PBN TRANSITION PLAN
POLAND

Approved by:

PRESIDENT

Civil Aviation Authority

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Contents

1. Document revision history

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0.1/10.07.2020	First draft for initial feedback	10.07.2020	Development: PANSA
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2. Introduction

At the 36th General Assembly of ICAO held in 2007, the Republic of Poland agreed to ICAO resolution A36-23 which urges all States to implement PBN. The 37th Assembly of ICAO held in 2010 adopted a new Assembly resolution on PBN (A37-11), that replaces Assembly resolution A36-23. It was also supported by representative of the Republic of Poland. The main difference between the old and new Resolution is that Aerodromes that have no APV equipped aircraft operating on their runways are exempted from establishing APV procedures, however, they need to have at least LNAV procedures.

In the performance of the above, the Polish CAA released "PBN Implementation Plan Poland". This document contains the Policy for the Application of PBN in the Republic of Poland. It provides a base on which PBN concept may be applied and the regulatory mechanism for the change that will have to be undertaken by the respective Air Navigation Service Providers (ANSPs) and operators in order to realize the projected benefits.

On July 18th, 2018, "Commission Implementing Regulation (EU) 2018/1048 on requirements for the use of airspace and operational procedures for performance-based navigation" (PBN IR) was issued. In accordance with Article 4, providers of ATM/ANS shall take the necessary measures to ensure a smooth and safe transition to the provision of their services using PBN by the establishment and implementation of a transition plan.

As the main ATM/ANS provider in Poland, it became PANSA's task to establish the Transition Plan, in cooperation with the interested parties (airspace users, airports, and other ATM/ANS providers), approved by the Polish CAA.

The Russian-Ukrainian war which broke out in February 2022 and the related military activity, particularly with regard to the use of electronic warfare means causing disruption to satellite navigation systems which are the main navigation sensor for PBN navigation, the protective measures taken by the armed forces of Poland and NATO, have caused significant perturbations in the use of some airports and airspace in FIR Warsaw. Some changes to the CNS infrastructure have been necessitated by work on the construction of the Centralny Port Komunikacyjny Airport, including the high-speed railway, which is to connect the remaining communication airports in Poland to the CPK Airport into a single multimodal transport network.

This situation forced the Polish Air Navigation Services Agency to revise the existing version of the PBN TP and develop a new version of the document taking into account the existing threats, but remaining in compliance with the PBN IR. This document is the result of the teamwork of experts from PANSA, Polish CAA and others.

3. PBN Strategy in Poland

Poland fully supports the Performance Based Navigation concept as defined in Doc 9613 (PBN Manual) and commits itself, that any new ATS route (including SIDs/STARs) as well as instrument approach procedures to be based on an appropriate PBN specification.

Mindful of the need for a gradual transition to PBN, particularly with respect to terminal and approach procedures, some conventional procedures may be permitted to remain as a contingency/reversion plan.

The airways network based on the RNAV-5 navigation specification has existed since 1998. RNAV-5 is now the main navigation specification for en-route airspace within the Warszawa FIR.

Under the leadership of EUROCONTROL, Poland, with the other ECAC member States, has committed to gradual implementation of RNAV-1 in the Terminal Areas. Within this framework, the main Polish Terminal Area (TMA Warszawa) has been covered by RNAV-1 arrival STARs and departure SIDs since 2009. So far, all Polish international aerodromes have implemented RNAV-1 SIDs and RNAV-1 STARs or RNP-1 SIDs and RNP-1 STARs. RNAV-1 specification SIDs and STARs will be also implemented in CPK Airport. PANSA will continue efforts to improve DME/DME coverage by the introduction of new DME stations to establish backup sensor for RNAV-1 SIDs and STARs. This will lead to phasing out the conventional SIDs and STARs.

The first LPV procedures were designed in Poland in 2011. In the framework of „HEDGE" and "EGNOS Introduction in the European Eastern Region Mielec" projects, four experimental LPV procedures were designed for EPKT (Katowice) and EPMI (Mielec).

So far all Polish international aerodromes have implemented RNP APCH procedures (minima lines: LNAV, LNAV/VNAV and LPV). It gives the opportunity to phase out conventional IAP (without a few conventional IAP procedures used as a contingency).

The use of satellite systems in the Warszawa FIR began in 2013 for operations based on GPS and will be rolled out gradually until it reaches the status of the main navigation sensor in 2030. According to SES, the responsible body in Europe for providing EGNOS SIS is ESSP. PANSA as national ANSP, to provide EGNOS navigation support in Poland signed an EGNOS Working Agreement (EWA) contract with ESSP in 2013. EWA contains the principles of cooperation, including the issues of monitoring and recording EGNOS and GPS signal, and generating proposals NOTAM content and its distribution.

It is obvious that the purpose of PBN IR is to provide a clear European strategy for the transition from conventional navigation with ground-based navigation aids to Performance Based Navigation (PBN) mostly supported by GNSS. Poland fully supports this position.

With the transition from sensor-based to performance-based navigation, Poland continues to rationalize its ground-based navigation infrastructure.

4. The consultation process

In accordance with Article 4 PANSA takes the necessary measures to safe transition to the provision of their services using PBN by the establishment and implementation of "the Transition Plan – Poland". It will be developed in collaboration with all the involved stakeholders and will be continuously updated in response to the development of navigation systems and regulatory requirements.

PBN Transition Plan Poland v0.3.1 has been consulted with:

a) aerodrome operators: EPWA, EPMO, EPGD, EPKK, EPKT, EPSC, EPBY, EPSY, EPWR, EPRZ, EPPO, EPZG, EPRA, EPLL, EPLB;
b) Main airline operators in Poland including LOT, Ryanair, Wizz air, Enter Air;
c) the Network Manager referred to in Article 3(1) of Regulation (EU) No 677/2011;
d) Oro Navigacija;
e) Military Air Traffic Service Office of the Polish Armed Forces.

PBN Transition Plan Poland v0.2.1 has been updated to version 0.3.1.

5. PBN IR (EU 2018/1048) requirements

PBN IR Article 4 AND 7 Applicability of AUR.2005		03 DEC 2020	25 JAN 2024	06 JUN 2030	Poland 17.11.2021	Poland 09.10.2023
Art.4	Transition Plan (or significant updates) approved (living document)	X			PBN Transition Plan Poland v.0.2. - Approved	PBN Transition Plan Poland v.0.3. - Approved
AUR 2005 1 or 2 or 3	RNP APCH without PA	X			Finished	Finished
	RNP APCH at all IREs (with PA)		X		Finished	Finished
AUR 2005 4 or 5	RNAV-1 or RNP-1 (+RF) for all SID and STAR		X		Finished	Finished
AUR 2005 6	RNAV-5 ATS Routes (excl. SIDs and STARs) at and above FL 150	X			Finished	Finished
	RNAV-5 ATS Routes (excl. SIDs and STARs) below FL 150		X		Finished	Finished
AUR 2005 7	Helicopter RNP 0.3 (or RNAV-1/ RNP-1 (+RF) SID/STAR – one per IRE		X		No Plans	No Plans
	Helicopter RNP 0.3 (or RNAV-1/ RNP-1 (+RF) for all SID/STAR			X	No Plans	No Plans
	Helicopter RNP 0.3 or RNAV-1/ RNP-1 ATS Routes (excl. SID/STARs) below FL150		X		No Plans	No Plans

Table 1. PBN IR (EU 2018/1048) requirements implementation status

6. En-route Airspace

6.1. RNAV-5 implementation status

	Effective date	Nav. Spec.	Nav. Infra.
FRA FL095-FL660	2019	RNAV-5	GNSS, DME, DVOR
RNAV-5 ATS Routes FL095 – FL660	1998	RNAV-5	GNSS, DME, DVOR

Table 2. RNAV-5 implementation status

6.2. RNAV-5 ATS Routes

The network based on the RNAV-5 navigation specification has existed since 1998. RNAV-5 is currently the only navigation specification for en-route airspace within Warszawa FIR – RNAV-5 FRA.

6.2.1. General

Free route airspace ('FRA') is a specified airspace within which airspace users may freely plan a route between defined entry and exit points. Subject to airspace availability, airspace users must have the possibility to choose a route via intermediate, published or unpublished, waypoints without reference to the ATS route network. Within that airspace, flights remain subject to air traffic control.

Flight trajectories used in FRA do not have a published track and therefore no airway record is created in the navigation database. The route is defined on-board by the aircraft's RNAV or RNP system in the

FMS, and a nominal performance requirement (in Europe, RNAV-5) is set to nominally 'bound' the operation along the aircraft's defined track. In fact, an aircraft cannot fly a flight path within an FRA without an RNAV or RNP system, and use of an RNAV or RNP system means that the compliance with a navigation specification is required for the operation.

According to COMMISSION IMPLEMENTING REGULATION (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan provided for in Regulation (EC) No 550/2004 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 409/2013 and repealing Commission Implementing Regulation (EU) No 716/2014, FRA implementation is carried out in two phases as follows:

a) initial FRA by the implementation target date of 31 December 2022: with time and structure constraints;
b) final FRA by the implementation target date of 31 December 2025: constant free route implementation with cross-border dimension and connectivity to TMAs.

Civil and military ANSPs, airspace users and the Network Manager must synchronise the implementation of system and procedural changes necessary for ASM and FRA according to the deployment programme. These sub functionalities can only be effective if they are activated simultaneously, requiring that air and ground systems are equipped within a common timeframe. Without synchronisation, the network may present gaps that would prevent the airspace users from seamlessly flying preferred and more efficient routes. Any local limitations to the implementation of A FUA below FL 305 must be indicated in the deployment programme.

7. Terminal Control Area (TMA)

7.1. PBN SIDs and STARs

PANSA plans that all terminal operations will be based on PBN, and primarily satellite-based navigation. STARs and SIDs will have defined vertical and lateral paths taking advantage of RNP performance to provide both precise trajectories as well as opportunities for increased airspace and airport capacity through reduced aircraft separation.

The RNAV-1 specification is primarily developed for RNAV operations in a radar environment. The RNP-1 specification is intended for similar operations outside radar coverage. The RNP-1 specification is based upon GNSS. While DME/DME-based RNAV systems are capable of RNP-1 accuracy, this navigation specification is primarily intended for environments where the DME infrastructure cannot support DME/DME area navigation to the required performance. The increased complexity in the DME infrastructure requirements and assessment means it is not practical or cost-effective for widespread application.

So far all Polish international aerodromes have implemented RNAV-1 SIDs/STARs or RNP-1 SIDs/STARs:

TMA	Navigation specification		Nav. Infra.	effective date	AIP Poland
	RNAV-1	RNP-1			
TMA Bydgoszcz		SIDs RWY 08,	GNSS	2018	AD2 EPBY 4-2-1-0
		SIDs RWY 26			AD2 EPBY 4-2-2-0
		STARs RWY 08			AD2 EPBY 5-3-1-0
		STARs RWY 26			AD2 EPBY 5-3-2-0
TMA Gdańsk	SID RWY 11		GNSS	2017	AD2 EPGD 4-2-1-0
	SIDs RWY 29				AD2 EPGD 4-2-2-0
	STARs RWY 11				AD2 EPGD 5-3-1-0
	STARs RWY 29				AD2 EPGD 5-3-2-0
TMA Kraków	SIDs RWY 07 EPKK		GNSS	2015/2018	AD2 EPKK 4-2-1-0
	SIDs RWY 25 EPKK				AD2 EPKK 4-2-2-0
	STARs RWY 07 EPKK				AD2 EPKK 5-3-1-0
	STARs RWY 25 EPKK				AD2 EPKK 5-3-2-0
	SIDs 08 EPKT				AD2 EPKT 4-2-1-0
	SIDs RWY 26 EPKT				AD2 EPKT 4-2-2-0
	STARs RWY 08 EPKT				AD2 EPKT 5-3-1-0
	STARs RWY 26 EPKT				AD2 EPKT 5-3-2-0
TMA Lublin		SIDs RWY 07	GNSS	2017/2019	AD2 EPLB 4-2-1-0
		SIDs RWY 25			AD2 EPLB 4-2-2-0
		STARs RWY 07			AD2 EPLB 5-3-1-0
		STARs RWY 25			AD2 EPLB 5-3-2-0
TMA Łódź		SIDsRWY07	GNSS	2020	AD2 EPLL 4-2-1-0
		SIDs RWY 25			AD2 EPLL 4-2-2-0
		STARs RWY 07			AD2 EPLL 5-3-1-0
		STARs RWY 25			AD2 EPLL 5-3-2-0
TMA Poznań	SIDs RWY10 EPPO		GNSS	2019	AD2 EPPO 4-2-1-0
	SIDs RWY 28 EPPO				AD2 EPPO 4-2-2-0
	STARs RWY 10 EPPO				AD2 EPPO 5-3-1-0
	STARS RWY28 EPPO				AD2 EPPO 5-3-2-0
	SIDsRWY11 EPWR			2014/2017	AD2 EPWR 4-2-1-0
	SIDs RWY 29 EPWR				AD2 EPWR 4-2-2-0
	STARs RWY 11 EPWR				AD2 EPWR 5-3-1-0
	STARs RWY 29 EPWR				AD2 EPWR 5-3-2-0
TMA Rzeszów		SIDs RWY 09	GNSS	2018	AD2 EPRZ 4-2-1-0
		SIDs RWY 27			AD2 EPRZ 4-2-2-0
		STARs RWY09			AD2 EPRZ 5-3-1-0
		STARs RWY27			AD2 EPRZ 5-3-2-0
TMA Szczecin		SIDs RWY 13	GNSS	2020	AD2 EPSC 4-2-1-0
		SIDs RWY 31			AD2 EPSC 4-2-2-0
		STARs RWY13			AD2 EPSC 5-3-1-0
		STARs RWY31			AD2 EPSC 5-3-2-0
TMA Olsztyn		SIDs RWY01	GNSS	2017	AD2 EPSY 4-2-1-0
		SIDs RWY19			AD2 EPSY 4-2-2-0
		STARs RWY01			AD2 EPSY 5-3-1-0
		STARs RWY19			AD2 EPSY 5-3-2-0
TMA Warszawa	SIDs RWY11 EPWA		GNSS, DME/DME	2006/2017	AD2 EPWA 4-2-1-0
	SIDs RWY15 EPWA				AD2 EPWA 4-2-2-0
	SIDs RWY29 EPWA				AD2 EPWA 4-2-3-0
	SIDs RWY33 EPWA				AD2 EPWA 4-2-4-0
	STARs RWY11 EPWA				AD2 EPWA 5-3-1-0

	STARs RWY15 EPWA				AD2 EPWA 5-3-2-0
	STARs RWY29 EPWA				AD2 EPSWA-3-3-0
	STARs RWY33EPWA				AD2 EPWA 5-3-4-0
	SIDs RWY 08 EPMO			2015	AD2 EPMO 4-2-1-0
	SIDs RWY08 EPMO				AD2 EPMO 4-2-2-0
	SIDs RWY08 EPMO				AD2 EPMO 4-2-3-0
	SIDs RWY26 EPMO				AD2 EPMO 4-2-4-0
	STARs RWY08 EPMO				AD2 EPMO 5-3-1-0
	STARs RWY08 EPMO				AD2 EPMO 5-3-2-0
	STARs RWY08 EPMO				AD2 EPMO 5-3-3-0
	STARs RWY08 EPMO				AD2 EPMO 5-3-4-0
	STARs RWY26 EPMO				AD2 EPMO 5-3-5-0
	STARs RWY26 EPMO				AD2 EPMO 5-3-6-0
TMA Radom		SIDsRWY07 EPRA	GNSS	2023	AD2 EPRA 4-2-1-0
		SIDs RWY 25 EPRA			AD2 EPRA 4-2-2-0
		STARs RWY 07 EPRA			AD2 EPRA 5-3-1-0
		STARs RWY 25 EPRA			AD2 EPRA 5-3-2-0
TMA Zielona Góra		STARs RWY 06,24	GNSS	2019	AD2 EPZG 5-3-1-0

Table 3. RNAV1/RNP-1 SID and STAR implementation status in TMAs

7.2. SIDs and STARs - Liquidation Plan

TMA	RWY	Conventional procedures	Name	Nav. Infra.	AIP Poland	Planned decommission date (no later than)
TMA Bydgoszcz	08	SIDs	GOBNI 1A, INTUN 1A, LUXUD 1A	DVOR/DME	AD2 EPBY 4-1-1	2024
	26		GOBNI 1G. INTUN 1G, LUXUD 1G		AD2 EPBY 4-1-3	2024
	08,26	STARs	INTUN 1S, LUXUD 1N, LUXUD 1S, GOBNI 1S		AD2 EPBY 5-1-1	2024
TMA Łódź	25	Arrival routs	VIDEV-LL404-DVOR/DME LDZ, ABAKU-DVOR/DME LDZ, UTOLU-LL401-DVOR/DME LDZ, ADOXO-LL402-DVOR/DME LDZ, SOXER-LL403-DVOR/DME LDZ	DVOR/DME	AD2 EPLL 5-2-1	2024
TMA Lublin	07, 25	STARs	VENES 1G, GAVDU 1P, OGVET 1P, VENES 1P	DVOR/DME	AD2 EPLB 5-1-1	2024
TMA Poznań	28	STAR	CMP 1D	DVOR/DME	AD2 EPPO 5-1-1	2024
TMA Zielona Góra	06/24	STARs	OBOLA 2V, BAREP 3V	DVOR/DME	AD2 EPZG 5-1-1	2024

Table 4. SIDs and STARs Liquidation Plan - 2023

8. Airports - Instrument Approach Procedures (IAP)

The requirements for providers of ATM/ANS concerning the implementation of PBN set out in PBN IR include, in particular, appropriate requirements for the implementation at all instrument runway ends of 3D approach procedures. However, imposing those requirements could in certain situations have serious adverse consequences which outweigh the potential safety, capacity and efficiency benefits.

Therefore, in such situations, ATM/ANS providers are entitled to deviate from these requirements. In this case they are subject to certain alternative requirements, which are better suited for these specific situations, while still enabling to achieve the safety, capacity and efficiency goals.

Furthermore, in the interest of a safe and smooth transition, providers of ATM/ANS are allowed to provide their services also through other means than using PBN for a reasonable time period (no longer than to 1 June 2030), in the light of the need to rationalise ATM/ANS provision and avoid unnecessary costs resulting from the existence of multiple layers of navigation infrastructure.

8.1. PBN approach procedures

Currently all Polish international aerodromes have implemented RNP APCH procedures (for 3 minimums: LNAV, LNAV-VNAV and LPV):

ICAO CODE	RWY	LNAV	LNAV/VNAV	LPV		effective date	AIP Poland
				Yes/No	remarks		
EPBY	08	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	26	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPGD	11	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	29	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPKK	07	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	25	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPKT	08	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	26	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPLB	07	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	25	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPLL	07	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	25	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPMO	08	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2020	AD 6-6-1-1
	26	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPPO	10	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2019	AD 6-6-1-1
	28	RNAV NPA	APV BARO-VNAV	Yes		2019	AD 6-6-2-1
EPRA	07	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2023	AD 6-6-1-1
	25	RNAV NPA	APV BARO-VNAV	Yes		2023	AD 6-6-2-1
EPRZ	09	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	27	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1

EPSC	13	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	31	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPSY	01	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	19	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPWA	11	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-1-1
	15	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-2-1
	29	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-3-1
	33	RNAV NPA	APV BARO-VNAV	Yes		2019	AD 6-6-4-1
EPWR	11	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2018	AD 6-6-1-1
	29	RNAV NPA	APV BARO-VNAV	Yes		2018	AD 6-6-2-1
EPZG	06	RNAV NPA	APV BARO-VNAV	Yes	Decision height below 250ft not authorized	2019	AD 6-6-1-1
	24	RNAV NPA	APV BARO-VNAV	Yes		2019	AD 6-6-2-1

Table 6. RNP APCH implementation status 2023

8.2. IAP Rationalisation Plan 2023-2030

Transition Period 2021- 2030			
ICAO CODE	**RWY**	**Primary IAP (Final Approach Segment)**	**Secondary IAP (Final Approach Segment)**
EPBY	08	RNP APCH	NPA VOR
	26	PA ILS CAT I/R 2025	RNP APCH
EPGD	11	RNP APCH	NPA VOR
	29	PA ILS CAT II&III	RNP APCH
EPKK*	07	RNP APCH	NPA VOR
	25	PA ILS CAT I	RNP APCH
EPKT	08	RNP APCH	NPA VOR
	26	PA ILS CAT II	RNP APCH
EPLB	07	RNP APCH	NPA VOR
	25	PA ILS CAT II	RNP APCH
EPLL	07	RNP APCH	NPA VOR
	25	PA ILS CAT I	RNP APCH
EPMO	08	PA ILS CAT II	RNP APCH
	26	RNP APCH	NPA VOR
EPPO	10	RNP APCH	NPA VOR
	28	PA ILS CAT II	RNP APCH
EPRA	07	RNP APCH	NPA VOR
	25	PA ILS CAT I	RNP APCH
EPRZ	09	RNP APCH	NPA VOR
	27	PA ILS CAT II	RNP APCH
EPSC**	13	RNP APCH	NPA VOR
	31	PA ILS CAT I	RNP APCH
EPSY	01	RNP APCH	NPA VOR
	19	PA ILS CAT II	RNP APCH
EPWA	11	PA ILS CAT II	RNP APCH
	15	RNP APCH	NPA VOR
	29	RNP APCH	NPA VOR
	33	PA ILS CAT II&III	RNP APCH
EPWR	11	RNP APCH	NPA VOR
	29	PA ILS CAT II	RNP APCH
EPZG	06	RNP APCH	NPA VOR
	24	PA ILS CAT I	RNP APCH
The new CPK Airport	08L	PA ILS CAT II&III/2028	RNP APCH/2028
	26R	PA ILS CAT II&III/2028	RNP APCH/2028

	08R	PA ILS CAT II&III/2028	RNP APCH/2028
	26L	PA ILS CAT II&III/2028	RNP APCH/2028

* The new ILS/DME will be built by Airport and maintained by PANSA based on a intent letter.

**Airport EPSC declared to implement CAT II.

Conventional NPA on primary approach will be decommissioned up to 2030.

After 2030			
ICAO CODE	RWY	Primary IAP (Final Approach Segment)	Secondary IAP (Final Approach Segment)
EPBY	08	RNP APCH	NPA VOR*
	26	RNP APCH	PA ILS
EPGD	11	RNP APCH	NPA VOR*
	29	PA ILS CAT II&III	RNP APCH
EPKK	07	RNP APCH	NPA VOR*
	25	PA ILS CAT II&III	RNP APCH
EPKT	08	RNP APCH	NPA VOR*
	26	PA ILS CAT II	RNP APCH
EPLB	07	RNP APCH	NPA VOR *
	25	PA ILS CAT II	RNP APCH
EPLL	07	RNP APCH	NPA VOR*
	25	RNP APCH	PA ILS
EPMO	08	PA ILS CAT II	RNP APCH
	26	RNP APCH	NPA VOR*
EPPO	10	RNP APCH	NPA VOR*
	28	PA ILS CAT II	RNP APCH
EPRA	25	RNP APCH	PA ILS
	07	RNP APCH	NPA VOR*
EPRZ	09	RNP APCH	NPA VOR*
	27	PA ILS CAT II	RNP APCH
EPSC**	13	RNP APCH	NPA VOR *
	31	PA ILS CAT II	RNP APCH
EPSY	01	RNP APCH	NPA VOR *
	19	PA ILS CAT II	RNP APCH
EPWA***	11	PA ILS CAT II	RNP APCH
	15	RNP APCH	NPA VOR*
	29	RNP APCH	NPA VOR*
	33	PA ILS CAT II&III	RNP APCH
EPWR	11	RNP APCH	NPA VOR*
	29	PA ILS CAT II	RNP APCH
EPZG***	06	RNP APCH	NPA VOR*
	24	RNP APCH	PA ILS
The new CPK Airport	08L	PA ILS CAT II&III	PA GLS II&III, RNP APCH
	26R	PA ILS CAT II&III	PA GLS II&III, RNP APCH
	08R	PA ILS CAT II&III	PA GLS II&III, RNP APCH
	26L	PA ILS CAT II&III	PA GLS II&III, RNP APCH

* as a contingency/reversion plan in case of GNSS loss

** Airport EPSC declared implementation of CAT II

*** Depends on State decision regarding EPZG and EPWA status.

9. NAV infrastructure

9.1. General

PBN IR states that the providers of ATM/ANS shall take the necessary measures to ensure that they remain capable of providing their services through other means where, for unexpected reasons beyond their control, GNSS or other methods used for performance-based navigation are no longer available, making it impossible for them to provide their services in accordance with Article 3 "PBN requirements". Those measures shall include, in particular, retaining a network of conventional navigation aids and related surveillance and communications infrastructure. State policy decisions set the level of network capacity and contingency capability required in the event of GNSS disruption, and will determine the complexity of contingency network that must be provided by ANSPs and regulators. These State policy decisions may require that some ground-based infrastructure, route networks and terminal procedures are maintained or developed specifically for contingency operations.

On the other hand the purpose of PBN IR shows that in general, the role of the ground-based NAVAIDS will gradually evolve towards providing a backup for GNSS and supporting contingency operations in case of GNSS becoming unusable. This evolution offers the opportunity for the rationalization of some of the ground-based infrastructure and retaining the maintenance of only a Minimum Operational Network (MON) which is designed to efficiently provide this backup reversion service.

On 4 July 2020 (EASA - CANSO Workshop 'Harmonised Implementation of the PBN IR') it was noted:

a) *After 2030, CAT II/III operations (including GBAS CAT II/III) are unaffected by the regulation, non PBN instrument flight procedures can be designed and kept in support of contingency modes.*
b) *Attendees agreed that it is premature to understand if by 2030 a pure PBN environment is achievable (in particular with respect to CAT.I operations). It is recommended to monitor the developments and to further assess the situation (e.g. SBAS equipage statistics, rationalization plans, GNSS vulnerabilities, RFI events, etc). Transition Plans should include the foreseen developments until 2030, these plans will consider the most update information.*
c) *ILS CAT I will be part of MON but its operational use remains to be fully clarified.*
d) *GBAS may support PBN 3D approaches. GBAS CAT I is recognised as an intermediate step to GBAS CAT II/III operations. The use of GBAS should be revisited when the scenarios and advantages of GBAS operations are more evident.*
e) *Despite the fact that no exemption mechanisms currently exist within the PBN IR, several partners support the idea of airport-specific approach minima exemptions.*
f) *No procedures based on PBN specifications different from those explicitly mentioned in the PBN IR will be authorised after 2030.*
g) *After 2030 we will operate a full PBN environment based on GNSS as primary infrastructure.*
h) *MON will allow aircraft to safely land in other places in case a contingency occurs.*
i) *It is confirmed that conventional navigation procedures can be used after 2030 only for contingency purposed.*

9.2. Navigation Infrastructure to support PBN

9.2.1. VOR

VOR has a limited role in PBN supporting one navigation application only (RNAV-5) which is primarily used in en-route. However existing VORs may be used for NPAs if no other option is available; to support aircraft only able to navigate conventionally (this may include state aircraft) up to June 2030, and also as contingency/reversion plan in case of GNSS loss.

9.2.2. DME

DME can support a position estimation for RNAV-5 and RNAV-1 operations. This enables operations in FRA, RNAV-5 ATS Routes and RNAV-1 SIDs/STARs.

DME/DME provides a fully redundant capability to GNSS for RNAV applications, and a suitable reversionary capability to RNA-1 for RNP applications requiring a lateral accuracy performance of ±1 NM (95%), providing there is an adequate DME infrastructure.

In Poland many DMEs are co-located with DVORs. When VORs are decommissioned, this is an opportunity to optimise the DME network. In such instances, to save costs or to improve DME/DME performance, DMEs are re-located if a co-located VOR is withdrawn. PANSA makes an effort to fill gaps and provide DME/DME coverage as low as possible without requiring more investment unless it is needed for safety reasons. DME/DME redundancy must be provided for both normal and contingency operations.

9.2.3. ILS

ILS is not a PBN Infrastructure. The PBN IR foresees that ILS will remain the standard for low visibility operations (CAT II/III). The ILS CAT I, II and III systems will continue to be the main facilities for the approach. ILS CAT I operations are not expected to cease until operators in given locations are fully equipped for SBAS CAT I.

All ILSs in Poland has been prepared to serve in at least CAT II operations and can be upgraded to CAT III by the installation of LOC FFM (Localizer Far Field Monitor).

9.3. GBAS

GBAS is not a PBN Infrastructure and is not a credible contingency alternative to SBAS CAT I, due to having a common failure mode (GNSS).

On 4 July 2020 (EASA - CANSO Workshop 'Harmonised Implementation of the PBN IR') EASA acknowledged that the advantages of GBAS implementation are currently being considered by various stakeholders and recognised that GBAS CAT I may be implemented in some airports as an intermediate step to CAT II/III. Post meeting note was: *"It should be recognised that the EU Air Navigation Strategy, recognised the potential use of GBAS for CAT II/III operations, however, or redundancy some ILS CAT II/III approached will need maintained. The strategy requires the use of SBAS for approach operation to the lowest possible LPV minima, furthermore as per recital 5 the use of SBAS approach via EGNOS should be promoted."*

9.4. MON

The role of the ground-based Navaids will evolve towards providing a reversion for GNSS and supporting contingency operations in case of GNSS becoming unusable. This evolution offers the opportunity for the rationalization of some of the ground-based infrastructure and retaining only a Minimum Operational Network (MON) which is designed to efficiently provide reversion service. MON refers to the minimum Navaid infrastructure needed to provide the required level of (ATM/ANS) service for both normal and contingency operations.

9.4.1. MON Plan

The process of identification of efficient MON for the Polish airspace is currently underway. See the schedule -Chapter 12.

9.4.2. Polish NAVAIDs Overview

- Airport (ILS/DME) and Airport – En-route (DVOR/DME) NAVAIDs :

Airport	NAVAID	ID	date of installation / EoL	Remarks or S-Stop of service, D- decommission, R – replacement, T – transition to stand-alone DME, RL- relocation, TBD - "To be decided" means that the work is ongoing, MON - Depending on the results of work on the MON Plan, CBA - Necessary CBA before replacing of NAVAID
EPBY	ILS/DME RWY 26	BYD	2001/2016	R (2025), MON
	DVOR/DME	BYZ	2013/2028	R (2030+)***, MON
EPGD	DVOR/DME	GZD	2012/2027	R (2030)***, MON
	ILS/DME RWY 29	IGDA	2016/2031	R (2030+), MON
EPKK	ILS/DME RWY 25	KRW	2003/2018	R, MON**
	DVOR/DME	KAK	2013/2028	R (2030+)***, MON
EPKT	ILS/DME RWY 27	IKTO	2015/2030	R (2030+), MON
	DVOR/DME	KAX	2012/2027	R (2030)***, MON
EPLB	ILS/DME RWY 25	ISWI	2013/2028	R (2030+)***, MON
	DVOR/DME	SWI	2012/2027	R (2030+)***, MON
EPLL	ILS/DME RWY 25R	LOD	2018/2033	R (2030+), MON
	DVOR/DME	LOZ	2015/2030	R (2030+), MON
EPMO	ILS/DME**** RWY 08	IMDX	2013/2028*****	R (2028)***, MON
	DVOR/DME	MOL	2012/2027	R (2030)***, MON
EPPO	ILS/DME RWY 28	POZ	2018/2033	R (2030+), MON
	DVOR/DME	LAW	2020/2035	R (2030+), MON
EPRA	DVOR/DME	RDO	2014/2029	R (2030), MON
	ILS/DME	IRDM	2023/2038	R (2030+), MON
EPRZ	ILS/DME RWY 27	RZW	2016/2031	R (2030+), MON
	DVOR/DME	RSW	2019/2034	R (2030+), MON
EPSC	ILS/DME RWY 31	SZC	2014/2029	R (2030), MON
	DVOR/DME	SCZ	2014/2029	R (2030), MON
EPSY	ILS/DME**** RWY 01	SZY	2016/2031	R (2030+), MON
	DVOR/DME	SYN	2017/2032	R (2030+), MON
EPWA	ILS/DME RWY 33	WA	2013/2028	TBD, MON*
	ILS/DME RWY 11	WAS	2011/2026	TBD, MON*
	DVOR/DME	OKC	2021/2036	TBD, MON*
	DVOR/DME	WAR	2023/2038	D*
EPWR	ILS/DME RWY 29	WRO	2013/2028	R (2030+)***, MON
	DVOR/DME	WCL	2012/2027	R (2030+)***, MON
EPZG	ILS/DME RWY 24	IZGA	2014/2029	R (2030+), MON*
	DVOR/DME	ZLG	2012/2027	R (2030+)***, MON*
CPK	ILS/DME RWY 26L	---	2028	N, MON
	ILS/DME RWY 26P	---	2028	N, MON
	ILS/DME RWY 08L	---	2028	N, MON
	ILS/DME RWY 08L	---	2028	N, MON

*Depends on State decision regarding EPZG and EPWA status.
**New navaid will be built by Airport, PANSA will be maintained this device. Exact date has not been known yet.
*** The item does not exist in the RP4 Investment Plan. If the funds become available, it is recommended to replace it earlier.
**** System not owned by PANSA, but maintained by PANSA.
***** System will be built by Airport.

- En-route NAVAIDs

Type NAVAID	NAVAID ID	Airport/ place of installation	date of installation / EoL	Remarks or S-Stop of service, D- decommission, R – replacement, T – transition to stand-alone DME, RL- relocation, TBD - "To be decided" means that the work is ongoing, MON – Depending on the results of work on the MON Plan, CBA - Necessary CBA before replacing of NAVAID, N – new NAVAID
DME	CZA	Czaplinek	2013/2028	R (2030)*, MON
DVOR/DME	CMP	Czempin	2015/2030	S,D
DVOR/DME	DAR	Darłowo	2004/2019	T (2028), DME MON, DVOR – D
DME	DIA	Działyń	2016/2031	R (2030+), MON
DME	DRE	Drezdenko	2011/2026	R (2030)*, MON
DVOR/DME	GRU	Grudziądz	2003/2018	T (2025), DME MON, DVOR – D
DME	IZB	Izbica	2013/2028	R (2030+)*, MON
DME	JED	Jędrzejów	2015/2030	R (2030+), MON
DME	KMI	Kmiecin	2016/2031	R (2030+), MON
DME	KRN	Karnice	2016/2031	R (2030+), MON
DME	LIN	Linin	2014/2029	R (2030), MON
DVOR/DME	MRA	Mrągowo	2003/2018	S, D
DME	NTA	Nowy Targ	2015/2030	R (2030+), MON
DME	OLX	Olesno	2012/2027	R (2030+)*, MON
DME	PCK	Płock	2013/2028	R (2030+)*, MON
DVOR/DME	RUD	Skupowo	2004	S,D
DVOR/DME	SIE	Siedlce	2004	S,D
DVOR/DME	SUW	Suwałki	2002	S,D
DME	TBN	Głuchów Górny	2014/2029	R (2030), MON
DME	TZE	Trzebielino	2011/2026	R (2030+)*, MON
DME	WIC	Wicko	2014/2029	R (2030), MON
DME	OSY	Olsztyn	2020/2035	R (2030+), MON
DME	WIE	Wieluń	2019/2034	R (2030+), MON
DME	PSZ	Pszczyna	2021/2036	R (2030+), MON
DME	BIA	Legnica	2024/2039	N, MON
DME	OST	Ostasze	2024/2039	N, MON
DME	GUS	Augustów	2025/2040	N, MON
DME		TMA Wrocław	2025/2040	N, MON
DME		TMA Kraków/Katowice	2025/2040	N, MON
DME		TMA Rzeszów 1	202?	N, MON
DME		TMA Rzeszów 2	202?	N, MON
DME		CPK 1	2026	N, MON
DME		CPK 2	2026	N, MON

* The item does not exist in the RP4 PANSA Investment plan. If the funds become available, it is recommended to replace it earlier.
** Items that do not exist in the PANSA Investment Plan but may become reality in connection with plans to implement the radar service at TMA Rzeszów. Device deployment dates may change depending on EPRZ implementation plans for the RNAV-1 specification.

10. Aircraft capabilities

A PBN implementation is only successful if the majority of the fleet has all the capabilities required in the navigation specification intended for the implementation.

The analysis of aircraft capabilities operating to/from Polish airports were conducted based on the IFR flight plans starting August 2023. Following data (Table #10, 11, 12) are got using EUROCOTROL CNS Dashboard .

Table 10. Aircraft capabilities – RNP APCH (August 2023)

Airport Code	Total # Aircraft	A – GBAS landing system		B – LPV (APV with SBAS)		S1 – RNP APCH		S2 – RNP APCH with BARO-VNAV	
		% Capable Aircraft	# Aircraft	% Capable Aircraft	# Aircraft	% Capable Aircraft	# Aircraft	% Capable Aircraft	# Aircraft
EPBY	122	10,7	13	9,0	11	10,7	13	88,5	108
EPGD	493	20,5	101	13,0	64	23,5	116	82,8	408
EPKK	983	24,3	239	5,8	57	21,1	207	93,7	921
EPKT	472	28,4	134	7,8	37	21,6	102	82,8	391
EPLB	115	32,2	37	9,6	11	13,0	15	87,8	101
EPLL	103	35,9	37	15,5	16	11,7	12	86,4	89
EPMO	259	47,5	123	7,3	19	8,5	22	92,3	239
EPPO	412	24,5	101	10,9	45	21,8	90	76,0	313
EPRA	51	19,6	10	3,9	2	11,8	6	58,8	30
EPRZ	417	10,3	43	9,6	40	21,1	88	73,1	305
EPSC	156	19,2	30	10,3	16	10,9	17	85,3	133
EPSY	67	35,8	24	22,4	15	22,4	15	82,1	55
EPWA	1052	8,7	91	15,4	162	30,2	318	86,6	911
EPWR	415	26,5	110	12,0	50	23,6	98	82,9	344
EPZG	33	0,0	0	12,1	4	24,2	8	81,8	27

Based on the data in Table 10, the following conclusions can be drawn with regard to the feasibility of RNP approach operations:

- *GBAS - GLS avionics equipment at FIR Warsaw, is still insufficient for the decision to implement GLS approaches. The exception is EPMO aerodrome, where the saturation of the fleet with suitable avionics represents about 50% of all aircraft operating at this aerodrome. A barrier, however, is the cost of the system, the installation of which under Polish conditions is estimated at seven ILS/DMEs.*
- *Very well, in comparison to the capacity for LPV and RNP APCH (S1) operations, looks like the equipment for RNP APCH with Baro VNAV operations presents itself from around 58% to above 90%. At the same time, the European Union's firm stance on equipping aircraft with SBAS avionics gives a sense of confidence that the saturation of the fleet with these avionics will also be at a sufficient level by 2030. Accordingly, GNSS operations to LNAV, LNAV/VNAV, LPV minima are being implemented at all Polish commercial airports.*

Table 11. Aircraft capabilities – RNAV-1/RNP-1 equipment (August 2023)

Airport Code	Total # a/c	D1– RNAV-1 all permitted sensors		D2 – RNAV-1 GNSS		D3 – RNAV-1 DME/DME		D4 – RNAV-1 DME/DME/IRU		RNAV-1 – GNSS only (D2 only)		RNAV-1 – Non GNSS (D3 or D4 and not (D1 or D2))		O2 – Basic RNP-1 GNSS	
		% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c
EPBY	122	82,8	101	10,7	13	41,8	51	0,0	0	6,6	8	0,0	0	28,7	35
EPGD	493	85,0	419	12,0	59	27,0	133	1,2	6	7,3	36	1,4	7	22,3	110
EPKK	983	91,8	902	5,4	53	35,5	349	0,3	3	2,2	22	1,6	16	10,5	103
EPKT	472	85,8	405	10,0	47	35,0	165	2,1	10	5,9	28	2,8	13	23,3	110
EPLB	115	80,9	93	14,8	17	44,3	51	0,9	1	9,6	11	0,9	1	39,1	45
EPLL	103	77,7	80	21,4	22	63,1	65	0,0	0	18,4	19	1,0	1	22,3	23
EPMO	259	88,0	228	10,4	27	80,3	208	0,0	0	9,3	24	0,4	1	8,1	21
EPPO	412	80,8	333	16,5	68	39,3	162	1,0	4	12,1	50	1,0	4	24,8	102
EPRA	51	47,1	24	23,5	12	15,7	8	0,0	0	15,7	8	7,8	4	19,6	10
EPRZ	417	83,7	349	12,7	53	24,9	104	1,7	7	7,0	29	1,4	6	19,4	81
EPSC	156	78,8	123	14,1	22	39,7	62	2,6	4	12,2	19	3,2	5	31,4	49
EPSY	67	65,7	44	29,9	20	53,7	36	0,0	0	20,9	14	1,5	1	38,8	26
EPWA	1052	85,4	898	12,5	131	13,3	140	0,4	4	6,7	71	1,0	11	19,1	201
EPWR	415	83,9	348	12,0	50	39,8	165	0,7	3	8,7	36	1,4	6	19,3	80
EPZG	33	69,7	23	27,3	9	6,1	2	0,0	0	21,2	7	0,0	0	57,6	19

Analysis of the data shown in Table 11 leads to the following conclusions.

- Overall, the RNAV-1 (D1) equipment looks very good. One may be puzzled by the fact that for the individual sensors (D2, D3, D4) the numbers are low and their sum does not give an aggregate value (D1). This may be an indication that the flight plans were not filled out very reliably in this regard.

The same is in case of the RNP-1 GNSS specification (O2), as only EPZG aerodrome shows a value above 50%, which would indicate a general lack of this capability on board aircraft operating in FIR Warsaw. However, the fact of smooth air traffic at individual airports in EPWA indicates that the actual state must be much better and again we must be dealing with unreliable flight plan filings.

Table 12. Aircraft capabilities – RNAV-5 (August 2023)

Airport Code	Total # a/c	B1 – RNAV-5 all permitted sensors	B2 – RNAV-5 GNSS	B3 – RNAV-5 DME/DME	B4 – RNAV-5 VOR/DME	B5 – RNAV-5 INS or IRS	RNAV-5 – GNSS only (B2 only)	RNAV-5 – GNSS and DME/DME ((B2 and B3) or B1)	RNAV-5 – VOR/DME only (B4 only)

		% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c	% Capable a/c	# a/c
EPBY	122	73,8	90	25,4	31	15,6	19	13,9	17	49,2	60	9,8	12	88,5	108	0,0	0
EPGD	493	77,5	382	21,5	106	13,2	65	11,2	55	29,4	145	7,9	39	89,2	440	0,2	1
EPKK	983	89,3	878	11,5	113	7,2	71	6,7	66	35,1	345	3,0	29	95,9	943	0,1	1
EPKT	472	78,8	372	18,4	87	12,7	60	11,9	56	35,4	167	7,8	37	88,8	419	0,2	1
EPLB	115	74,8	86	22,6	26	12,2	14	12,2	14	46,1	53	11,3	13	86,1	99	0,9	1
EPLL	103	77,7	80	22,3	23	2,9	3	1,9	2	60,2	62	19,4	20	80,6	83	0,0	0
EPMO	259	87,6	227	11,2	29	1,2	3	3,5	9	79,9	207	7,7	20	88,8	230	0,0	0
EPPO	412	74,5	307	23,5	97	12,1	50	12,6	52	41,7	172	11,7	48	85,4	352	0,2	1
EPRA	51	54,9	28	43,1	22	3,9	2	13,7	7	5,9	3	19,6	10	56,9	29	0,0	0
EPRZ	417	75,8	316	22,1	92	17,0	71	17,0	71	30,7	128	5,0	21	91,1	380	0,2	1
EPSC	156	61,5	96	34,6	54	22,4	35	23,7	37	57,7	90	13,5	21	81,4	127	1,3	2
EPSY	67	56,7	38	40,3	27	16,4	11	16,4	11	53,7	36	22,4	15	73,1	49	0,0	0
EPWA	1052	81,9	862	18,0	189	9,7	102	9,5	100	11,5	121	6,5	68	91,1	958	0,2	2
EPWR	415	75,9	315	21,7	90	12,3	51	11,6	48	45,1	187	9,9	41	87,0	361	0,5	2
EPZG	33	24,2	8	72,7	24	51,5	17	51,5	17	42,4	14	18,2	6	75,8	25	3,0	1

Analysis of the data in Table 12 leads to the following conclusions:

- The fleet's ability to perform operations in an RNAV-5 environment is high, even widespread.
- The avionics of the aircraft allow simultaneous use of GNSS, DME/DME, DVOR/DME, INS/IRS sensors. Only a small fraction have B4 avionics (DVOR/DME only).

This may lead to the conclusion that, even in en-route applications, a stronger emphasis must be placed on the DME/DME sensor than on the DVOR/DME.

11. Contingency operations during GNSS reversion in the event of a GNSS outage or GNSS interference.

As "European GNSS Contingency/Reversion Handbook for PBN Operations" indicates, in both normal and contingency operations a Safety Assessment must be undertaken – this activity can be undertaken just before actual changes in ATM functional system because operational and safety environment and requirements can change till the day of implementation. If the contingency operation is just to get the aircraft safely on the ground, a basic level of backup infrastructure may suffice. If the contingency operation is planned to maintain the same level of operations, regardless of the GNSS outage, then clearly a full backup infrastructure probably with redundancy will need to be available. When developing contingency scenarios within the Airspace Concept, inter-dependencies should be identified particularly when dealing with GNSS which affects so many systems. This will permit multiple system failures to be considered e.g. radar and GNSS failure, or COM and GNSS failure. Whilst redundancies must be provided, care must be taken to ensure that viable shared redundancies are identified (include trade off considerations) to avoid unnecessary costs.

Assumption for normal and contingency operations in FIR EPWW:

<u>En- route navigation:</u>

GNSS as a basic navigation sensor.

<u>Contingency/Reversion plan</u>

Maintaining PANSA's ability to ensure RNAV-5 navigation accuracy for at least 95 % of the flight time throughout the FIR Warsaw FL95 – FL 660.

<u>Terminal navigation:</u>

Two group of airports:

With the RNP-1 specification and CAT I or II operations implemented;

With the RNAV-1 specification and CAT I/II/III operations implemented.

<u>I. Airports (EPRZ, EPLB, EPSY, EPLL, EPBY, EPZG, EPRA, EPSC) - with the RNP-1 specification and CAT I/II operations implemented.</u>

<u>Two categories of airports:</u>

1) with implemented ILS/DME CAT II: EPRZ, EPLB, EPSY;

2) with implemented ILS/DME CAT I: EPRA, EPZG, EPLL, EPSC. In case of EPSC formal declaration of intention to implement CAT II in 2025.

- GNSS as a basic navigation sensor, PBN and PA procedures implemented based on ILS/DME CAT I or II.

<u>Contingency/Reversion Plan:</u>

- ILS/DME,
- DVOR/DME – maintaining aerodrome and en-route radionavigation facility. Leaving the conventional flight procedure using DVOR/DME allowing for insertion into the ILS/DME beam, to ensure the NPA approach and to provide guidance on the missed approach segment.

<u>II. Airports (EPWA, EPPO, EPWR, EPGD, EPKK, EPKT, EPMO) - with the RNAV-1 specification and at least CAT II operations implemented.</u>

- GNSS as the basic navigation sensor, PBN and PA procedures implemented based on ILS/DME CAT II or III.

<u>Contingency/Reversion Plan:</u>

- ILS/DME,
- DME/DME (as RNAV-1 sensor),
- radar vectoring,

- DVOR/DME - maintaining aerodrome and en-route radionavigation facility. Leaving the conventional flight procedure using DVOR/DME allowing for insertion into the ILS/DME beam, to ensure the NPA approach and to provide guidance on the missed approach segment.

See the schedule - Chapter 12.

12. Timetable

			<2018	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1.	En-route	EN ROUTE														
a)		RNAV-5 ATS Routes Implementation														
b)																
c)		Cross-border FRA Implementation														
2.	TMA	TMA														
a)		RNAV-1 SIDs/STARs Implementation								DME/ DME[2]				The new CPK Airport		
b)		RNP-1 SIDs/STARs Implementation														
c)		Conventional SIDs/STARs Decommission														
3.	IAP	APCH														
a)		RNP APCH Implementation							EPRA					The new CPK Airport		
b)		NPA VOR Decommission														
c)		PA ILS CAT I Decommission[1)]														
d)		PA ILS CAT II and III Implementation														
4.	MON	NAVAID														
a)		Polish NAVAIDs Overview														
b)		MON Plan Preparation														
5.	Contingency/Reversion Plans and Procedures Review	CONTINGENCY														
a)		Contingency/Reversion for RNAV-5														
b)		Contingency/Reversion for RNAV-1/RNP-1														
c)		Contingency/Reversion for RNP APCH														
d)		Contingency operations during GNSS reversion in the event of a GNSS outage or GNSS interference														
6.	Aircraft capabilities	CAPABILITY														
7.		monitoring														

[1)] It is not expected to cease ILS CAT I operations, until operators in given locations will be fully equipped for SBAS CAT I.

[2)] DME/DME upgrade of existing GNSS RNAV-1 SID/STARs in some TMA, for instance: EPGD, EPPO, EPWR, EPKT/EPKK. At first we add sensor DME-DME in EPGD, it is planned in 2024, than it will be EPPO 2025, EPWR 2025, and the last one will be EPKT/EPKK in 2026.

13. Terms and definitions.

Terms	Definitions
PBN IR	
performance based navigation (PBN)	performance based navigation as defined in Article 2(5) of Regulation (EU) No 965/2012
ATS route	ATS route as defined in Article 2(46) of Implementing Regulation (EU) No 923/2012
instrument approach procedure (IAP)	instrument approach procedure as defined in Article 2(90) of Implementing Regulation (EU) No 923/2012;
conventional navigation procedures	ATS routes and instrument approach procedures predicated on the use of ground-based navigation aids that do not enable compliance with the PBN requirements set out in IR PBN
navigation specification	a set of requirements for aircraft and aircrew needed to support performance-based navigation operations within a defined airspace
required navigation performance (RNP) X specification	a navigation specification based on area navigation that includes the requirement for on-board performance monitoring and alerting, whereby 'X' refers to the lateral navigation accuracy in nautical miles or the operation type and required functionalities;
lateral navigation (LNAV), lateral navigation/vertical navigation (LNAV/VNAV) and localizer performance with vertical guidance (LPV)	the labels to identify the different types of operating minima on approach charts depicting approach procedures based on Global Navigation Satellite Systems (GNSS) which are classified as RNP approaches (RNP APCH);
radius to fix (RF)	a constant radius circular path about a defined turn centre that terminates at a fixed point
2D approach	an instrument approach procedure, classified as an non-precision approach procedure, as defined in Article 2(90) of Implementing Regulation (EU) No 923/2012;
3D approach	an instrument approach procedure, classified as an approach with vertical guidance or a precision approach, as defined in Article 2(90) of Implementing Regulation (EU) No 923/2012;
satellite-based augmentation system (SBAS)	a wide-coverage augmentation system in which the user of a GNSS receives augmentation information from a satellite-based transmitter
area navigation (RNAV) X specification	a navigation specification based on area navigation that does not include the requirement for on-board performance

	monitoring and alerting, whereby 'X' refers to the lateral navigation accuracy in nautical miles;
standard instrument arrival (STAR) route	a designated instrument flight rule arrival route linking a significant point, normally on an air traffic service (ATS) route, with a point at which a published instrument approach procedure can be commenced;
standard instrument departure (SID) route	a designated instrument flight rule departure route linking the aerodrome with a specified significant point, normally on a designated ATS route, at which the en route phase of a flight commences;
navigation functionality	the detailed capability of the navigation system required to meet the needs of the proposed operations in the airspace.
Other terms and definitions using in the document	
Ground Based Augmentation System (GBAS)	a new precision approach landing system using GNSS navigation with differential correction provided by a ground station.
Aircraft-based augmentation system (ABAS)	An augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft
Satellite-based augmentation system (SBAS).	A wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter. An SBAS augments core satellite systems by providing ranging, integrity and correction information via geostationary satellites. The system comprises: a network of ground reference stations that monitor satellite signals , master stations that collect and process reference station data and generate SBAS messages, uplink stations that send the messages to geostationary satellites; and transponders on these satellites that broadcast the SBAS messages.
EGNOS (European Geostationary Navigation Overlay Service)	the European Satellite-Based Augmentation System (SBAS)
DME/DME Full Redundancy	Means that two independent DME pairs are available to provide positioning anywhere along the flight path
DME/DME Limited Redundancy	Means that there is a common DME in two DME pairs

14. Relevant documents

1. Commission Implementing Regulation (EU) 2018/1048 of 18 July 2018 laying down airspace usage requirements and operating procedures concerning performance-based navigation
2. Commission Implementing Regulation (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan provided for in Regulation (EC) No 550/2004 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 409/2013 and repealing Commission Implementing Regulation (EU) No 716/2014
3. EASA Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 1332/2011 and Commission Implementing Regulation (EU) 2018/1048
4. **EASA SIB 2022-02R2 z 06.11.2023r.**
5. ICAO Document 9613, 'Performance-based Navigation (PBN) Manual', 2013, 4th Edition
6. European Airspace Concept Handbook for PBN Implementation (Edition 4.0); EUROCONTROL - February 2021
7. European PBN Implementation and Transition Planning Handbook (PBN Handbook No. 5) Edition2, EUROCONTROL; May 2021
8. European GNSS Contingency/Reversion Handbook for PBN Operations (PBN HANDBOOK No. 6) EUROCONTROL; April 2020
9. Performance-Based Navigation Vision 2030 for ANSPs; CANSO; February 2017
10. EASA-CANSO Workshop "Harmonised Implementation of the PBN IR"; draft Notes; 4 June 2020
11. PBN Implementation Plan POLAND; 17.08.2017
12. Strategic Navigation Infrastructure Development Plan; PANSA; 2015
13. Strategic Airspace FIR EPWW Development Plan; PANSA; 2018
14. **Polityka rozwoju lotnictwa cywilnego w Polsce do 2030r. (z perspektywą do 2040r.) z dnia 21.11.2023r.**

15. Abbreviations

ABAS	Aircraft-based augmentation system
APCH	Approach
APV	Approach Procedure with Vertical Guidance
APV SBAS	Approach Procedure with Vertical Guidance by SBAS
Baro-VNAV	Barometric Vertical Navigation
CAA	Civil Aviation Authority
DME	Distance Measuring Equipment
EGNOS	European Geostationary Navigation Overlay Service
EoL	End of life
EWA	EGNOS Working Agreement
FIR	Flight Information Region
FL	Flight Level
GBAS	Ground Based Augmentation System
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IAP	Instrument Approach Procedure
ILS	Instrument Landing System
IRE	Instrument Runway End
IRS	Inertial reference systems
IRU	Inertial Reference Units
LNAV	Lateral navigation
LNAV/VNAV	Lateral Navigation/Vertical Navigation
LP	Localizer performance
LPV	Localizer Performance with Vertical Guidance
NAV	Navigation
NAVAID	Navigational Aid
MSA	Minimum Sector Altitude
MON	Minimum Operational Network
NDB	Non-Directional Beacon
NPA	Non-Precision Approach
NSA	National Supervisory Authority
PA	Precision approach
PBN	Performance-Based Navigation
PCP	Pilot Common Project
RF	Radius to Fix
RNAV	Area Navigation
RNP	Required Navigation Performance
SBAS	Satellite Based Augmentation System
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival Route
TBD	To Be Decided/To Be Done
TMA	Terminal Control Area
VOR	Very-High Frequency (VHF) Omni-directional Radio Range
VNAV	Vertical Navigation