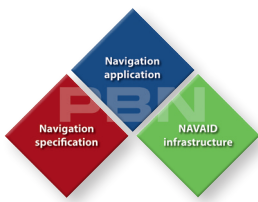**EUROCONTROL**

RNP Approaches

RNP approach procedures enabled by satellite navigation improve safety by reducing the risk of controlled flight into terrain (CFIT). In addition, such procedures can provide lower minima and enable access to runways that are not equipped with precision approach and landing aids.

Modern avionics can provide both lateral and vertical guidance along a predefined path that is stored in the aircraft's navigation database.

In accordance with the European Commission Implementing Regulation EU 2018/1048, RNP approaches are to be deployed at every instrument runway end by January 2024.

Approach procedures used to be divided into 2 Categories:

- **Non-Precision Approach (NPA)** used to be based on conventional navigation aids such as NDB, VOR and DME which enabled the flight crew to bring the aircraft to a point where the runway was in view and a landing could be performed safely. No vertical guidance is included in NPA procedures; they are therefore described as **2D operations**. However, ICAO and EASA expect that they are flown as Continuous Descent Final Approaches (CDFA).
- **Precision Approach (PA)** using a precision landing system such as ILS, MLS or GBAS which provides both lateral and vertical guidance on a stabilised continuous descent path. These are **3D operations** according to ICAO Annex 6.

In 2007, the 36th ICAO Assembly passed a resolution urging all States to implement approach procedures with vertical guidance (RNP APCH to LNAV/VNAV and LPV minima). This resolution was reiterated at the 37th Assembly in 2010. In the revised resolution RNP APCH to LNAV minima was also recognised as an acceptable alternative where an approach with vertical guidance cannot be implemented.

*In July 2018, the European Commission adopted the PBN Implementing Regulation EU 2018/1048 (PBN IR). This IR mandates RNP APCH to LNAV/VNAV and LPV minima at all runways without precision approach capabilities by **3 December 2020** and at all instrument runway ends by **25 January 2024**.*

Different kinds of RNP approach

In the past, RNP approach charts were titled RNAV (GNSS). ICAO now requires that these chart titles are changed to RNP (for example **RNP RWY 24** - see EUROCONTROL's flyer on 'RNAV' approach charts renamed 'RNP'). These charts can have several minima lines depending on the kind of RNP approach to be flown:

- **LNAV minima (MDA/H)** for 2D operations.
- **LNAV/VNAV minima (DA/H)** for 3D operations using barometric vertical guidance.
- **LPV minima (DA/H)** for a 3D operations with geometric vertical guidance based on SBAS (A 2D approach to LP minima using SBAS is also possible).

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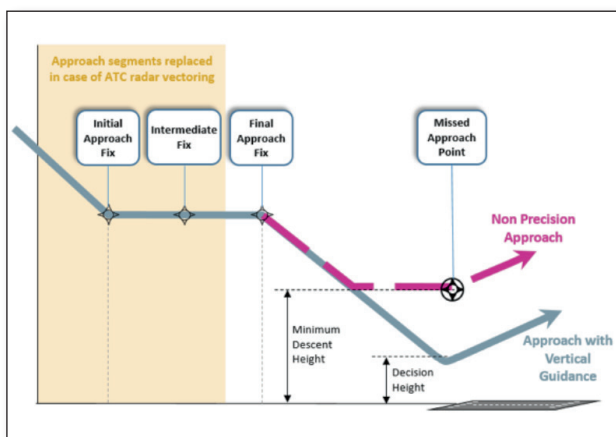
RNP Approach in more details

RNP approaches are based on the RNP APCH navigation specification published in the ICAO PBN Manual (Doc 9613). Two kinds of RNP APCH operation with vertical guidance exist:

- **RNP APCH to LNAV/VNAV** minima is a vertically guided approach that can be flown with VNAV functionality using barometric inputs. Most Commercial Air Transport and Business Aviation aircraft have this capability.
  According to ICAO, any navigation system meeting the performance required for LNAV/VNAV procedures can, a priori, be used for vertical guidance on such procedures. In Europe, some national authorities accept the use of SBAS to fly LNAV/VNAV procedures.

- **RNP APCH to LPV** minima is enabled by SBAS (such as EGNOS in Europe and WAAS in the USA) to provide lateral and vertical guidance. The lateral guidance is equivalent to an ILS localizer and the vertical guidance is provided against a geometrical path in space rather than a barometric altitude.
  Two sets of procedure design criteria exist for LPV procedures; these are called APV-I and SBAS CAT-I. The EGNOS LPV200 service level supports SBAS CAT-I operations with DH as low as 200ft.
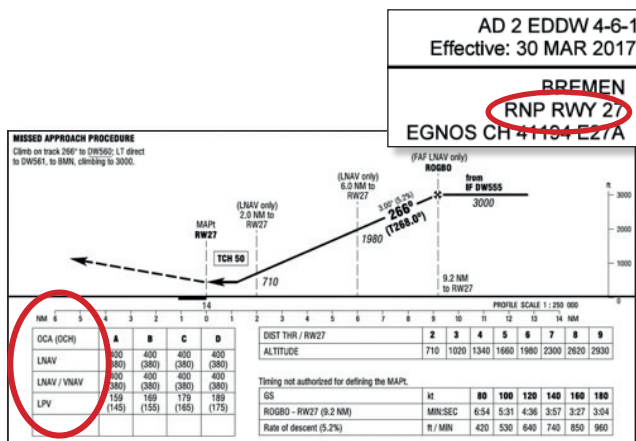
RNP approaches should not to be confused with RNP Authorisation Required (AR) approaches. RNP AR APCH is aimed at more demanding procedures that require specific authorisation. AR will appear in brackets in the title of the chart (e.g. RNP RWY 11 (AR)) and the minima will be labelled with the navigation performance requirement (i.e. RNP 0.1). Such procedures require a specific approval for the aircraft, specific crew training and a Flight Operational Safety Assessment (FOSA).

AR:	Authorisation Required
CDFA:	Continuous Descent Final Approach
CFIT:	Controlled Flight Into Terrain
DA/H:	Decision Altitude/Height
EGNOS:	European Geostationary Navigation Overlay Service
GNSS:	Global Navigation Satellite System
LNAV:	Lateral Navigation
LP:	Localiser Performance
LPV:	Localiser Performance with Vertical Guidance
MDA/H:	Minimum Descent Altitude/Height
PBN:	Performance-based Navigation
RNP:	Required Navigation Performance
SBAS:	Satellite Based Augmentation System (e.g. EGNOS)
VNAV:	Vertical Navigation

Improved safety

A large proportion of CFIT accidents occur in the final approach phase. Several improvements enhancing safety can be obtained with RNP APCH:

- The use of GNSS to provide accurate **lateral navigation (LNAV)** improves flight crew situational awareness.

- Adding **vertical navigation (VNAV)** against a predefined approach path further improves situational awareness.

- Even approaches designed as 2D procedures are to be flown using the Continuous Descent Final Approach (CDFA) technique for improved safety.
  CDFA can be performed by applying a constant rate of descent or by making use of vertical navigation (VNAV) functions available on many aircraft. The use of VNAV on a 2D procedure is considered a 3D operation.

Further Information

The EUROCONTROL **RNP Approach Implementation Support Group (RAISG)** coordinates the activities necessary for the implementation of RNP Approach procedures in ECAC.

For more information, please contact the nav.user.support@eurocontrol.int or visit our website: https://www.eurocontrol.int/navigation-activities

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