

Performance-based navigation distinguishes between RNAV and RNP Specifications, both of which rely on area navigation techniques which allow aircraft to operate on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these. An RNP 1 specification allows an aircraft to fly a specific path between two 3D-defined points in space; to this end, the RNP 1 specification requires a lateral performance accuracy of +/- 1NM 95% of the flight time, on-board performance monitoring, alerting capability and high integrity navigation databases.

Where ANS providers have established SID or STAR and where higher performance requirements than those of RNAV 1 are required in order to maintain air traffic capacity and safety in environments with high traffic density, traffic complexity or terrain features, they shall implement those routes in accordance with the requirements of the RNP 1 specification, including one or more of the following additional navigation functionalities:

- (a) operations along a vertical path and between two fixes and with the use of:
  - (i) an 'AT' altitude constraint;
  - (ii) an 'AT or ABOVE' altitude constraint;
  - (iii) an 'AT or BELOW' altitude constraint;
  - (iv) a 'WINDOW' constraint;
- (b) the radius to fix (RF) leg.

Establishment of RNP1 SID or STAR is not imposed as obligatory requirement by the PBN Regulation (EU) 2018/1048 (business decision on having SID or STAR is up to an individual stakeholder). However, the PBN regulation does prescribe obligatory set of specifications to be complied with, where a stakeholder had decided to establish SID or STAR. Individual ANSPs, airports and aircraft operators outside of the Applicability Area 1 may implement this functionality on a voluntary basis. In this case they will need to evaluate the business case for the implementation of RNP 1 procedures according to local circumstances.

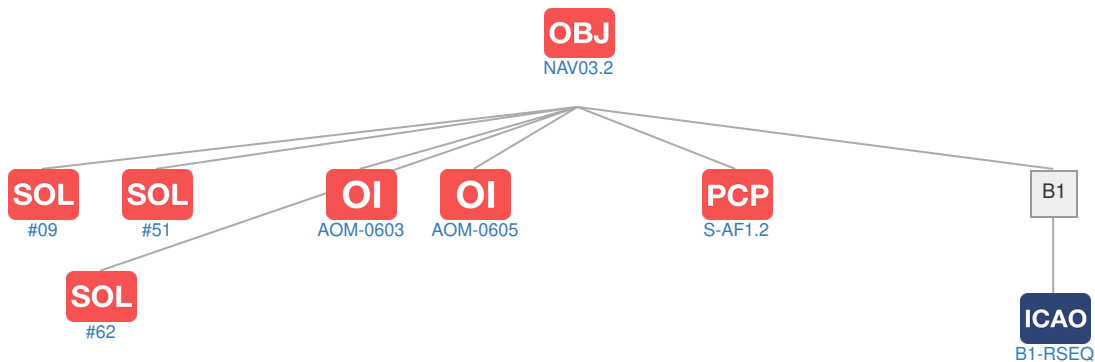
*NOTE 1: System improvements for controller support tools which may be required are covered by other Implementation Objectives like ATC12.1 (MTCD, conflict resolution support info and MONA), ATC02.9 (STCA) and ATC02.8 (APW).*

*NOTE FOR MILITARY AUTHORITIES: It is the responsibility of each military authority to review this Objective IN ITS ENTIRETY and address each of the SLoAs that the military authority considers RELEVANT for itself. This has to be done on top and above of the review of "MIL" SLoAs which identify actions EXCLUSIVE to military authorities.*

<b>Edition</b>	2022
<b>Stakeholders</b>	Regulator / Air Navigation Service Provider / Airspace Users
<b>Type</b>	SES
<b>Scope</b>	ECAC+
<b>Status</b>	Active

## Context

### Related Elements



## Applicability Area(s) and Timescales

- Applicability Area 1:** All EU SES States except: Estonia, Hungary, Latvia, Maastricht UAC, Malta, Portugal, Romania  
(EU SES states instrument RWY ends.)
- Applicability Area 2:** Albania, Bosnia and Herzegovina, Israel, Moldova, Montenegro, North Macedonia, Serbia, Türkiye, Ukraine, United Kingdom  
(Other ECAC+ states instrument RWY ends, except those already listed in Applicability Area 1.)

Timescales	From	By	Applicable to
Start	07-08-2018	-	Applicability Area 1 + Applicability Area 2
One SID and STAR per instrument RWY, where established	-	25-01-2024	Applicability Area 1
Locally determined number of RNP1 SID/STAR, where established.	-	06-06-2030	Applicability Area 2
All SIDs and STARs per instrument RWY, where established	-	06-06-2030	Applicability Area 1

## Links to ATM Master Plan Level 2

### **OI** Operational Improvement Steps

Code	Title	IOC	FOC	Related Elements
AOM-0603	<a href="#">Enhanced Terminal Airspace for RNP-based Operations</a>	31-12-2019	31-12-2023	<b>SOL</b> <b>OI</b> <b>EN</b> <b>OBJ</b> <b>DS</b> <b>PCP</b> <b>ICAO</b>
AOM-0605	<a href="#">Enhanced Terminal Operations with RNP transition to ILS/GLS/LPV</a>	31-12-2020	31-12-2026	<b>SOL</b> <b>OI</b> <b>EN</b> <b>OBJ</b> <b>DS</b> <b>PCP</b> <b>ICAO</b>

### **SOL** Links to SESAR Solutions

Code	Title	Program	Related Elements
#09	<a href="#">Enhanced terminal operations with automatic RNP transition to ILS/GLS</a>	SESAR1	<b>SOL</b> <b>OI</b> <b>OBJ</b> <b>DS</b> <b>EOC</b> <b>PCP</b> <b>ICAO</b>
#51	<a href="#">Enhanced terminal operations with LPV procedures</a>	SESAR1	<b>SOL</b> <b>OI</b> <b>OBJ</b> <b>DS</b> <b>EOC</b> <b>PCP</b> <b>ICAO</b>
#62	<a href="#">P-RNAV in a complex TMA</a>	SESAR1	<b>OI</b> <b>OBJ</b> <b>DS</b> <b>EOC</b> <b>PCP</b> <b>ICAO</b>

### **PCP** Links to PCP ATM Sub-Functionalities

Code	Title	Related Elements
S-AF1.2	<a href="#">Enhanced Terminal Airspace using RNP-Based Operations</a>	<b>SOL</b> <b>OI</b> <b>EN</b> <b>OBJ</b> <b>ICAO</b>



## ICAO Block Modules

Designator	Title	Related Elements
B1		
B1-RSEQ	Improved Airport operations through Departure, Surface and Arrival Management	SOL OI OBJ PCP

## References

### Applicable legislation

COMMISSION IMPLEMENTING REGULATION (EU) 2018/1048 of 18 July 2018 laying down airspace usage requirements and operating procedures concerning performance-based navigation

### Applicable ICAO Annexes and other references

None

### Deployment Programme 2022

-

### Operating Environments

Terminal Airspace

## Expected Performance Benefits

<b>Safety</b>	Increased situational awareness and indirect benefit to both ATC and pilot through reduction of workload during RNP operations.
<b>Capacity</b>	Increased capacity through efficient and improved systemisation of SID/STARs based on RNP 1, particularly on curved paths using Radius to Fix functionality.
<b>Operational efficiency</b>	Reduction in fuel burn and potential to reduce track miles through optimised TMA procedures using the Radius to Fix Functionality.
<b>Cost efficiency</b>	-
<b>Environment</b>	Emissions and noise nuisance reduced by use of optimal flight procedures and routings.
<b>Security</b>	-

## Stakeholder Lines of Action

Code	Title	From	By	Related Enablers
REG01	Verify the transition plan for PBN in ANS provision	03-12-2020	06-06-2030	
ASP01	Develop an airspace concept based on designated RNP 1 arrival and departure procedures with Radius to Fix (RF)	01-01-2018	25-01-2024 06-06-2030	
ASP02	Where necessary, provide appropriate navigation infrastructure to support RNP 1 operations including the infrastructure required for GNSS reversion	01-01-2018	06-06-2030	<b>EN</b>
ASP03	Train air traffic controllers in RNP1 with Radius to Fix (RF) procedures	01-01-2018	06-06-2030	
ASP04	Implement at least one RNP1 SID and STAR with radius to Fix (RF), per instrument RWY	01-01-2018	25-01-2024 06-06-2030	
ASP05	Develop a local safety assessment	01-01-2018	06-06-2030	
ASP06	Establish the transition plan for PBN in ANS provision	03-12-2020	06-06-2030	
ASP07	Implement all RNP1 SID and STAR with radius to Fix (RF), per instrument RWY	07-08-2018	06-06-2030	
USE01	Install appropriate RNP 1 with Radius to Fix (RF) equipment	01-01-2018	06-06-2030	<b>EN</b>
USE02	Train flight crews in RNP 1 TMA procedures	01-01-2018	06-06-2030	

## Supporting Material

Title	Related SLoAs
EASA - EASA Decision 2018/013/R - AMC & GM to Regulation (EU) 2018/1048 (PBN IR) – Annex II to EASA Decision 2018/013/R 11/2018 <a href="https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf">https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf</a>	ASP01, ASP04, ASP06, ASP07, REG01
EC - COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 - (OJ L 62, 8.03.2017, p. 1) - COMMISSION IMPLEMENTING REGULATION (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 03/2017 <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0373&amp;from=EN">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0373&amp;from=EN</a>	ASP05
EUROCONTROL - Air Navigation Systems Safety Assessment Methodology (SAM) - Version 2.1 / 11/2006 <a href="https://www.eurocontrol.int/tool/safety-assessment-methodology">https://www.eurocontrol.int/tool/safety-assessment-methodology</a>	ASP05
EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021 <a href="https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn">https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn</a>	ASP01, ASP04, ASP06, ASP07, REG01
EUROCONTROL - Distance Measuring Equipment Tracer (DEMETER) Tool - Version 1.0.4 / 01/2012 <a href="https://www.eurocontrol.int/online-tool/distance-measuring-equipment-tracer">https://www.eurocontrol.int/online-tool/distance-measuring-equipment-tracer</a>	ASP02
EUROCONTROL - GUID-114 - Guidelines for RNAV 1 Infrastructure Assessment - Edition 2.0 / 07/2021 <a href="https://www.eurocontrol.int/publication/eurocontrol-guidelines-rnav-1-infrastructure-assessment">https://www.eurocontrol.int/publication/eurocontrol-guidelines-rnav-1-infrastructure-assessment</a>	ASP02
ICAO - Doc 4444 - Air Traffic Management - Edition 16 / 11/2016 <a href="https://store.icao.int/">https://store.icao.int/</a>	ASP03
ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011 <a href="https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx">https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx</a>	ASP01, ASP03, ASP04, ASP06, ASP07, REG01
ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011 <a href="https://store.icao.int/">https://store.icao.int/</a>	ASP01, ASP03, ASP04, ASP06, ASP07, REG01, USE01
ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 <a href="https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613">https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</a>	ASP01, ASP02, ASP04, ASP06, ASP07, REG01, USE01, USE02
ICAO - Doc 9992 - Manual on the Use of Performance-based Navigation (PBN) in Airspace Design - First Edition / 01/2013 <a href="http://store1.icao.int/">http://store1.icao.int/</a>	ASP01, ASP04, ASP06, ASP07

## Consultation & Approval

<b>Working Arrangement in charge</b>	NSG - Navigation Steering Group
<b>Outline description approved in</b>	-
<b>Latest objective review at expert level</b>	12/2018
<b>Commitment Decision Body</b>	Provisional Council (PC)
<b>Objective approved/endorsed in</b>	05/2019
<b>Latest change to objective approved/endorsed in</b>	05/2019