



# MIDANPIRG PBN SG/4 Meeting Cairo, Egypt, 19-21 January 2020

**Kingdom of Saudi Arabia**

Presented by

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# Presentation Outline

- Brief of the State National PBN Implementation Plan
- Status of Implementation
- Post assessment results of the PBN Implementation
- Lessons Learned
- Challenges
- Thoughts/Recommendations



# National PBN Implementation Plan

KSA PBN implementation strategy version 2010 updated May 2012

## PBN (Performance-Based Navigation) Timeline

	Navigation Specification	Airspace Application	Near Term				Medium Term				Long Term								
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
1	RNAV10	N/A	Will not be used																
2	RNP4	N/A	Will not be used																
3	RNAV2	N/A	Will not be used																
4	RNP5 into RNAV5	Enroute	[Shaded area from 2010 to 2016]																
5	RNAV1	Enroute	[Shaded area from 2013 to 2016]																
6	RNAV1	TMA Dep. And Arr.Sur	[Shaded area from 2011 to 2016]																
7	Basic RNP1	TMA Dep. And Arr. Non sur	[Shaded area from 2011 to 2016]																
8	RNP APCH	Approach	[Shaded area from 2011 to 2016]																
9	RNP AR APCH	Approach International Airport	[Shaded area from 2013 to 2025]																
10	RNAV1	SIDs / STARs	[Shaded area from 2011 to 2016]																
11	Basic RNP1	Enroute	[Shaded area from 2013 to 2025]																
12	advanced-RNP-1	Enroute	[Shaded area from 2017 to 2025]																
13	Advanced-RNP-1	Terminal Airspace	[Shaded area from 2017 to 2025]																
14	Use of NDB	Approach Operations	Stopped using the NDB for Approach Operations																
15	Conventional NPA procedures		[Shaded area from 2010 to 2016] < ----- stopped the conventional NPA procedures ----- >																

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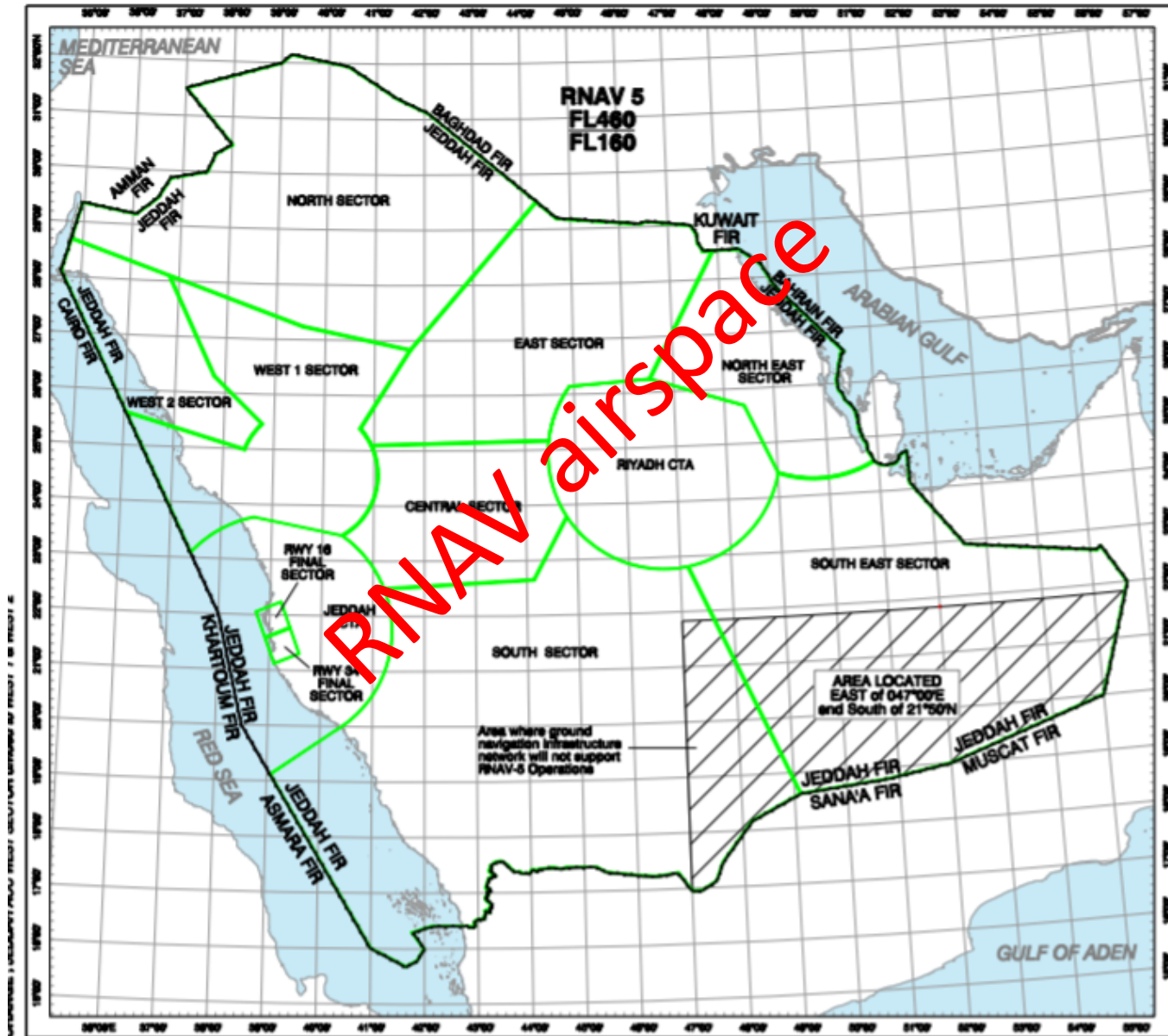
# National PBN Implementation Plan



KSA PBN implementation strategy version May 2012

- ✓ Near-term and mid-term (2009-2016): Implemented
- ✓ Long-term (2017-2025)
  
- ✓ RNAV 1 would be considered for implementation for en-route continental/local domestic operations.
- ✓ A-RNP would be considered for implementation as a regional requirement

# National PBN Implementation Plan





# National PBN Implementation Plan

## KSA PBN Implementation plan



### SUMMARY TABLE AND IMPLEMENTATION TARGETS

Airspace	Short term (up to 2020)		Medium term (2021-2025)	
	Navigation Specification Preferred	Targets	Navigation Specification Acceptable	Targets
En-route – Oceanic	NA			
En-route - Remote continental	NA			
En-route – Continental	RNAV 5	Implemented	RNAV1	TBD
En-route - Local / Domestic	RNAV 5	Implemented	RNAV1	TBD
TMA – Arrival (International Airports)	RNAV 1 (surveillance environment) or RNP 1 (non-surveillance environment)	RNAV 1: Implemented (OEDF effective Q2-2020)		
TMA – Departure (International Airports)	RNAV 1 (surveillance environment) or RNP 1 (non-surveillance environment)	RNAV 1: Implemented (OEDF effective Q2-2020)		
Approach (International Airports)	LNAV: for all RWY Ends at International Aerodromes LNAV/VNAV: for all RWY Ends at International Aerodromes	LNAV: Implemented (OEDF effective Q2-2020) LNAV/VNAV: Implemented (OEDF effective Q2-2020 OEMA effective Q3-2020)		
CCO and CDO (International Airports)	W/A	CCO and CDO: Implemented (OEDF effective Q2-2020)		

– W/A: where applicable/defined Airspace, in accordance with State PBN implementation Plans, the MID Region Air Navigation Strategy and the MID ANP.  
 – \* would be considered for implementation at the identified Airspace/TMAs  
 – When no month is specified (e.g. by 2017) means by the end of the year (December 2017).



# Status of Implementation

## 2019

- New Airport (Neom Bay).
- New RWYs (Al Baha, turaif, Quaisumah, Al Jouf, Abha, ) and rehabilitation of existing RWYs.
- Restructure of Sectors in the KSA airspace.
- Redesign new IFPs based on ICAO / PANS – OPS.

## 2020

- Implementation new PBN IFPs for Dammam international Airport.
- Redesign new conventional and PBN IFPs based on ICAO / PANS – OPS.
- Initiating Saudi Future Airspace Concept (SFAC) project.

## 2021 and beyond

- Develop a Saudi Future Airspace Concept (SFAC) project.





# Status of Implementation

## 1. Regulations

- GACA Regulations Part 172 and Part 173 are available on GACA Website.
- One national and one foreign IFPs design organizations are certified and audited on a regular basis by GACA.
- One national flight validation/Inspection provider is certified and audited on a regular basis by GACA.

## 2. PANS-OPS Inspectorate.

- GACA has 4 PANS-OPS inspectors belong to General Directorate dedicated for IFP Design, Flight check, AIS and Obstacle evaluation.

## 3. Airspace concept.

- Initiation of Saudi Future Airspace Concept (SFAC) project for the modernization of Saudi Airspace Jeddah FIR.





# Status of Implementation

## 4. Procedure Design.

- 2 organizations certified by GACA.
- 2 chief designers accepted by GACA.
- Multiple IFP designers trained conventional and PBN IFPs.
- Static aeronautical data within AIS.
- New AIS system with integrated database operational end 2020.
- IFPs organizations and AIS are ISO certified.

## 5. Automated tools

- Design Automation tools (FPDAM) is updated to the latest amendment of ICAO Doc 8168.
- Link and exchange between AIM database, eTOD database and Design automation tools (FPDAM) based on XML.

## 6. Rename IAP from RNAV to RNP

- Rename RNAV (GNSS) Approaches to RNP during 2020 and 2021



# Status of Implementation

Int'l AD (Ref. MID ANP)	RWY	Conventional Approaches			APTA			CCO					CDO			Remarks	
		Precision		VOR or NDB	PBN PLAN Update date	LNAV	LNAV / VNAV	PBN RWY	RNAV SID	PER AD	CCO	PER AD	RNAV STAR	PER AD	CDO		PER AD
		xLS	CAT														
SAUDI ARABIA																	4
OEDF	16L	ILS	I	-													
	16R	ILS	I	VORDME													
	34L	ILS	I	VORDME													
	34R	ILS	I	VORDME													
OEJN	16L	ILS	I			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
	16C	ILS	I			Y	Y	Y	Y		Y		Y		Y		
	16R	ILS	I	VORDME		Y	Y	Y	Y		Y		Y		Y		
	34L	ILS	I	VORDME				Y	Y		Y		Y		Y		
	34C	ILS	I	VORDME		Y	Y	Y	Y		Y		Y		Y		
	34R	ILS	I			Y	Y	Y	Y		Y		Y		Y		
OEMA	17	ILS	I	VORDME		Y		Y	Y	Y			Y	Y	Y	Y	
	18			VORDME		Y		Y	Y				Y		Y		
	35	ILS	I	VORDME		Y		Y	Y				Y		Y		
	36	ILS	I	VORDME		Y		Y	Y				Y		Y		
OERK	15L	ILS	I	VORDME		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
	15R	ILS	I	VORDME		Y	Y	Y	Y		Y		Y		Y		
	33L	ILS	I			Y	Y	Y	Y		Y		Y		Y		
	33R	ILS	I	VORDME		Y	Y	Y	Y		Y		Y		Y		
Total	18	17		13	Y	13	9	14	14	3	10	2	13	3	13	3	
%		94		72	May 2012	72	50	78	78	75	56	50	72	75	72	75	Plan needs update



# Status of Implementation

S. No.	Airport	RWY	Instrument Approach Procedures					RNAV SID & STAR		
			ILS CAT I	LNAV	LNAV/VNAV	LPV	RNP AR	RNAV SID	RNAV STAR	CCO/CDO
1	OEJN KAIA, Jeddah	16L	Y	Y	Y	N	N	Y	Y	Y
		16C	Y	Y	Y	N	N	Y	Y	Y
		16R	Y	Y	Y	N	N	Y	Y	Y
		34L	Y	N*	N*	N	N	Y	Y	Y
		34C	Y	Y	Y	N	N	Y	Y	Y
		34R	Y	Y	Y	N	N	Y	Y	Y
2	OERK KKIA, Riyadh	15L	Y	Y	Y	N	N	Y	Y	Y
		15R	Y	Y	Y	N	N	Y	Y	Y
		33L	Y	Y	Y	N	N	Y	Y	Y
		33R	Y	Y	Y	N	N	Y	Y	Y
3	OEDF KFIA, Dammam	16L	Y			N	N			
		16R	Y	Q2	Q2	N	N	Q2	Q2	Q2
		34L	Y	2020	2020	N	N	2020	2020	2020
		34R	Y			N	N			
4	OEMA PMBAIA, Madinah	17	Y	Y		N	N	Y	Y	Y
		35	Y	Y	Q3	N	N	Y	Y	Y
		18	-	Y	2020	N	N	Y	Y	Y
		36	Y	Y		N	N	Y	Y	Y

N\*: Operationally Unacceptable OCA



# Status of Implementation



## OERK — RIYADH / KING KHALED INTERNATIONAL

RWY Ends	ILS / CAT	LNAV	LNAV/ VNAV	LPV	RNP AR	RNAV SID	RNAV STAR
15L	I	Y	Y			Y	Y
15R	I	Y	Y			Y	Y
33L	I	Y	Y			Y	Y
33R	I	Y	Y			Y	Y



# Status of Implementation



## OEJN — JEDDAH / KING ABDULAZIZ INTERNATIONAL

RWY Ends	ILS / CAT	LNAV	LNAV/ VNAV	LPV	RNP AR	RNAV SID	RNAV STAR
34R	I	Y	Y			Y	Y
34C	I	Y	Y			Y	Y
34L	I	NA	NA			Y	Y
16R	I	Y	Y			Y	Y
16C	I	Y	Y			Y	Y
16L	I	Y	Y			Y	Y



# Status of Implementation

## OEMA — MADINAH / PRINCE MOHAMMAD BIN ABDULAZIZ INTERNATIONAL

RWY Ends	ILS / CAT	LNAV	LNAV/ VNAV	LPV	RNP AR	RNAV SID	RNAV STAR
35	I	Y	2020			Y	Y
17	I	Y	2020			Y	Y
36	I	Y	2020			Y	Y
18	-	Y	2020			Y	Y



# Status of Implementation



## OEDF — DAMMAM / KING FAHD INTERNATIONAL

RWY Ends	ILS / CAT	LNAV	LNAV/ VNAV	LPV	RNP AR	RNAV SID	RNAV STAR
34L	I	2020	2020			2020	2020
34R	I	2020	2020			2020	2020
16L	I	2020	2020			2020	2020
16R	I	2020	2020			2020	2020





# Status of Implementation



Aerodrome	CDO	CCO
<b>OERK</b> — RIYADH / KING KHALED INTERNATIONAL	Implemented	Implemented
<b>OEJN</b> — JEDDAH / KING ABDULAZIZ INTERNATIONAL	Implemented	Implemented
<b>OEMA</b> — MADINAH / PRINCE MOHAMMAD BIN ABDULAZIZ INTERNATIONAL	Implemented	Implemented
<b>OEDF</b> — DAMMAM / KING FAHD INTERNATIONAL	2020	2020



# Post assessment of PBN Implementation and Lessons Learned

- Simulation and coordination with ATCO and stakeholder before implementation.
- Harmonize the PBN implementation for near airports.
- Implementation after 2 AIRAC cycles.
- Get feed back from users after implementation.
- Periodic review of IFPs considering feedback from users .
- Use automation tools, digital data, eTOD and minimize human calculations.
- Involve Regulator from the beginning (conceptual design).
- Needs to understand/consider all elements (Aircraft capability, operations, planning, training, ATCO, Crew, etc.).
- Establish regulatory framework / national advisory material / IFP register.



# Challenges

- PBN capability register and aircraft minimum equipment lists (MEL)
- Mixed fleet/system operations
- Updating the CNS infrastructure to enhance the operation
- Establishing priorities.
- Establishing requirements for airspace redesign projects.
- Performing a good coordination plan between stakeholders ( to not design and publish IFPs or routes not needed ).
- Developing and performing a follow-up and inspections.
- Ensuring that PBN is environment-friendly.
- Improving safety and increasing airspace capacity.
- Education and training of personnel employed by the GACA, ANSP and aircraft operators.



# Thoughts/Recommendations

- Obstacle surveyors must be accepted by the Civil Aviation Authority.
- Close coordination between all stakeholders.
- Harmonization between adjacent FIRs for the implementation of PBN and NAV SPEC.
- Advanced Training for all intervenient.
- PBN implementation must take into consideration environmental impacts.



**Thank you**