2011	ASECNA	
	<b>8. Implement eAIP</b>	2012	ASECNA	
	<b>9. Training of AIS personal</b>	Apr 2011	CAA and ASECNA	
<b>Supporting</b>	<b>4. Technology evaluation and gap analysis</b>			

<b>tools</b>	5. Safety case and safety analysis
	6. Business case and cost benefit analysis
	7. National workshops and seminars
<b>ATM Community members</b>	Aerodrome operators, Airspace providers, Airspace users, ATM service providers, ATM support industry, Regulatory authorities and ICAO
<b>ATM Community expectations</b>	10.
	11. Cost effective air navigation services
	12. Minimize environmental impact
	13. Flexibility in adapting flight trajectories
	14. Consistent and dependable levels of service
	15. Safety is highest priority
<b>Project Output</b>	National performance plan for implementation of air navigation system elements that are operationally suitable, technically feasible and economically viable.
<b>Project Outcome</b>	Enhanced efficiency of aeronautical information service.
<b>Risk Management</b>	Risk factors: lack of funding; insufficient data
	Risk mitigation: identification different funding sources; involvement of aircraft operators in the decision making; access to commercial databases
<b>Linkage to GPIs</b>	GPI/5: performance-based navigation; GPI/9: situational awareness; GPI/13: Aerodrome design and management; GPI/14: Runway operations; GPI/17: Data link applications; GPI/18: Aeronautical information; GPI/20: WGS-84; GPI/21: Navigation systems; and GPI/22: Communication infrastructure.

## 7- Risk Management

ANACS knows that there are risks in operating PBN, as mixed operation of aircraft with or without RNP equipped, and the availability of the satellites. To make the transition to PBN, ANACS will consider the following safety principles for the implementation:

- During the period of coexistence, the conventional navigation systems will be retained to provide services to aircraft not equipped with PBN;
- Safety assessments will be conducted as well as safety inspections and a contingency plan to ensure safe operation
- Monitoring of the operation will be performed, including the classification of the operations, aircraft performance. Navigation errors and corrective measures will be formulated.