

In accordance with Article 237 (3) of the Air Transport Law (“Official Gazette of the Republic of Serbia” No 73/10, 57/11 and 93/12) and Article 18 of the Regulation on the development and form of navigation procedures (“Official Gazette of the Republic of Serbia” No 71/13), the Management Board of the Civil Aviation Directorate hereby adopts this

DECISION

1. Performance-based navigation implementation plan shall hereby be adopted and is attached to this Decision and is an integral part thereof.
2. This Decision shall enter into force on the day of its adoption.

No. 1/0-01-0005/2013-0016

In Belgrade, 26 December 2013

Management Board

Chairman

signed

Aleksandar Antic

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PERFORMANCE BASED NAVIGATION IMPLEMENTATION PLAN

1. Introduction

Resolution A37 -11 of the Assembly of the International Civil Aviation Organization (hereinafter ICAO) emphasized the urgency of intensifying the activities by the States on the introduction of performance-based navigation (hereinafter PBN) in ATS route network, including the PBN approach and landing procedures within the area of their responsibility.

Performance based navigation implementation plan of the Republic of Serbia the method, scope and timeframe for the introduction of the PBN concept to in the Republic of Serbia. Implementing PBN in the airspace of the Republic of Serbia aims at contributing to:

- a higher level of air navigation safety,
- economic benefit to all stakeholders and
- environment protection.

PBN implementation plan is designed for operators, air navigation service providers, the Civil Aviation Directorate (hereinafter Directorate) and other stakeholders in the Republic of Serbia. The objective of the plan is to facilitate timely planning of regulatory changes, equipment purchasing, training of staff and other related activities.

This plan ensures the following:

- 1) Using conventional navigation procedures by users who are not capable for RNAV/RNP operations;
- 2) Maintaining the acceptable level of civil aviation safety in accordance with the State Safety Program;
- 3) Continuous compliance with the changes in global and regional ICAO PBN implementation plans, ICAO standards and recommended practices.

1.1 Development of area navigation

Area navigation is a navigation permitting aircraft operation on any desired flight path within the coverage of ground or space-based navigation aids or within the limits of the capability of self-contained aids. Operating a direct route between any two points is impossible using the conventional navigation method based on ground-based navigation aids, which are limited to location while their coverage can be significantly limited due to land configuration.

Development and implementation of area navigation in the late 20 and in the early 21 century had not been globally harmonized. Inconsistent criteria were applied by the States, depending on the objectives they wanted to achieve within a given airspace, including the aircraft equipment, which resulted in the application of different criteria in Europe and the United States.

European initiative led by the Organization for the Safety of Air Navigation (hereinafter EUROCONTROL) and the European Joint Aviation Authorities (hereinafter JAA) developed the basic area navigation standards (hereinafter B - RNAV), applicable to the en-route segment of airspace, including the precision area navigation (hereinafter P- RNAV) for use in terminal areas (hereinafter TMA). Those standards were introduced in order to harmonize the implementation of area navigation in the region of the European Civil Aviation Conference (hereinafter ECAC).

US Federal Aviation Authority (hereafter FAA) developed the standards RNAV Type A (applicable in en-route phase of flight) and RNAV Type B (applicable within TMA) which are not entirely consistent with the European standards.

PBN is a navigation concept introduced by ICAO, which was created by integrating the technical standards and practices found in different regions of the world. Implementation of the PBN concept initiated global harmonization of area navigation.

ICAO PBN concept is defined in ICAO Doc 9613 and is an operational model based on which area navigation is defined by navigational specifications. Navigation specification contains technical and operational requirements that should be met by air traffic service providers, and requirements that should be met by aircraft operators in respect of aircraft equipment, including flight crew training so that operation of aircraft within specified airspace is carried out according to PBN rules.

Navigation performance of an aircraft within the PBN concept is expressed in terms of accuracy, integrity, continuity and functionality, needed within a particular airspace.

2. RNAV Navigation specification

RNAV is one of the two ICAO PBN navigation specifications subgroups that do not include the requirement for on-board performance monitoring and alerting. As a rule, RNAV routes can only be made in controlled airspace where radar air traffic control service is provided.

RNAV navigation specifications are:

- RNAV 10: designed for the en-route phase of flight on oceanic routes and remote continental routes (remote continental operations);
- RNAV 5: designed for the en-route phase of flight on continental routes;
- RNAV 2 and RNAV 1: designed for the en-route phase of flight, Standard Instrument Departures (hereinafter SID), Standard Instrument Arrivals (hereinafter STAR), and instrument approach procedures up to the Final Approach Fix/Point (hereinafter FAF/FAP);

3. RNP Navigation Specification

Navigation specifications from RNP subgroup include the requirement for on-board performance monitoring and alerting.

RNP navigation specifications are:

- RNP 4: designed for operations in the en-route phase of flight on oceanic routes and remote continental routes (remote continental operations);
- RNP 1: designed for the operations in the en-route phase of flight, SID, STAR and instrument approach procedures up to the FAF/FAP, including the airspace without radar ATS surveillance with low to medium density traffic;
- RNP APCH: designed for straight-in (without turns) non-precision approach and landing procedures;
- RNP AR APCH: designed for approach and landing procedures with authorization required and represents a navigation procedure with vertical guidance.

4. Benefits from RNAV/RNP implementation

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

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

5. Challenges

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

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

5.1 Traffic situation in the Republic of Serbia and status of RNAV operations

ATS route network in the Republic of Serbia has been designed in accordance with the European B - RNAV navigation specifications. SID and STAR procedures are established within the TMAs of the Republic of Serbia, including conventional instrumental procedures for approach and landing at aerodromes. Within the TMAs of the Republic of Serbia, the aviation procedures in accordance with the P-RNAV specification have not been established. In accordance with the ICAO strategy, ICAO Doc 9613 provides for the transition of European specifications P - RNAV and B - RNAV to the RNAV 1 and RNAV 5 specifications.

The air transport requirements and development strategies for the Republic of Serbia are outlined in the "Strategy of Railway, Road, Inland Waterway, Air and Intermodal Transport Development in the Republic of Serbia, 2008 - 2015" (hereinafter: Development Strategy) and the General Transport

Master Plan for the Republic of Serbia (hereinafter: Master Plan). Development Strategy and Master Plan provide for the development of infrastructure of Belgrade, Nis, Vršac, and Bor aerodromes and modification of purpose of aerodromes Kraljevo/Ladjevci, Batajnica, Užice/Ponikve, which should increase the air traffic capacity in the Republic of Serbia.

5.1.1 Belgrade Airport

In the Belgrade TMA, aircraft are subject to radar control, while separation is carried out in accordance with radar separation minima (5 nm). In low visibility operations (LVO) for aircraft in the final approach the time separation minimum - 6 minutes from FAF is applied.

Conventional procedures have been published for Belgrade airport. The placement of SID/STAR procedures corresponds to the traffic needs and the operational requirements of air traffic control. In periods of lower traffic density, shortened procedures are applied, subject to approval by ATC, which include the shortest paths both in the horizontal and vertical planes.

Radar air traffic control service is provided within Belgrade TMA, allowing for application of RNAV 1 navigation specification for SID and STAR procedure design. RNAV GNSS STAR and SID procedures for Belgrade TMA shall be designed to correspond as much as possible to the current radar vectoring routes, which will allow for radar guidance of aircraft not equipped with the appropriate equipment on RNAV routes.

5.1.2 Niš Airport

RNAV 1 navigation specification may be applied in Niš TMA only if radar air traffic control service is introduced or if a particular portion of airspace is delegated to the Belgrade ACC.

Bearing in mind that this airport does not have a high traffic density, RNP 1 specification can be applied to navigation procedures up to the final approach phase, in accordance with the ICAO PBN Manual.

5.1.3 Vršac Airport

RNP 1 specification can be applied to Vršac airport. This airport serves for the purpose of pilot training and is subject to VFR operations only. PBN navigation procedures are to be introduced in accordance with the plans to expand the airport capacity (runway extension and installation of new radio navigation facilities).

Note 1: Implementation of PBN concept at Batajnica, Kraljevo/Ladjevci and Užice/Ponikve military aerodromes will be carried out in accordance with the modification of aerodrome purpose, in accordance with the needs and capabilities of Serbian Armed Forces.

Note 2: Navigation specification planned to be implemented in Niš TMA and Vršac TMA may be subsequently changed following the implementation of PBN concept in Belgrade TMA.

6. PBN Implementation Plan

The implementation of PBN in the Republic of Serbia will be conducted in three phases:

- Phase 1 (short-term plan): implementing RNAV standard arrival and departure procedures at Belgrade airport, testing, collecting and analyzing data and experiences.
- Phase 2 (medium-term plan): improvement of existing conventional navigation procedures and the implementation of RNP procedures at other airports in the Republic of Serbia, as well as the implementation of RNP procedures for non-precision approach and landing;

- Phase 3 (long-term plan): the introduction of RNP precision approach and landing procedures at airports in the Republic of Serbia, phased withdrawal of conventional navigation procedures and their replacement with RNP procedures.

Implementation of PBN concept in the Republic of Serbia has been enabled by the regulations governing:

- Minimal aircraft equipment required for RNAV/RNP operations in the Republic of Serbia;
- Air crew personnel training;
- Navigation databases utilization for RNAV/RNP operation;
- RNAV/RNP operations by domestic and foreign operators within the Republic of Serbia.

In accordance with the ICAO recommendation, the designated air navigation service provider:

- designs RNAV/RNP navigation procedures;
- conducts air traffic controllers training (in accordance with the approved training program);
- validates RNAV/RNP navigation procedures on the ground (check of the criteria applied in the design of procedures, check of the procedures on FSTD) and from the air (validation of procedures from the air);
- publishes NOTAMs in relation to RAIM information for the destination aerodrome;
- publishes aeronautical charts with RNAV/RNP procedures and other information in AIP;
- introduces changes to the functional system in accordance with applicable regulations.

Operators may use PBN in the Republic of Serbia on condition they:

- operate aircraft with the appropriate on-board equipment installed in accordance with ICAO PBN navigation specifications;
- have appropriate operational procedures in place;
- have adequately trained personnel;
- have their specific approvals for flights operated according to rules for PBN procedures listed on the list of specific approvals or in the AOC.

The following navigation specifications are to be used in the Republic of Serbia:

- RNAV 1: SID/STAR at Belgrade Airport;
- RNP 1: SID/STAR at Niš, Vršac, Batajnica, Kraljevo and Užice airports;
- RNAV 5: on ATS route network.
- RNP APCH: Belgrade Airport (medium-term plan), Niš, Vršac, Batajnica, Kraljevo and Užice (long-term plan).
- RNP AR APCH: at airports where operational advantage of the implementation of this specification is recognized.

GNSS will be the primary source of navigation data for all navigation procedures implemented under this Plan.

Utilization of GNSS as the primary source of navigation data is a worldwide trend, while the implementation of navigation procedures based on GNSS is the most efficient and cost-effective.

Bearing that in mind, while taking into consideration the current state of the infrastructure of radio navigation aids in the Republic of Serbia, use of GNSS as the primary source of navigation data is the best solution.

Table 1: PBN navigation specification implementation plan for the Republic of Serbia

Flight phase	Short-term plan (2013-2014)	Medium-term plan (2014 – 2017)	Long-term plan (2018 – 2022)
Route phase of flights	B-RNAV	RNAV 5	RNAV 5 or RNP 5
Terminal space	RNAV 1	RNAV 1 Basic RNP-1	RNAV 1 Basic RNP-1
Approach	-	RNP APCH	RNP APCH RNP AR APCH

6.1 Short-term plan (2013-2014)

ATS routes: ATS route network was designed in accordance with the European B - RNAV navigation specifications, and it will undergo transition to the RNAV 5 navigation specification in accordance with the ICAO European regional navigation plan.

Arrivals and departures: for the purpose of flight validation, testing and monitoring of the effects of PBN implementation, trial SID and STAR procedures for Belgrade airport are to be published in accordance with the RNAV 1 navigation specification by the end of 2013 or in the beginning of 2014. Air traffic services provider will perform monitoring of flights operated under trail RNAV 1 SID and STAR procedures, and will analyze the data gathered and lessons learned by flight personnel and ATCOs.

Permanent RNAV 1 SID and STAR procedures are to be implemented by the end of 2014 based on the lessons learned from monitoring of the flights operated under RNAV 1 SID and STAR trial procedures for Belgrade airport.

After implementing RNAV/RNP procedures at Belgrade airport these are to be implemented at all the other airports in the Republic of Serbia.

Approach and landing: approach and landing procedures are not included in the short-term plan.

Table 2: Short-term plan for PBN implementation in Serbia

Activities	Navigation specifications	Deadline
Adoption of legal framework required for PBN implementation	-	2014
SID & STAR trial procedures at Belgrade airport	RNAV 1	2013
Implementation of RNAV GNSS SID and STAR CDO procedures at Belgrade airport	RNAV 1	2014

6.2 Medium-term plan (2014-2017)

ATS routes: ATS route network is to maintain its development in line with international standards and recommended practices, in close cooperation with international and regional aviation organizations.

Arrivals and departures: RNAV GNSS navigation procedures in TMA Belgrade will be updated and improved according to the lessons learned from monitoring the operations on published GNSS RNAV routes. GNSS RNP procedures in case of standard arrivals and departures will gradually be implemented at all the other airports in the Republic of Serbia.

Approach and landing: RNP procedures for precision approach and landing are planned to be introduced at Belgrade airport.

Table 3: Medium-term plan for PBN implementation in Serbia

Activities	Navigation specifications	Deadline
Implementation of RNAV/RNP GSS procedure for non-precision approach and landing at Belgrade airport	RNP APCH	2014
Implementation of RNP GNSS SID & STAR procedures at other Serbian airports	RNP 1	2015
Implementation of APV/baro-VNAV at all instrument approach airports in RS	RNP APCH	2016

6.3 Long-term plan (2018-2022)

ATS routes: ATS route network is to maintain its development in line with international standards and recommended practices, in close cooperation with international and regional aviation organizations.

Arrivals and Departures: conventional procedures for standard arrivals and departures for airports in the Republic of Serbia will be subject to gradual withdrawal and finally superseded by RNAV/RNP GNSS procedures. The conventional navigation procedures are to be withdrawn from use by 2022. In case of contingency situations, airports will follow only one conventional method as a backup to RNAV/RNP GNSS procedures.

Approach and landing: RNP GNSS procedures for non-precision and precision approach and landing are to be implemented at all airports in the Republic of Serbia, in accordance with the operational requirements.

Table 4: Long-term plan for the introduction of PBN in Serbia

Activities	Navigation specifications	Deadline
Implementation of RNAV/RNP GSS procedure for non-precision approach and landing at all Serbian airports	RNP APCH	2020
SID & STAR trial procedures at Belgrade airport	RNAV 1, RNP 1, RNP APCH, RNP AR APCH, APV	2022

7. DEFINITIONS

Approach procedure with vertical guidance (APV) means an instrument procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Area navigation means a navigation method which permits aircraft operation on any desired flight path within the coverage of ground or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Mixed navigation environment means environment where different navigation specifications may be applied within the same airspace (e.g. RNP 10 routes and RNP 4 routes in the same airspace) or where operations using conventional navigation are allowed in the same airspace with RNAV or RNP applications.

Performance based navigation means an area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

RNAV specification means specification based on area navigation that does not include the requirement for on-board performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

RNP specification means a navigation specification based on area navigation that includes the requirement for on-board performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Standard instrument arrival (STAR) means a defined IFR route on arrival for landing connecting a point on ATS route with the point where an instrument approach procedure can be commenced.

Standard instrument departure (SID) means a designated IFR departure route linking the aerodrome or a specified runway of the aerodrome with a specified significant point on a designated ATS route, at which en- route phase of a flight commences.

8. ABBREVIATIONS

AOC	Air operator certificate
APCH	Approach
APV	Approach procedure with vertical guidance
AR	Authorization required
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
CDO	Continuous descent operations
FAF	Final approach fix
FAP	Final approach point
GNSS	Global navigation satellite system
IFR	Instrument flight rules
LVO	Low visibility operations
PBN	Performance-based navigation
RAIM	Receiver autonomous integrity monitoring
RNAV	Area navigation
RNP	Required navigation performance
SID	Standard instrument departure
STAR	Standard instrument arrival
TMA	Terminal control area
VFR	Visual flight rules

9. Appendix: Timeframe for PBN implementation in the Republic of Serbia

Number

1. Adopting bylaws required for PBN concept implementation in the Republic of Serbia
2. Implementation of GNSS SID and STAR CDO trial procedures at Belgrade airport
3. Implementation of RNAV GNSS SID & STAR CDO procedures at Belgrade airport
4. Implementation of RNAV/RNP GNSS non-precision approach and landing at Belgrade airport
5. Implementation of RNP GNSS SID and STAR procedures at all airports in the Republic of Serbia
6. Implementation of APV/baro-VNAV at all instrument approach airports
7. Implementation of RNAV/RNP GNSS procedures for non-precision approach and landing at all airports in the Republic of Serbia
8. Replacement of the existing conventional procedures with RNAV/RNP GNSS procedures