




CIVIL AVIATION AUTHORITY OF REPUBLIC OF MOLDOVA

Approved:
Operations Deputy Director
Valeriu BUZU 
Data:

“PBN IMPLEMENTATION PLAN” (Version February 2021)

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1. Introduction

Republic of Moldova has developed present PBN Implementation Plan in order to manage the enforcing of the ICAO Resolution A37-11, which:

Urges all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the *Performance-Based Navigation (PBN) Manual* (Doc 9613);

Resolves that:

a) States complete a PBN implementation plan as a matter of urgency to achieve:

1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and

2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and

3) implementation of straight-in LNAV only procedures, as an exception to 2) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more;

b) ICAO develop a coordinated action plan to assist States in the implementation of PBN and to ensure development and/or maintenance of globally harmonized SARPs, Procedures for Air Navigation Services (PANS) and guidance material including a global harmonized safety assessment methodology to keep pace with operational demands;

Urges that States include in their PBN implementation plan provisions for implementation of approach procedures with vertical guidance (APV) to all runway end serving aircraft with a maximum certificated take-off mass of 5 700 kg or more, according to established timelines and intermediate milestones;

Instructs the Council to provide a progress report on PBN implementation to the next ordinary session of the Assembly, as necessary;

Requests the Planning and Implementation Regional Groups (PIRGs) to include in their work program the review of status of implementation of PBN by States according to the defined implementation plans and report annually to ICAO any deficiencies that may occur; and

Declares that this resolution supersedes Resolution A36-23.

2. Benefits from PBN implementation

The advantages as opposed to the conventional navigation are the following:

- reduces fuel consumption and allows for more efficient use of national airspace (due to better route placement, fuel efficiency, reduced emission, noise abatement, etc.);
- reduces costs for operators through the use of optimal routes, reduces fuel consumption and flight duration, increases payload;
- increases airspace capacity by reducing horizontal and vertical separation of aircraft;
- reduces workload for pilots and air traffic controllers by simplifying ATM instructions, reducing the need for radio and telephone communications and radar vectoring;
- reduces cost of purchase, maintenance and flight inspection of ground radio navigation aids.

3. Challenges

The implementation of the PBN concept in the Republic of Moldova is a great challenge for all stakeholders, and it encompasses the following:

- adapting ATM system to the PBN concept (from the technical and operational aspects);
- application of RNAV/RNP procedures and conventional navigation procedures in the same airspace during the period of PBN introduction;
- providing domestic operators' fleets with RNAV/RNP equipment;
- utilization and monitoring of the quality of the navigation databases used in PBN;
- safety oversight of the air navigation service provider and operators;
- functioning of the Global Navigation Satellite System (GNSS) and the publication of information on the availability of GNSS navigation signals (Receiver Autonomous Integrity Monitoring - RAIM);
- training of operators' flight crews, the air navigation service provider personnel and the CAA's personnel.

4. National Stakeholders uses of PBN

Various stakeholders are involved in the development of the airspace concept and the resulting navigation application(s). These stakeholders are:

1. National Airspace Management Joint Committee (Consiliul National de management al Spațiului Aerian) – responsible for the airspace planning;
2. Ministry of Economy and Infrastructure – is a Regulatory Authority, responsible for adopting of the regulatory frame work;
3. CAA RM – responsible for the operational and airworthiness certification, approval and supervising processes;
4. National ANSP (State Enterprise “MoldATSA”) - responsible for procedures design and air traffic services, procurement and operation of the ground and space based NAVAIDs;
5. National Air Operators – responsible for maintaining of their fleet PBN capabilities and flight crew operational performances

Each stakeholder has a different role and set of responsibilities. The stakeholders of Performance-based Navigation use the concept at different stages:

- a) At a *strategic level*, airspace planners and procedure designers have to translate “the PBN concept” into the reality of route spacing, aircraft separation minima and procedure design;
- b) Also at a *strategic level*, airworthiness and regulatory authorities ensure that aircraft and aircrew satisfy the operating requirements of the intended implementation. Similarly, operators/users need to understand the operating requirements and effect any necessary changes for equipage and personnel training; and
- c) At a *tactical level*, controllers and pilots use the PBN concept in real-time operations. They rely on the “preparatory” work completed at the strategic level by other stakeholders.

All stakeholders use *all* the elements of the PBN concept, however, each stakeholder tends to focus on a particular part of the PBN concept.

- a) *Airspace planners*, for example, have to focus more on the navigation system performance required by the *navigation specification*. While they are interested to know how the required performance of accuracy, integrity, continuity and availability are to be achieved, they use the required performance of the navigation specification to determine route spacing and separation minima.
- b) *Procedure designers* design IFPs in accordance with obstacle clearance criteria associated with a particular *navigation specification*. Unlike airspace planners, procedure designers focus on the entire navigation specification (performance, functionality and the navigation sensors of the navigation specification), as well as flight crew procedures. These specialists are also particularly interested in the NAVAID infrastructure because of the need to ensure that the IFP design takes into account the available or planned NAVAID infrastructure.
- c) *The Regulatory and Supervising Authorities*, must ensure that the aircraft is properly certified and approved to operate in accordance with the *navigation specification* prescribed for operations in an airspace, along an ATS route or

instrument procedure. Consequently, the *Regulatory and Supervising Authorities* must be cognizant of the *navigation application*

5. Current Status

5.1 National Air Operators PBN Capabilities

At present, the most of the Moldovan registered commercial airplanes (A319, A320, A321; E190, E120) have P-RNAV capabilities certified by the manufacturers.

5.2 National Air Operators PBN Approvals

In order to facilitate the PBN operational approval process for national operators, Moldovan Civil Aviation Authority developed a Procedure Manual “Performance-Based Navigation Operational Approval”. Below is presented updated information concerning PBN operational approval of national Air Operators.

Nr.	Air Operators	PBN operational approval
	CA “Air Moldova” SRL	RNAV-5, RNAV-2, RNAV-1, RNP-APCH
	CA “Fly One” SRL	RNAV-10, RNAV-5, RNAV-1 RNP-10, RNP-APCH
	CA “Hi Sky” SRL	RNAV-5, RNAV-1 RNP-1
	CA “Terra Avia” SRL	RNAV-10, RNAV-5, RNAV-1 RNP-10, RNP-1
	CA “AeroTransCargo” SRL	RNAV-10, RNAV-5, RNAV-1 RNP-1, RNP-4, RNP-APCH
	CA “Fly Pro” SRL	RNAV-10, RNAV-5 RNP-10, RNP-1
	CA “Valan ICC” SRL	RNAV-5
	CA “Aim Air” SRL	N/A
	CA “Pecotox” SRL	N/A
	CA “MEGAviation” SRL	N/A
	IS “Moldaeroservice” SRL	N/A

5.3 ATS routes network , Terminal Areas and Instrument Approach procedures

En- Route

ATS route network in the Republic of Moldova has been designed in accordance with the ICAO RNAV 5 navigation specifications.

NAV application	Navigation Specifications
ATS Routes	RNAV - 5

Airport Chisinau LUKK (TMA)

At date of this Edition of PBN Implementation Plan (February 2021), all applicable STARs and SIDs for Chisinau International Airport (LUKK), are based on a conventional ground based NAVAIDS, having RNAV 5 Navigation Specifications

RWY	NAV application	Navigation Specification	Conventional instrument procedures
08	STARs	RNAV 5	DVOR/DME
26	STARs	RNAV 5	DVOR/DME
09	STARs	RNAV 5	DVOR/DME
27	STARs	RNAV 5	DVOR/DME
08	SIDs	RNAV 5	DVOR/DME
26	SIDs	RNAV 5	DVOR/DME
09	SIDs	RNAV 5	DVOR/DME
27	SIDs	RNAV 5	DVOR/DME

Starting with 22.04.2021 (with AIRAC AIP AMDT 002/2021) new SID/STAR RNAV (GNSS), VOR/DME OVERLAY (Navigation Specification RNAV 1) will be applicable for all runways of Chisinau International Airport (LUKK), as mentioned in table below:

RWY	NAV application	Navigation Specification	OVERLAY (PBN/Conventional) instrument procedures
08	STARs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
26	STARs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
09	STARs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
27	STARs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
08	SIDs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
26	SIDs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
09	SIDs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY
27	SIDs	RNAV 1	RNAV (GNSS), VOR/DME OVERLAY

(APP)
Instrument Approach Procedure

Between 21.08.2014 and 16.08.2018, the following PBN IAP were applicable for Chisinau International Airport:

RWY	NAV application	PBN IAP	Navigation Specification

08	IAP	RNAV (GPS) LNAV ONLY	RNP APCH-LNAV
26	IAP	RNAV (GPS) LNAV ONLY	RNP APCH-LNAV

Between 16.08.2014 and 21.05.2020, the following PBN IAP were applicable for Chisinau International Airport:

RWY	NAV application	PBN IAP	Navigation Specification
08	IAP	RNAV (GNSS) LNAV ONLY	RNP APCH-LNAV
09	IAP	RNAV (GNSS) LNAV ONLY	RNP APCH-LNAV
26	IAP	RNAV (GNSS) LNAV ONLY	RNP APCH-LNAV
27	IAP	RNAV (GNSS) LNAV ONLY	RNP APCH-LNAV

From 21.05.2020, the following PBN IAP were applicable for Chisinau International Airport:

RWY	NAV application	PBN IAP	Navigation Specification
08	IAP	RNP (LNAV & LNAV/VNAV ONLY)	RNP APCH (BARO-VNAV)

09	IAP	RNP (LNAV & LNAV/VNAV ONLY)	RNP APCH (BARO-VNAV)
26	IAP	RNP (LNAV & LNAV/VNAV ONLY)	RNP APCH (BARO-VNAV)
27	IAP	RNP (LNAV & LNAV/VNAV ONLY)	RNP APCH (BARO-VNAV)

Airport Mărculești LUBM

(TMA)

STARs/SIDs

Since 21.08.2014, the following SIDs and STARs were published and applicable for Mărculești International Airport:

RWY	NAV application	Navigation Specification	PBN Instrument flight procedure
07	STARs	RNAV 1	(RNAV GNSS)
25	STARs	RNAV 1	(RNAV GNSS)
07	SIDs	RNAV 1	(RNAV GNSS)
25	SIDs	RNAV 1	(RNAV GNSS)

(APP)

Instrument Approach Procedure

Between 21.08.2014 and 05.12.2019, the following PBN IAP were applicable for Mărculești International Airport:

RWY	NAV application	PBN IAP	Navigation Specification
07	IAP	RNAV (GPS) LNAV ONLY	RNP APCH-LNAV
25	IAP	RNAV (GPS) LNAV ONLY	RNP APCH-LNAV

Since 05.12.2019, the following PBN IAP were applicable for Marculesti International Airport:

RWY	NAV application	PBN IAP	Navigation Specification
07	IAP	RNP LNAV ONLY	RNP APCH-LNAV
25	IAP	RNP LNAV ONLY	RNP APCH-LNAV

6. Future PBN implementation targets



In respect to further PBN implementation it is planned to:

- Review and optimize the existing RNAV (GNSS) SIDs and STARs for LUKK aerodrome, in order to implement CDO/CCO to the end of 2025. Real implementation date will depend on operational needs, stakeholders' readiness and available resources. Depending on it, the implementation date will be reviewed and adjusted accordingly
- design and publish PBN SIDs and STARs based on DME/DME for LUKK aerodrome to the end of 2030. The development of the DME/DME coverage infrastructure in CHISINAU FIR will bring an advantage and alternative aircraft navigation means in the application of PBN SID and STAR. Real implementation




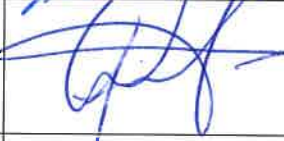


date will depend on operational needs, stakeholders' readiness and available resources. Depending on it, the implementation date will be reviewed and adjusted accordingly

- implement RNP approach procedures with vertical guidance (APV) based on SBAS. LPV implementation still depends on SBAS coverage, which for the moment is not ensured for FIR CHISINAU. As a planned target for implementation, is assumed the end of the year 2030. However, this target is linked to the availability of the satellite-based augmentation systems (SBASs), in particular provided under the European Geostationary Navigation Overlay Service (EGNOS)

Elaborated:

Nr	Name, Surname	Function	Signature	Date
	Madalina Ciobanu	Inspector ANS division CAA RM		24.02.2021
	Andrei Bzovii	Chief ANS division CAA RM		24.02.2021

Coordinated:

Nr	Name, Surname	Function	Signature	Date
1	Alexei Gîrbu	Acting Chief FOD CAA RM		03.03.2021
2	Vasile Croitoru	Chief Airworthiness division CAA RM		03.03.2021
3	Vladimir Buinitki	Chief Aerodrome division CAA RM		24.02.2021
4	Gheorghita S	Head of SMTA S.E. MOLDATSA		24.02.2021
5	Dorin Gadimba	Head of AIM S.E. MOLDATSA		24.02.2021
6	Sandu S	Head of TD S.E. MOLDATSA		24.02.2021