

SES		Active							ECAC+		
NAV03.2		RNP 1 in TMA Operations									
REG	ASP	MIL	APO	USE	INT	IND	NM	MET	AIS	USP	

Subject matter and scope

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.

Applicability Area(s) & Timescale(s)

Applicability Area 1 (EU SES states instrument RWY ends.)	All EU SES States except: Estonia, Hungary, Latvia, Lithuania, Maastricht UAC, Malta, Portugal, Romania		
Applicability Area 2 (Other ECAC+ states instrument RWY ends, except those already listed in Applicability Area 1.)	Albania, Bosnia and Herzegovina, Israel, Moldova, Montenegro, North Macedonia, Serbia, Türkiye, Ukraine, United Kingdom		
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
All SIDs and STARs per instrument RWY, where established		06/06/2030	Applicability Area 1
Locally determined number of RNP1 SID/STAR, where established.		06/06/2030	Applicability Area 2

References

European ATM Master Plan

OI step -	[AOM-0603]-Enhanced Terminal Airspace for RNP-based Operations									
	Enablers -	APP ATC 134	CTE-N08	MIL-STD-01	MIL-STD-02	REG-0500				
OI step -	[AOM-0605]-Enhanced Terminal Operations with RNP transition to ILS/GLS/LPV									
	Enablers -	A/C-07	CTE-N01	MIL-STD-01	MIL-STD-02					

Legend:	WXYZ-001	Covered by SLoA(s) in this objective	WXYZ-002 zzz	Covered by SLoA(s) in another objective Objective covering the enabler	WXYZ-003	Not covered in the Implementation Plan
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Applicable legislation

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

Essential Operational Changes

Airport and TMA performance

SESAR Solution

#09 - Enhanced terminal operations with automatic RNP transition to ILS/GLS, #51 - Enhanced terminal operations with LPV procedures

ICAO GANP - ASBUs

APTA-B1/2 PBN SID and STAR procedures (with advanced capabilities)

Deployment Programme

- none -

European Plan for Aviation Safety

RMT.0445	Technical requirements and operational procedures for airspace design, including flight procedure design
RMT.0639	Performance-based navigation implementation in the European air traffic management network

Operating Environments

Terminal Airspace

Stakeholder Lines of Action (SLoAs)

SLoA ref.	Title	From	By
NAV03.2-REG01	Verify the transition plan for PBN in ANS provision	03/12/2020	06/06/2030
NAV03.2-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
NAV03.2-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
NAV03.2-ASP03	Train air traffic controllers in RNP1 with Radius to Fix (RF) procedures	01/01/2018	06/06/2030
NAV03.2-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
NAV03.2-ASP05	Develop a local safety assessment	01/01/2018	06/06/2030
NAV03.2-ASP06	Establish the transition plan for PBN in ANS provision	03/12/2020	06/06/2030
NAV03.2-ASP07	Implement all RNP1 SID and STAR with radius to Fix (RF), per instrument RWY	07/08/2018	06/06/2030 06/06/2030
NAV03.2-USE01	Install appropriate RNP 1 with Radius to Fix (RF) equipment	01/01/2018	06/06/2030
NAV03.2-USE02	Train flight crews in RNP 1 TMA procedures	01/01/2018	06/06/2030

Description of finalised and deleted SLoAs is available on the eATM Portal @ https://www.eatmportal.eu/working/depl/essip_objectives

Expected Performance Benefits

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

Detailed SLoA Descriptions

NAV03.2-REG01	Verify the transition plan for PBN in ANS provision	From:	By:
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NAV03.2	RNP 1 in TMA Operations
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		03/12/2020	06/06/2030
Action by:	National Supervisory Authorities (NSAs)		
Description & purpose:	<p>This SLoA is mandatory only for the States subject to Commission Implementing Regulation (EU) 2018/1048 of 18 July 2018.</p> <p>Verify whether the draft transition plan, or the draft significant update thereof, complies with the requirements of PBN Implementing Regulation and in particular whether it takes account of the views of airspace users where appropriate, including those operating State aircraft.</p> <p>Inform the providers of ATM/ANS of the outcome of that verification without undue delay.</p>		
	<p>Note : This SLoA is recommended as the best practice to the States which are not subject to Commission Implementing Regulation (EU) 2018/1048 of 18 July 2018.</p>		
Supporting material(s):	<p>EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021</p> <p>Url : https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn</p> <p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013</p> <p>Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p> <p>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</p> <p>Url : https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf</p> <p>ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011</p> <p>Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx</p> <p>ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011</p> <p>Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - The outcome of the verification has been notified to ANSP.		
NAV03.2-ASP01	Develop an airspace concept based on designated RNP 1 arrival and departure procedures with Radius to Fix (RF)	From: 01/01/2018	By: Applicability Area 1: 25/01/2024 Applicability Area 2: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	Develop an airspace concept, including designated RNP 1 SID and STAR procedures with Radius to Fix (RF) with a view to providing performance benefits. The airspace concept is to include non-nominal operations to accommodate reversion from RNP 1 operations.		
Supporting material(s):	<p>EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021</p> <p>Url : https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn</p> <p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013</p> <p>Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p> <p>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</p> <p>Url : https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf</p> <p>ICAO - Doc 9992 - Manual on the Use of Performance-based Navigation (PBN) in Airspace Design - First Edition / 01/2013</p> <p>Url : http://store1.icao.int/</p> <p>ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011</p> <p>Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx</p> <p>ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011</p> <p>Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - An airspace concept based on RNP 1 arrival and departure procedures with Radius to Fix (RF) has been implemented.		
NAV03.2-ASP02	Where necessary, provide appropriate navigation infrastructure to support RNP 1 operations including the infrastructure required for GNSS reversion	From: 01/01/2018	By: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	The RNP 1 specification requires the mandatory use of GNSS, specifically GPS. This means that the ANSPs would need to determine whether and to what extent a DME infrastructure is needed to accommodate non-nominal operations in the event of a GNSS outage requiring reversion from RNP 1 operations. Such a determination is made on the basis of several criteria, including fleet equipage with DME/DME, traffic density and complexity. This may result in a requirement to install new DME stations and/or the relocation of existing units.		

NAV03.2	RNP 1 in TMA Operations
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	<p>Note :According to ICAO standards the only appropriate basis for RNP1 procedures is GNSS. For reversion a fallback to RNAV1 operations based on DME/DME is a feasible option (see NAV03.1-ASP02). The actual fallback solution has to be chosen under local considerations.</p>		
Supporting material(s):	<p>EUROCONTROL - GUID-114 - Guidelines for RNAV 1 Infrastructure Assessment - Edition 2.0 / 07/2021 Url : https://www.eurocontrol.int/publication/eurocontrol-guidelines-rnav-1-infrastructure-assessment ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613 EUROCONTROL - Distance Measuring Equipment Tracer (DEMETER) Tool - Version 1.0.4 / 01/2012 Url : https://www.eurocontrol.int/online-tool/distance-measuring-equipment-tracer</p>		
ATM Master Plan relationship:	<p>[CTE-N01]-GPS L1/L5 [CTE-N08]-DME Ground Infrastructure optimisation</p>		
Finalisation criteria:	1 - Infrastructure has been assessed and modified if required to meet the requirements for RNP1 procedures.		
NAV03.2-ASP03	Train air traffic controllers in RNP1 with Radius to Fix (RF) procedures	From: 01/01/2018	By: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	Train ATCOs in RNP1 with radius to Fix (RF) operations and new methods of managing traffic on SID/STARs to ensure safe and expeditious operations. RNP1 with radius to Fix (RF) procedures could reduce the need for radar vectors up to the FAP.		
Supporting material(s):	<p>ICAO - Doc 4444 - Air Traffic Management - Edition 16 / 11/2016 Url : https://store.icao.int/ ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011 Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011 Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - The necessary training has been given to controllers responsible for the operation of RNP1 with Radius to Fix (RF) terminal procedures.		
NAV03.2-ASP04	Implement at least one RNP1 SID and STAR with radius to Fix (RF), per instrument RWY	From: 01/01/2018	By: Applicability Area 1: 25/01/2024 Applicability Area 2: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	Where SID or STAR are established, design, develop and implement at least one RNP 1 arrival and departure procedures with Radius to Fix (RF), based on the airspace concept and the transition plan. Publish the procedures in the State AIP.		
	<p>Note :Note 1: This SLoA is applicable only where higher performance requirements than those of RNAV 1 are required. Otherwise RNAV1 SID/STAR described in objective NAV03.1 are sufficient. Note 2: If you implement RNP1 SID and STAR with vertical paths defined by the constraints, rather than RF, please report it in the LSSIP comment to this SLoA. Note 3: The deadline of 25/01/2024 applies only to EU SES states. Other ECAC+ states have deadline 06/06/2030.</p>		
Supporting material(s):	<p>EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021 Url : https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613 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 Url : https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf ICAO - Doc 9992 - Manual on the Use of Performance-based Navigation (PBN) in Airspace Design - First Edition / 01/2013 Url : http://store1.icao.int/ ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011 Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011 Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - RNP 1 arrival and departures with radius to Fix (RF) have been published in AIP and implemented. (If you implement RNP1 SID and STAR with vertical paths defined by the constraints, rather than RF, please report it in the LSSIP comment to this SLoA).		

NAV03.2	RNP 1 in TMA Operations
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NAV03.2-ASP05	Develop a local safety assessment	From: 01/01/2018	By: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	<p>Develop safety assessment of the changes related to the implementation of RNP 1 procedures. The tasks to be done are as follows:</p> <ul style="list-style-type: none"> - Conduct hazard identification, risk assessment in order to define safety objectives and safety requirements mitigating the risks; - Develop safety assessment; - Deliver a safety assessment report to the NSA, if new standards are applicable or if the severity class of identified risks is 1 or 2. <p>This safety assessment shall be based on fully validated/recognised method.</p>		
Supporting material(s):	<p>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</p> <p>Url : https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0373&from=EN</p> <p>EUROCONTROL - Air Navigation Systems Safety Assessment Methodology (SAM) - Version 2.1 / 11/2006</p> <p>Url : https://www.eurocontrol.int/tool/safety-assessment-methodology</p>		
Finalisation criteria:	1 - The safety assessment report for the changes has been developed and delivered to the NSA as necessary.		
NAV03.2-ASP06	Establish the transition plan for PBN in ANS provision	From: 03/12/2020	By: 06/06/2030
Action by:	ATM Service Providers		
Description & purpose:	<p>This SLoA is mandatory only for the States subject to Commission Implementing Regulation (EU) 2018/1048 of 18 July 2018.</p> <p>Establish and implement a transition plan for using PBN. The transition plan shall be kept up-to-date. The transition plan shall be consistent with the European ATM Master Plan and the common projects referred to in Article 15a of Regulation (EC) No 550/2004 of the European Parliament and of the Council.</p> <p>Consult all of the following parties on the draft transition plan and the draft of any significant updates thereof and take account of their views where appropriate:</p> <ul style="list-style-type: none"> a) aerodrome operators, airspace users and representative organisations of such airspace users affected by the provision of ANS services; b) the Network Manager; c) ANS providers in adjacent airspace blocks. <p>Submit the results of the consultation, as well as the draft transition plan, or the draft significant update thereof, for approval to the competent authority.</p>		
	<p>Note : This SLoA is recommended as the best practice to the States which are not subject to Commission Implementing Regulation (EU) 2018/1048 of 18 July 2018.</p>		
Supporting material(s):	<p>EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021</p> <p>Url : https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn</p> <p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013</p> <p>Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p> <p>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</p> <p>Url : https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf</p> <p>ICAO - Doc 9992 - Manual on the Use of Performance-based Navigation (PBN) in Airspace Design - First Edition / 01/2013</p> <p>Url : http://store1.icao.int/</p> <p>ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011</p> <p>Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx</p> <p>ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011</p> <p>Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - The draft transition plan, or the draft significant update thereof, has been submitted to the competent authority for approval.		
NAV03.2-ASP07	Implement all RNP1 SID and STAR with radius to Fix (RF), per instrument RWY	From: 07/08/2018	By: 06/06/2030
Action by:	ANS Providers		
Description & purpose:	Where SID or STAR are established design, develop and implement RNP 1 arrival and departure procedures with Radius to Fix (RF), based on the airspace concept and the transition plan. Publish the procedures in the State AIP.		

NAV03.2	RNP 1 in TMA Operations
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	<p>Note :Note 1: This SLoA is applicable only where higher performance requirements than those of RNAV 1 are required. Otherwise RNAV1 SID/STAR described in objective NAV03.1 are sufficient.</p> <p>Note 2: If you implement RNP1 SID and STAR with vertical paths defined by the constraints, rather than RF, please report it in the LSSIP comment to this SLoA.</p> <p>Note 3: In the LSSIP comment field, name the airports where the implementation takes/took place.</p>		
Supporting material(s):	<p>EUROCONTROL - Airspace Concept Handbook for the Implementation of Performance Based Navigation (PBN) - Edition 4.0 / 04/2021 Url : https://www.eurocontrol.int/publication/airspace-concept-handbook-implementation-performance-based-navigation-pbn</p> <p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p> <p>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 Url : https://www.easa.europa.eu/sites/default/files/dfu/Annexes%20to%20EDD%202018-013-R.pdf</p> <p>ICAO - Doc 9992 - Manual on the Use of Performance-based Navigation (PBN) in Airspace Design - First Edition / 01/2013 Url : http://store1.icao.int/</p> <p>ICAO - Doc 7030 - Regional supplementary Procedures - Edition 5 / 07/2011 Url : https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx</p> <p>ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011 Url : https://store.icao.int/</p>		
Finalisation criteria:	1 - RNP 1 arrival and departures with radius to Fix (RF) have been published in AIP and implemented.		
NAV03.2-USE01	Install appropriate RNP 1 with Radius to Fix (RF) equipment	From: 01/01/2018	By: 06/06/2030
Action by:	Airspace Users		
Description & purpose:	Install equipment meeting RNP1 requirements.		
Supporting material(s):	<p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p> <p>ICAO - Doc 8168-Volume II - Aircraft Operations - Volume II - Construction of Visual and Instrument Flight Procedures - Edition 5 / 11/2011 Url : https://store.icao.int/</p>		
ATM Master Plan relationship:	[A/C-07]-Flight management and guidance for RNP transition to ILS/GLS/LPV		
Finalisation criteria:	1 - Aircraft have been certified for both RNP 1 and Radius to Fix (RF) operations.		
NAV03.2-USE02	Train flight crews in RNP 1 TMA procedures	From: 01/01/2018	By: 06/06/2030
Action by:	Airspace Users		
Description & purpose:	Train flight crews in the application of RNP1 TMA procedures.		
Supporting material(s):	<p>ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613</p>		
Finalisation criteria:	<p>1 - Training manuals have been updated to include RNP1 TMA procedures.</p> <p>2 - The aircrew has been trained accordingly.</p> <p>3 - The aircrew have met the regulatory requirements for RNP1 and RF transition operations.</p>		

