Estonian National

PBN Deployment Plan

Version 2.1

Document revision history

Version	Date	Status	Approval
0.1	29.08.2018	1st draft for initial feedback	
0.2	16.09.2019	2nd draft after initial feebdack	
0.3	31.03.2020	3d draft commented by Stakeholders	
0.4	04.06.2020	Modification after NM review.	
0.5	02.07.2020	Modification after CIV/MIL meeting.	
1.0	28.08.2020	Delivered to CAA after final coordination with MIL	
1.1	02.03.2023	Chapter 8 update	
2.0	10.05.2023	All chapters updated	
2.0	08.12.2023	Modifications after NM review	
2.1	20.01.2024	Modifications after NM review and updated dates	
2.1	20.06.2024	Modification after consultation with stakeholders	

Table of contents

1. EXECUTIVE SUMMARY

The Estonian Transport Administration has tasked Estonian Air Navigation Services (EANS), to develop an airspace strategy and a supporting PBN deployment plan to ensure regulatory compliance with the PBN IR and to meet Air Traffic demands, without impacting on the safety or capacity of the airspace whilst fulfilling national environmental commitments.

This airspace concept, which is to meet all of the national objectives, will be supported by a PBN implementation plan that will have clearly defined transition plan with timescales to deliver the concept, as well as identifying exemptions for non-PBN compliant State Aircraft. EANS will consider the transition from current operations and ensure the connectivity of the ATS network throughout the airspace. The concept and implementation plan will be cognisant of the national safety and environmental policies and will demonstrate that the new airspace concept is as safe as current operations, if not safer, through a safety assessment. EANS will undertake appropriate stakeholder consultation to ensure a smooth transition during implementation.

EANS will present the strategic roadmap for PBN implementation to the Estonian Transport Adminitration for acceptance and confirmation once the performance targets, safety assessment and stakeholder consultation have been successfully undertaken. Following acceptance, it will be EANS responsibility to manage the implementation to ensure that the agreed timelines are met. The Estonian Transport Administration will be responsible for ensuring the stakeholders involved are appropriately certified and operationally approved. However, it will be EANS responsibility to communicate with the stakeholders (airport operators, airlines, adjacent ANSPs and the Network Manager) to ensure that the airspace users know about the planned changes and have enough time to equip/retrofit the correct equipment on board the aircraft. Finally, EANS will develop appropriate training material for the stakeholders which is to be approved by the Estonian Transportation Administration prior to use.

The final document, when fully complete, will describe the proposed airspace changes to meet regulatory requirements and the State's strategic intent. The deliverables of the process will be a strategic roadmap defining the PBN implementation. The State commitment to this plan will be clearly indicated by the Estonian Transportation Administration signing the finalised document. They will also be responsible for developing the relevant aircraft documentation, ensuring stakeholder awareness through appropriate communication channels and laying out the transition plan for the implementation. Finally, the Estonian Transportation Administration will be required to approve the specific training required for the PBN implementation which EANS will develop as one of the transition activities.

2. Statement of Strategic Compliance - Intention Policy

EANS, Ämari Air Base together with other ANSP-s within Estonia undertakes to develop an airspace concept and an associated PBN implementation plan to meet the national objectives as detailed by the State. This concept and its associated implementation plan will be developed in collaboration with all the involved stakeholders, it will follow the high-level principles elaborated by the State and will comply with both European and national regulatory requirements, particularly as regards:

- *PBN IR*

CP1 IR The airspace concept will be developed to ensure efficient and cohesive flows of traffic and provide opportunities to safely improve capacity whilst meeting environmental commitments. The associated PBN implementation plan will be developed to ensure that the airspace concept is achieved in a timely fashion and ensure that the State meets its specified goals. Throughout the development and deployment of the airspace concept, the EANS will ensure that performance targets are clearly defined and met and that the future airspace changes are at least as safe as current operations if not safer. Furthermore, through the involvement of the stakeholders, the EANS will ensure that the concept and plan are balanced and deliverable in coordinated timeframe. The PBN implementation plan will be supported by a transition plan which will ensure that the evolution from today's operations to tomorrow's environment is communicated, coordinated and executed in the most efficient and cost beneficial way.

However, for non-PBN compliant State Aircraft, military conventional navigation structure will be maintained, maintaining conventional NPA and PA approach procedures along with the implementation of PBN procedures in military aerodromes.

3. Compliance Methodology

EANS will follow the EUROCONTROL guidance on PBN implementation by applying the seventeen activities laid out in the European Airspace Concept handbook for PBN Implementation (Edition 3 published in 2013). EANS will review the national objectives set out by the State and EU Regulatory requirements and derived a set of operational requirements to fulfil the strategic goals. These operational requirements will form the basis of the airspace concept which the EANS will provide to the State for acceptance. Once mutual agreement on the airspace concept has been achieved, EANS will develop the implementation and transition plans necessary to deliver the operational requirements. EANS will draw together an implementation team consisting of all involved stakeholders to then develop a set of implementation objectives to achieve the operational requirements. These objectives will be prioritised to ensure that a timely and coordinated set of successful implementations will deliver the future airspace concept; the prioritisation will form the basis of the transition plan. Each individual objective will require a team of involved stakeholders to manage the implementation and it will be at this granularity that specific performance targets will be set and safety demonstrated in accordance with

the national safety policy. The careful coordination of the implementation objectives will ensure the connectivity through the airspace and at its boundaries is maintained and that the airspace users will have an efficient, cost beneficial set of flows within the national airspace.

4. ANALYSIS

4.1. Main drivers for change and PBN implementation:

PBN IR Article 4 and 7 Applicability of AUR.2005		03 DEC 2020	25 JAN 2024	06 JUN 2030
Art 4	Transition Plan (*or significant updates)* approved *(living document)*[1]	x[1]	x[1]	x[1]
AUR 2005 1 or 2 or 3	RNP APCH at IREs without Precision Approach (PA)	x		
	RNP APCH at all IREs (with PA), including IREs at PCP airports.	x		
AUR 2005 4 or 5	RNAV 1 or RNP 1(+ RF) SID and STAR - one per IRE (EETU, EETN)		x	
	RNAV 1 or RNP 1(+RF) for all SID and STARs			x
AUR 2005 6	RNAV 5 ATS Routes (excl. SIDs/STARs) at and above FL150	x		
	RNAV 5 ATS Routes (excl. SIDs/STARs) below FL150	x		
AUR 2005 7	Helicopter RNP 0.3 (or RNAV 1/RNP1(+RF)) SID/STAR - one per IRE (EETN)		x	
	Helicopter RNP 0.3 (or RNAV 1/RNP1(+RF)) for all SID/STAR			x
	Helicopter RNP 0.3 or RNAV 1/RNP1 ATS Routes (excl. SIDs/STARs) below FL150 (Not applicable)			

Note 1 – In the context of EU regulatory obligations, the transition plan will have several iterations; Article 4 requires that the draft/significant updates to the plan must be approved by the competent authority prior to it being implemented. The obligations in the transition plans would need to be commensurate with the target date obligations.

Flight Phase	*NAV-application*	*When*	*NAV specification*	*NAV infrastructure*	*NAV back-up infrastructure*
En-route	*FRA*	*Implemented NOV 2015*	*-*	*GNSS*	*DME/DME* *+ surveillance*
	ATS-routes	*Implemented*	*RNAV 5*		
TMA	*SID/STAR*	*2020*	*RNAV 1*	*GNSS*	*Surveillance*
		2024	*RNAV 1 SID/STAR per IRE (EETU, EETN)*	*GNSS*	*DME/DME*
		2030	*RNAV 1 for all SID/STAR*	*GNSS*	*DME/DME*
APP	*IAP*	*Type A/Type B implemented (exept EEEI)*	*RNP APCH*	*GNSS*	*Conventional (ILS,VORTAC, DME/DME)*

The table above describes general roadmap of PBN deployment for Tallinn FIR taking into account **PBN IR Article 4 and 7 Applicability of AUR.2005.**

5. NATIONAL AIRSPACE CONCEPT

EANS will comply with all European legislation and the Service Provider will ensure that all national obligations and performance targets will be met. Therefore, the introduction of Free Routes airspace within the national boundaries above FL095 has been implemented in 2015.

Within terminal airspace to comply with the ICAO General Assembly resolution 37/11 and both PBN and PCP IRs, the introduction of RNP APCH to each instrument runway end to replace conventional NPAs and provide back-up to precision approach[1]. Whilst ICAO considered this a primarily a safety initiative to reduce CFIT, EU regulation also wishes to ensure the transition to GNSS based approaches using PBN, and to enable access to aerodromes which previously were not supported with approach procedures.

[1] Ämari Air Base, whilst introducing RNP APCH procedures, will maintain conventional NPA and PA to serve non-PBN compliant State Aircraft until, at least 2035.

To provide an efficient flow of traffic without impacting on capacity, the Free Routes airspace will be connected to major TMAs (Including Helsinki), with connecting ATS routes if necessary. Capacity demand will drive the performance requirement on these ATS routes with current RNAV5 routes maintained in low traffic demand areas and the implementation of a reduced route spacing in high demand airspace.

Within the TMAs, to minimise delay and to reduce the amount of holding, the introduction of point merge will be analysed for major airports to provide the opportunity to maximise runway throughput. Furthermore, to reduce environmental impact, the application of continuous climb and continuous descent operations (CCO/CDO) through the strategic deconfliction of the arrival and departure flows will reduce noise and emissions and provide fuel savings to the airspace users. In addition, the application of consistent, highly repeatable turn performance will enable arrival and departure routes to be placed in the most beneficial location.

To ensure equality and freedom of access to all airspace users, advanced flexible use of airspace (AFUA) will be applied throughout the national airspace and dynamic airspace configurations will be designed to optimise the airspace. In addition, the provision of Class G airspace below CTA and TMA-s will be provided outside of protected airspace enabling GA and RPAS operations.

Finally, consideration is given to managing lower capable aircraft and the provision of some conventional operations will be maintained for a pre-defined period post PBN implementation. Following that exemption period, only aircraft appropriately certified and approved will be permitted to operate within Estonian airspace. This will not apply to non-PBN capable State Aircraft, which will be able to use conventional navigation and approach procedures (to Ämari Air Base) for an extended time. This derives from the need of State Aircraft to access airspace to fulfil their missions, despite of technical difficulties of certain aircraft to comply with PBN requirements.

In order to develop the current plan, the following main activities were performed by EANS

- EANS has developed document “Estonian navigational and operational environment description”.

- Questionnaires were prepared and distributed to Airspace Users and local Estonian Airport / ANSPs to collect requirements about airspace users’ needs in ground-based navigation aid infrastructure. The feedback was analysed by EANS and “Analysis of Navigation Questionnaires” was prepared.

- “Aircraft Navigation Capabilities Analysis” has been conducted by EANS. The analysis supplements the quarterly report on GNSS and PBN fleet capability, performed by Eurocontrol.

Customer consultation meeting was held in EANS premises at 05.10.2018 by EANS Study team. Estonian CAA, Tallinn Airport, Military service provider and airspace users were participated at the meeting. “

Network Manager has reviewed the PBN plan 2.0 during the consultation process. PBN Plan ver 2.1 have been reviewed and consulted by stakeholders in June 2024.

6. OPERATIONAL REQUIREMENTS AND PBN IMPLEMENTATION OBJECTIVES

***Introduction of Free Routes**:*

The Free Routes Airspace within Tallinn FIR above FL095 has been implemented in 2015.

In FRA there is no navigation specification required, but the aircraft must be capable of point-to-point navigation achieved through an area navigation computer.

***Deployment of connecting ATS routes to connect FRA to Terminal Airspace**:*

Laterally segregated inbound and outbound flows to/from major airports will be implemented if necessary. The implementation of those routes shall follow FRA design guidelines.

RNAV5 ATS routes or dedicated FRA Arrival/Departure Connecting points will connect the Free Route Airspace and TMA-s. Then to connect these RNAV 5 ATS routes or dedicated FRA Arrival/Departure Connecting points with the runway, RNP1 SIDs and STARs could be developed with the RNP1 STARs connecting to the runway via a RNP APCH. RF functionality will be considered in all cases to allow planners and designers to achieve lower route spacing and to design environmentally friendly procedures.

***SIDs and STARs**:*

The required navigational performance for operations within the TMAs will be RNP1 and/or RNAV1.

CCOs/CDOs will be enabled by segregating inbound and outbound flows laterally wherever possible:

a. *EANS will assess climb and descent performance of aircraft fleets operating within the State. Develop a climb and descent profile chart.*
b. *Crossing points will be near departure end of runway or at distance from aerodrome. Close crossing points allow all departures to have uninterrupted climb passing under arrival flow. Distant crossing points allow arriving aircraft an uninterrupted descent whilst departing traffic crosses above the arrival flow.*

Conventional procedures might be maintained in TMA-s over the exemption period if operationally required (based on safety case).

EANS proposal for the TMA´s and FIZ:

TMA or FIZ	***ATC or AFIS airports***	***SID***	***STAR***	***Infrastructure (for PBN)***
Tartu FIZ	*EETU*	*RNAV 1*	*RNAV 1*	*GNSS, DME-DME* *B-up: SUR procedures, ILS RWY 26*
Tallinn TMA	*EETN*	*RNAV 1* *RNP 0,3 for CAT H* *RNP 1 (2030)*	*RNAV 1* *RNP 1 (2030)*	*GNSS* *B-up: SUR procedures, ILS RWY 08/26*
	EEEI	*Conventional 2030* *RNAV 1/RNP 1 (2030)*	*Conventional 2030* *RNAV 1/ RNP 1 (2030)*	*GNSSB-up: ILS RWY 06/24, VORTAC 06/24, SUR procedures, conventional SID/STAR based on VORTAC 2030*
Kuressaare FIZ	*EEKE*	*RNAV 1 (2030)*	*RNAV 1 (2030)*	*GNSS* *B-up: ILS RWY 17*
Kärdla FIZ	*EEKA*	*RNAV 1 (2030)*	*RNAV 1 (2030)*	*GNSS*
Pärnu FIZ	*EEPU*	*RNAV 1 (2030)*	*RNAV 1 (2030)*	*GNSS*

***<u>Introduction of RNP APCH</u>**:*

RNP APCH will be implemented at all instrument runway ends with three lines of minima. ICAO EUR Doc 025 [Ref] provides useful high-level guidance on RNP approach Implementation.

Development of RNP APCHs will be prioritized based on:

a. *Traffic demand and aircraft capabilities; develop the procedure as an APV based on demand and the capabilities of the aerodrome and aircraft.*
b. *Provision of full obstacle surveys.*
c. *Provision of precision approach; replace all Type A procedures before developing procedures for runways supported by Type B operations (i.e. ILS).*

Implement as soon as possible.

What ANSP proposes for the aerodromes:

ICAO Code	***Airport Name***	***IFR RWY***	***LNAV***	***LNAV/VNAV***	***LPV***	***RNP AR***	***Notes***
EETN	*Tallinn L.Meri*	*08 ILS*	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	
		26 ILS	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	
EETU	*Tartu*	*08*	*Implemented*	*Implemented*	*Implemented, Type A*	*No plans*	
		26 ILS	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	
EEKE	*Kuressaare*	*17 ILS*	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	
		35	*Implemented*	*Implemented*	*Implemented, Type A*	*No plans*	
EEKA	*Kärdla*	*14*	*Implemented*	*Implemented*	*Implemented, Type A*	*No plans*	
		32	*Implemented*	*Implemented*	*Implemented, Type A*	*No plans*	
EEPU	*Pärnu*	*03*	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	

		21	*Implemented*	*Implemented*	*Implemented, Type B*	*No plans*	
EEEI	*Ämari*	*06 ILS*	*Planned*	*Planned*	*Planned, Type B*	*No plans*	*VORTAC IAPs to be maintained until, at least, 2035*
		24 ILS	*Planned*	*Planned*	*Planned, Type B*	*No plans*	

7. CONSIDERATIONS FOR PBN IMPLEMENTATION

The operational requirements identified above will require an implementation and transition plan. This will be the task of the individual implementation teams which will be created from the different stakeholder groups impacted by the airspace change. Each implementation will follow the EUROCONTROL methodology for PBN implementation as detailed in the Airspace Concept Handbook for PBN Implementation [Ref]. Each implementation team is to ensure there is lateral and vertical connectivity:

i. *RWY to TMA*
ii. *TMA to En-route*
iii. *En-route to Neighbouring States*
iv. *En-route to FRA*

The operational requirements identified above might also require contingency measures to be provided as part of the implementation and transition plan. This will be the task of the collective of various implementation teams, using as a basis, the individual implementation teams which will be created from the different stakeholder groups impacted by the airspace change. Each implementation will follow the EUROCONTROL methodology for PBN implementation as detailed in the Airspace Concept Handbook for PBN Implementation [Ref].

8. PBN TRANSITION PLAN

Estonia has implemented following PBN procedures:

- RNAV1 SID/STARs have been implemented for EETN in 2013.
- RNP APCH (LNAV, BARO-VNAV, LPV) implemented for EETN in 2019.
- RNP APCH (LPV only for Cat. H) implemented in 2020. Helicopters can also use LNAV minima for Cat. A implemented for EETN in 2019.

- LNAV and APV/baroVNAV and RNAV SID/STARs for EETU are implemented in 2015.
- LPV for EETU implemented 2019.

- RNP APCH (LNAV, BARO-VNAV, LPV) for EEKE are implemented in 2017.

- RNP APCH (LNAV, BARO-VNAV, LPV) for EEKA are implemented in 2018.
- RNP APCH (LNAV, BARO-VNAV, LPV) for EEPU are implemented in 2021.

The following shows a calendar for the introduction of the operational requirements and phasing out of obsolete operations by phase of flight:

	Implemented	2030	Remarks:
FRA	FRA FL095-FL660		2015 NEFRA
En Route	RNAV 5 FL095-FL660		
SID/STAR	RNAV1 in EETU and EETN TMA	EEKA; EEKE, EEEI	
IAP – RNP APCH (LNAV, BARO-VNAV, LPV)	EETN, EEKE, EEKA, EETU, EEPU	EEEI	
Helicopter RNP 0.3 (or RNAV 1/RNP1(+RF)) SID/STAR - one per IRE	EETN (SID only, RNP 0.3, RWY 08/26)	EEKE (RWY 17/35 RNP 0.3), EEKA (RWY 14/32 RNP 0.3); EETU (RWY 08/26 RNP 0.3)	Shall be decided by 2030.
Helicopter RNP 0.3 (or RNAV 1/RNP1(+RF)) for all SID/STAR	EETN (SID only, RNP 0.3, RWY 08/26)	EEKE (RWY 17/35 RNP 0.3), EEKA (RWY 14/32 RNP 0.3); EETU (RWY 08/26 RNP 0.3)	Shall be decided by 2030.

~~Helicopter RNP 0.3 or RNAV 1/RNP1 ATS Routes (excl. SIDs/STARs) below FL150~~			~~Shall be decided 2024+.~~

Table below is from Rationalisation of NIRP ver 0.2 paragraph 6.5 and describes schedule of ground-based aids rationalisation:

	Operational from	**Operational until**	**Remarks**
TLL DME		2024	End of planned operational life
KRS DME		2024	End of planned operational life, certificate extendable
AMI VORTAC		2035	Planned for en-route use 2024
EETU ILS	2010		RWY 26
EEKE ILS	2010		RWY 17
EETN ILS	2010		RWY 08/26
EEEI ILS	2011		RWY 06/24
DME network according to 6.2	Q1 2024		
DME network according to 6.3	Q1 2024		

9. PBN IMPLEMENTATION ACTIVITIES TBD

This section shall be developed after CAA approval of paragraph 1-8.

EANS Implementation Team

a. *Composition*
b. *Roles and Responsibilities*

Stipulate the Implementation Expectations

a. *Planning*
b. *Conceptual design*
c. *Validation*
d. *Implementation*
e. *Post Implementation*

10. PBN IMPLEMENTATION TBD

This section shall be developed after CAA approval of paragraph 1-8.

The PBN implementation will follow the steps detailed below. Further considerations in each step of the implementation process will include:

a. *Planning:*
    v. *Confirm operational requirements will meet Airspace Concept*
    vi. *Timelines*
    vii. *Consultation – stakeholder and public*
    viii. *Cost Benefit Analysis*
    ix. *Safety and Security assessments*
        - *Reversion capabilities*
    x. *Assumptions*
b. *Conceptual design*
c. *Validation:*
    xi. *Ground*
    xii. *Airborne*
d. *Implementation:*

xiii. *Go/No Go decision – Performance and Safety targets met?*

xiv. *System changes*

xv. *Awareness and Training*

xvi. *Publication*

e. *Post Implementation:*

xvii. *Monitoring*

xviii. *Confirming performance and safety targets met*

xix. *Constant review cycle*