PBN IMPLEMENTATION

BY;

KENYA

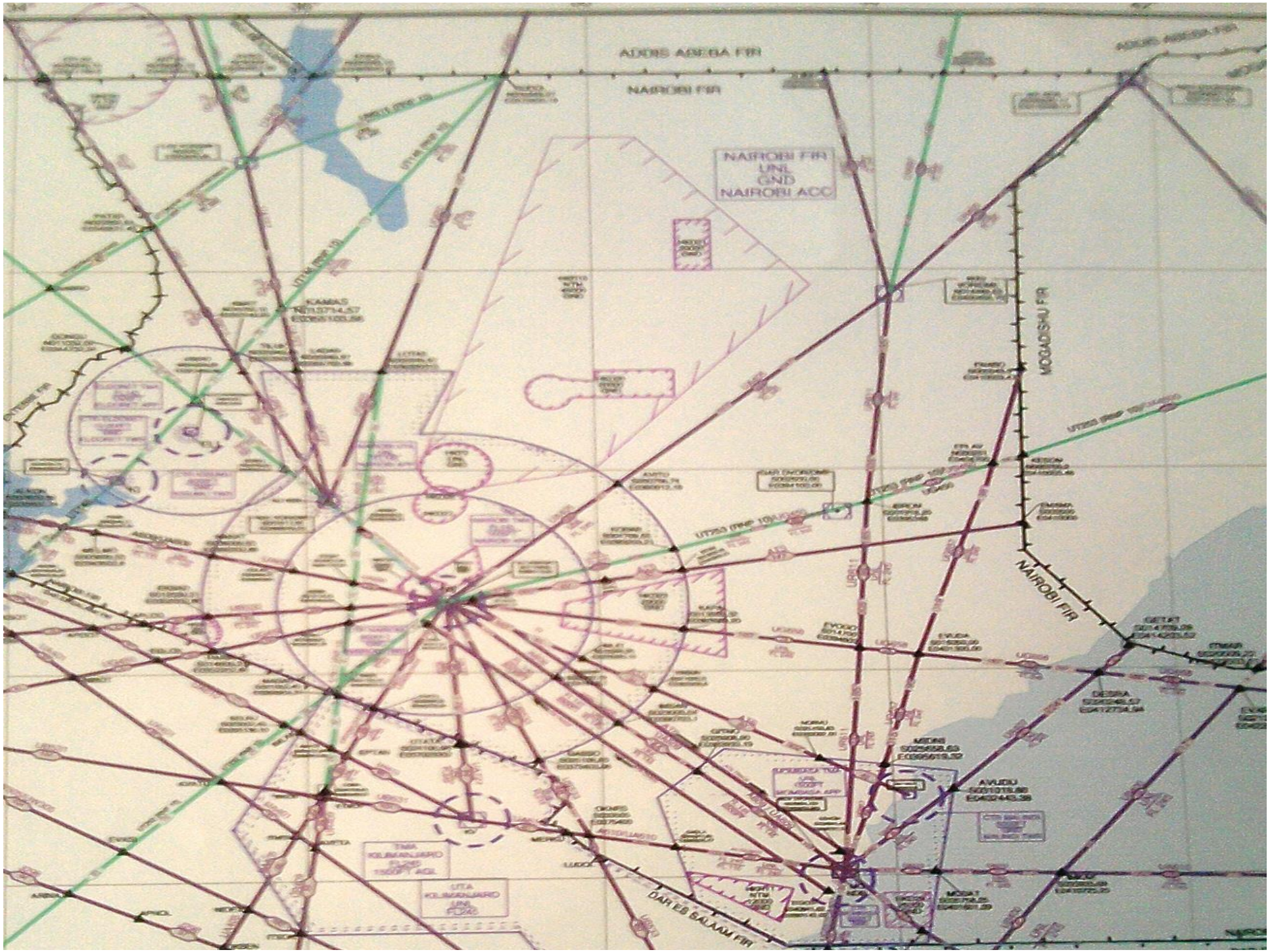
Terms of Reference for National PBN Program Manager.

- Responsible for ensuring that proper mechanisms are put in place for the effective implementation of PBN by:
  - Establishment of a National PBN Implementation Group.
  - Development of a National PBN Implementation Plan.
- Act as Focal Point and Coordinator of the activities of StatesôPBN Implementation Groups
- Participate in, coordinate and provide support to, APIRG PBN Implementation Task Force meetings and assigned tasks.

Fleet equipage

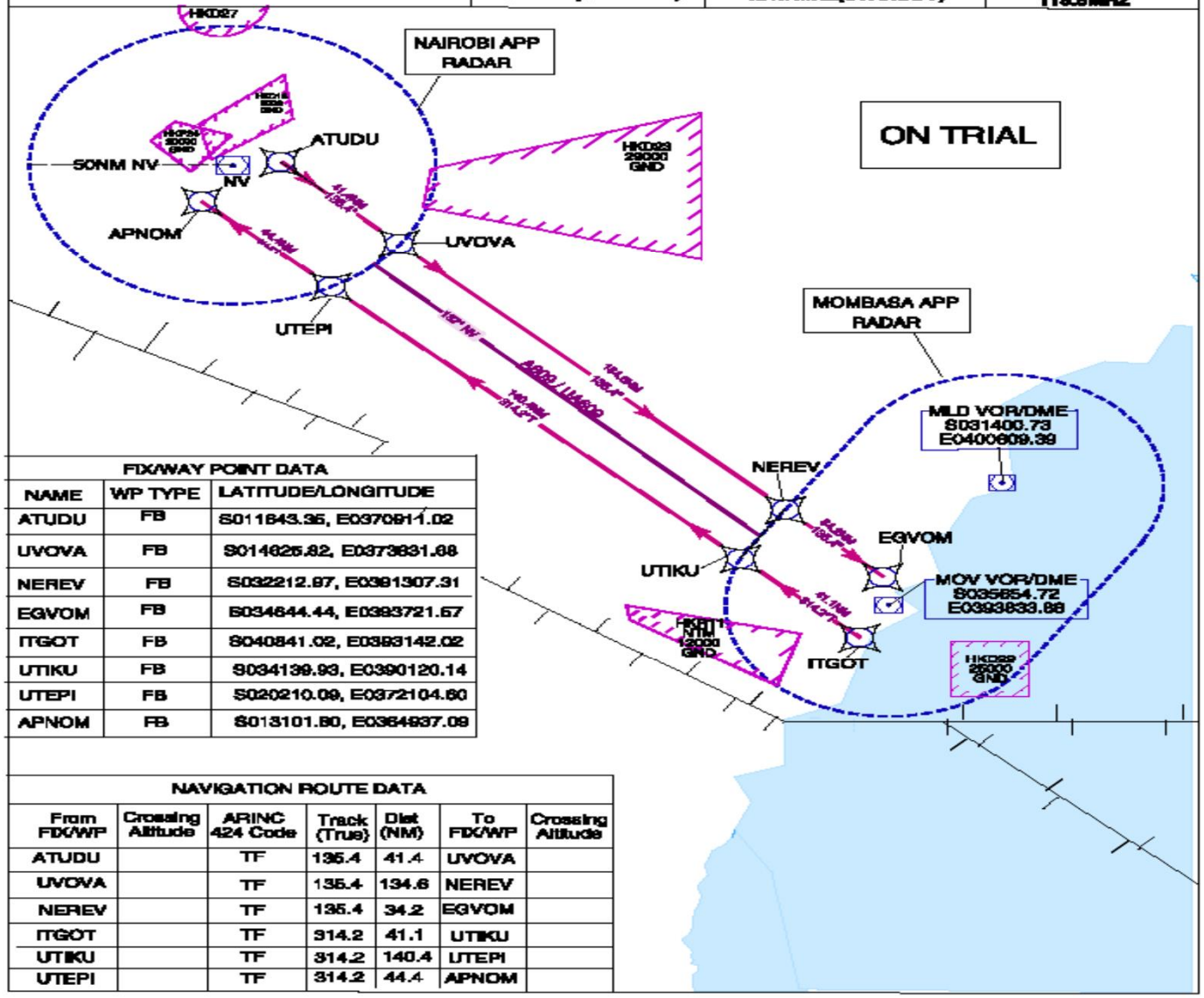
- Percentage of aircraft equipage determined through filed flight plans for operations through the Nairobi Flight information region (FIR) and eight (8) ATS manned airports. *(five of them have been sampled here)*

	FIR	JKIA	MIA	KSM	ELD	WAP
Non equipped in %	**40**	25	35	40	60	90
RNAV equipped in %	**60**	75	65	60	40	10


ADDIS ABEBA FIR
NAIROBI FIR
NAIROBI FIR
UNL
GND
NAIROBI ACC
MOGADISHU FIR
NAIROBI FIR
DAR ES SALAAM FIR

NAIROBI-MOMBASA TRACKS

FREQUENCIES		
NAIROBI RADAR 122.3MHZ(MAIN) 119.7MHZ(STANDBY)	MOMBASA RADAR 122.7MHZ(MAIN) 121.7MHZ(STANDBY)	NAIROBI ACC 125.3MHZ 120.5MHZ 118.6MHZ



FIX/WAY POINT DATA		
NAME	WP TYPE	LATITUDE/LONGITUDE
ATUDU	FB	S011843.35, E0370911.02
UVOVA	FB	S014625.82, E0373831.68
NEREV	FB	S032212.97, E0391307.31
EGVOM	FB	S034644.44, E0393721.67
ITGOT	FB	S040841.02, E0393142.02
UTIKU	FB	S034139.93, E0390120.14
UTEPI	FB	S020210.09, E0372104.60
APNOM	FB	S013101.80, E0364937.09

NAVIGATION ROUTE DATA						
From FIX/WP	Crossing Altitude	ARINC 424 Code	Track (True)	Dist (NM)	To FIX/WP	Crossing Altitude
ATUDU		TF	135.4	41.4	UVOVA	
UVOVA		TF	135.4	134.6	NEREV	
NEREV		TF	135.4	34.2	EGVOM	
ITGOT		TF	314.2	41.1	UTIKU	
UTIKU		TF	314.2	140.4	UTEPI	
UTEPI		TF	314.2	44.4	APNOM	

PBN Current status in Kenya

- RNAV, ATS routes, SIDs, STARs and approaches developed as shown in the three stages of implementation in accordance with the AFI plan.
- Awareness training has been concluded (last week) for all ATC and CNS personnel
- Awareness training being arranged for the regulator
- Though a number of meetings have been held, Plans are underway to aggressively engage stakeholders

Implementation strategy

- This plan provides a high-level strategy for the evolution of navigation capabilities to be implemented in three timeframes:
  - It encompasses instrument approaches, Standard Instrument Departure (SID) and Standard Terminal Arrival (STAR) operations, as well as en-route continental, oceanic and remote operations.

PBN implementation plan

- The Kenyan implementation Plan is in three stages:-
  - Near Term (between 2008 and 2012/13)
  - Medium Term (between 20012/13 and 2016/17)
  - Long term (2017 and beyond)

Near term strategy (2008-2012)

- The near-term strategy focused on expediting the implementation and proliferation of RNAV and RNP procedures.
- Key components included wide-scale RNAV implementation and the introduction of RNP for en route, terminal, and approach procedures.
- Kenya implemented RNAV-1 SIDs and STARs, at major airports and is now making associated changes in airspace design.

Implementation Targets

- RNAV-1 SID/STAR for JKIA (Jomo-Kenyatta International Airport-Nairobi) by 2010 and MIA (Moi International Airport-Mombasa) by 2012;
- Review existing conventional and RNAV routes to transition to PBN RNAV-5 or where operationally required RNAV-2/1 by 2012.

Medium term strategy (2013-2016)

- **Oceanic and Remote Continental**
  - In the mid term, Kenya will endeavor to work with international air traffic service providers to promote the application of RNP10 and RNP 4 in additional sub-regions of the oceanic environment.
- **Continental**
  - The review of en-route airspace will be completed by 2016.
- **Implementation**
  - By the end of the mid term other benefits of PBN will have been enabled, such as flexible procedures to manage the mix of faster and slower aircraft in congested airspace and use of less conservative PBN requirements.

In Oceanic and Remote Continental

- implementing RNAV10 and where operationally required RNP-4 by 2010.
- Medium term endeavour to promote the application of RNAV10 and RNP 4 in additional sub-regions of the oceanic environment.
- Long term achieve full implementation of RNAV 10 or RNP 4 where operationally required.
- Where high density traffic occur review airspace concept to convert to continental en-route operation where sufficient surveillance is available so as to allow RNAV 5.

PBN implementation plan

In Oceanic and Remote Continental

2008---2012/13	2012/13---2016/17	2016/17-&-beyond
RNAV 10 → or → RNP 4	RNAV 10 /RNAV 5 → or → RNP 4	RNAV 10 /RNAV 5 → or → RNP 4

In En route continental

- Conventional routes to RNAV 5 or
- implement RNAV 5 where applicable
- RNAV 2 or RNAV 1 where operationally required;

PBN implementation plan

In En route continental

2008---2012/13	2012/13---2016/17	2016/17-&-beyond
RNAV 10 → or RNP 4	RNAV 10 /RNAV 5 → or RNP 4	RNAV 10 /RNAV 5 → or RNP 4

In Terminal area and approach (TMA STARS/ SIDS)

- RNAV 1 in surveillance airspace; 30% of international airports by 2010 and 50% by 2012
- Medium and Long term RNAV-1 or RNP-1 SID/STAR for 100% of international airports by 2016 and RNAV-1 or RNP-1 SID/STAR for 70% of busy domestic airports where there are operational benefits.

PBN implementation plan

In Terminal area and approach (Approach)

2008-------2012/13	2012/13-----2016/17	2016/17 -&- beyond
RNP APCH with Baro-VNAV RNP AR APCH if required	Expand RNP APCH with (Baro-VNAV) and APV and Expand RNP AR APCH	Expand RNP APCH with (Baro-VNAV) and APV and Expand RNP AR APCH

Implementation Targets

- ÅRNP APCH (with Baro-VNAV) or APV in Eldoret International Airport runway 08 and any other instrument runway by 2016.
- ÅRNAV-1 or RNP-1 SID/STAR for Eldoret International Airport AND all other international airports by 2016.
- ÅImplementation of additional RNAV/RNP Routes as required.

Long term strategy (2017 and beyond)

- No one solution or simple combination of solutions will address the inefficiencies, delays, and congestion anticipated to result from the growing demand for air transportation.
- Therefore, Kenya and key Stakeholders need an operational concept that exploits the full capability of the aircraft in this time frame.

Some key considerations

- Overall system responsiveness achieved through flexible routing and well-informed, collaborative decision-making.
- Systems ability to adapt rapidly to changing meteorological and airspace conditions.
- System leverages through advanced navigation capabilities such as fixed radius transitions, RF legs, and RNP offsets.
- Increased use of operator-preferred routing and dynamic airspace.
- Increased collaboration between service providers and operators.

Implementation Matrix

- PBN Action plan-june 2012-1.doc

CHALLENGES

- Procurement process; had to take almost 2 years to procure survey for WGS84 for Eldoret and Wajir, this has made us not achieve 100% in provision of PBN procedures in all international airport runways as depicted in the latest survey by ICAO.
- Exposure of the concept to users; ATC and operators
- Lack of dedicated (full time) team for procedure design experts and the regulator

CHALLENGES (Cont..)

- Major infrastructural improvement in all airports. In most times the ANSP is not brought on board in good time and this slows down planning
- Slow deployment of PBN routes due to regional challenges. (Infrastructure and imbalance in ATM)
- Fleet population.

END

THANK YOU