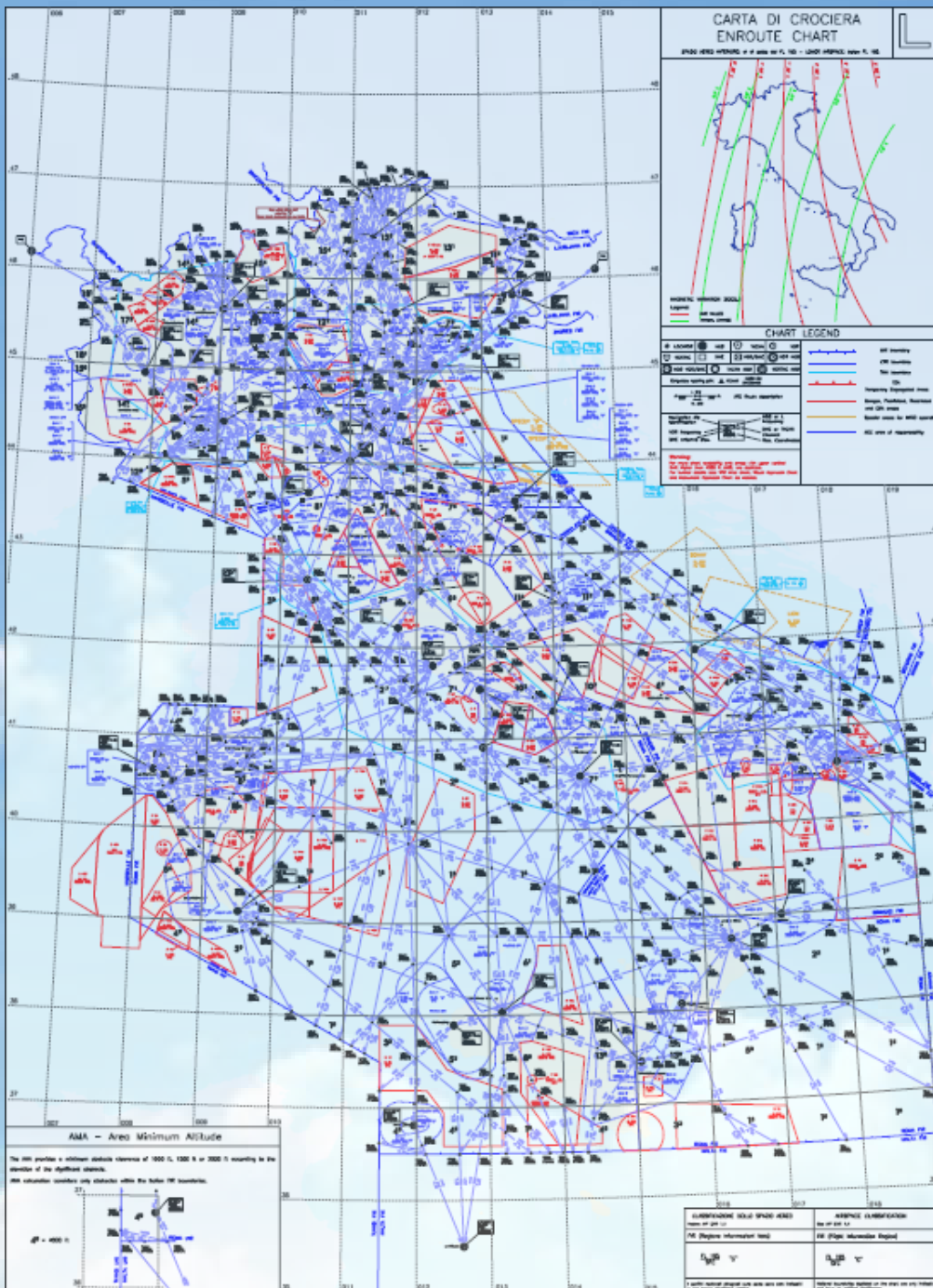


PBN Implementation Plan Italy

Version 1



Document approval

The PBN Implementation plan has been prepared by Ente Nazionale per l'Aviazione Civile (ENAC) and Italian ANSP (ENAV) in accordance with ICAO guidelines.

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Abbreviations

ABAS: Aircraft-based augmentation system

ADS-B: Automatic dependent surveillance – broadcast

ADS-C: Automated dependent surveillance – contract

AIP: Aeronautical information publication

ANSP: Air navigation service provider

AOC: Air Operator Certificate

APV: Approach procedure with vertical guidance

ATM: Air traffic management

ATS: Air traffic service(s)

Baro-VNAV: refers to one such system that uses altimetry to measure vertical position

B-RNAV: Basic Area Navigation

CCO: Continuous Climb Operations

CDO: Continuous Descent Operations

DME: Distance measuring equipment

EASA: European Aviation Safety Agency

EGNOS: European Geostationary Navigation Overlay Service

ENAC: Italian Civil Aviation Authority

ENAV: Italian ANSP

EUROCAE: European Organisation for Civil Aviation Equipment

EUROCONTROL: European Organisation for the Safety of Air Navigation

FAB: Functional Airspace Block

FATO: final approach and takeoff area

FTE: Flight technical error

FMS: Flight management system

FRT: Fixed radius transition

GBAS: Ground-based augmentation system

GNSS: Global navigation satellite system

GPS: Global positioning system

GRAS: Ground-based regional augmentation system

IFP: Instrument flight procedure

INS: Inertial navigation system

IRS: Inertial reference system

IRU: Inertial reference unit

LNAV: Lateral navigation

LPV: Localizer performance with vertical guidance

MNPS: Minimum navigation performance specification

NAVAID: Navigation aid

PBN: Performance-based navigation

NDB: Non Directional Beacon

NPA: Non Precision Approach
P-RNAV: Precision Area Navigation
PSR: Primary surveillance radar
RAIM: Receiver autonomous integrity monitoring
RF: Radius to fix
RNAV: Area navigation
RNP: Required navigation performance
RNP APCH: RNP approach
SBAS: Satellite-based augmentation system
SESAR: Single European Sky ATM Research
SID: Standard instrument departure
SSR: Secondary surveillance radar
STAR: Standard instrument arrival
VNAV: Vertical navigation
VOR: Very high frequency (VHF) omnidirectional radio range

Explanation of terms

Aircraft-based augmentation system (ABAS). An augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft.

Note. – The most common form of ABAS is receiver autonomous integrity monitoring (RAIM).

Airspace concept. An airspace concept provides the outline and intended framework of operations within an airspace. Airspace concepts are developed to satisfy explicit strategic objectives such as improved safety, increased air traffic capacity and mitigation of environmental impact etc. Airspace Concepts can include details of the practical organization of the airspace and its users based on particular CNS/ATM assumptions, e.g. ATS route structure, separation minima, route spacing and obstacle clearance.

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

Area navigation (RNAV). A method of navigation which permits aircraft operation 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.

Note.– Area navigation includes performance-based navigation as well as other RNAV operations that do not meet the definition of performance-based navigation.

Area navigation route. An ATS route established for the use of aircraft capable of employing area navigation.

ATS surveillance service. A term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.– A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Mixed navigation environment. An 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.

Navigation aid (navaid) infrastructure. Navaid infrastructure refers to space-based and or ground-based navigation aids available to meet the requirements in the navigation specification.

Navigation application. The application of a navigation specification and the supporting navaid infrastructure, to routes, procedures, and/or defined airspace volume, in accordance with the intended airspace concept.

Note.– The navigation application is one element, along with communication, surveillance and ATM procedures which meet the strategic objectives in a defined airspace concept.

Navigation function. The detailed capability of the navigation system (such as the execution of leg transitions, parallel offset capabilities, holding patterns, navigation databases) required to meet the airspace concept.

Note.– Navigational functional requirements are one of the drivers for the selection of a particular navigation specification. Navigation functionalities (functional requirements) for each navigation specification can be found in Volume II, Parts B and C.

Navigation specification. A set of aircraft and aircrew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specification:

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

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

An RNP X means that a navigation system must be able to calculate its position to within a circle with a radius of X nautical miles.

Note.– The Performance-based Navigation (PBN) Manual (Doc 9613), Volume II, contains detailed guidance on navigation specifications.

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

Note.– Performance requirements are expressed in navigation specifications in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

Procedural control. Air traffic control service provided by using information derived from sources other than an ATS surveillance system.

Receiver autonomous integrity monitoring (RAIM). A form of ABAS whereby a GNSS receiver processor determines the integrity of the GNSS navigation signals using only GPS signals or GPS signals augmented with altitude (baroaiding). This determination is achieved by a consistency check among redundant pseudo-range measurements. At least one additional satellite needs to be available with the correct geometry over and above that needed for the position estimation, for the receiver to perform the RAIM function.

RNAV operations. Aircraft operations using area navigation for RNAV applications. RNAV operations include the use of area navigation for operations which are not developed in accordance with this manual.

RNAV system. A navigation system which permits aircraft operation 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 RNAV system may be included as part of a flight management system (FMS).

RNP operations. Aircraft operations using an RNP system for RNP navigation applications.

RNP route. An ATS route established for the use of aircraft adhering to a prescribed RNP navigation specification.

RNP system. An area navigation system which supports on-board performance monitoring and alerting.

Satellite-based augmentation system (SBAS). A wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter.

Standard instrument arrival (STAR). A designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.

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

1 Background

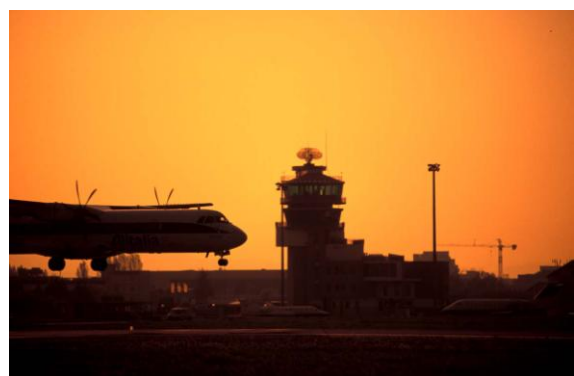
ICAO Assembly Resolution A37-11 requires member States to submit National Implementation Plans concerning the introduction of Performance Based Navigation (PBN) procedures.

This resolution encourages States to develop RNP & RNAV instrument flight procedures in en-route, terminal areas and, especially, approach procedures with vertical guidance (APV) to be implemented on all relevant instrument runway ends by the end of 2016.

In order to comply with these requirements, a PBN Task Force has been established in Italy, formed by the Italian Civil Aviation Authority (ENAC), the Air

Navigation Service Provider (ENAV) and the largest national airline (Alitalia).

This Implementation Plan highlights the potential benefits which are expected to be obtained in the coming years inside the Italian Airspace and, at the same time, provides the users with a brief guideline about the types of performance which are going to be addressed depending on the flight phase and level of air navigation service provided.



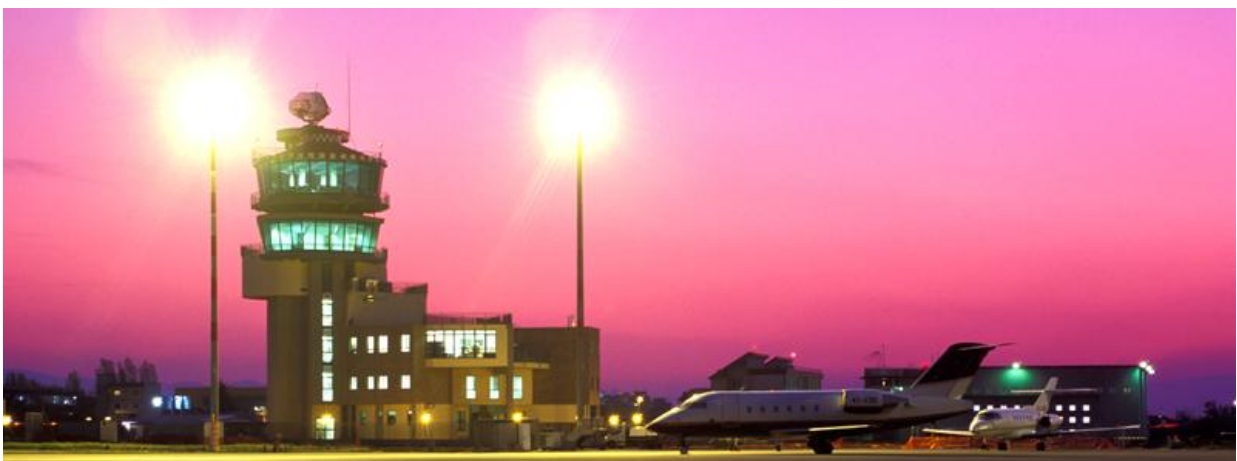
2 PBN concept

General

In conventional air navigation, the aircraft is guided to fly inbound or outbound by receiving signals from ground-based navigation aids, and the route design and flight procedures in the terminal area are restricted by the placement of ground-based navigation infrastructures and various navigation aids. With the ever improving onboard equipment capabilities and the evolution of satellite-based navigation, along with other state-of-the-

art technologies, the ICAO has presented the concept of performance-based navigation (PBN).

PBN refers to the aircraft's performance requirements in terms of system accuracy, integrity, availability, continuity, and functionality for operations along a given route, within an instrument flight procedure or a particular airspace, and with the availability of pertinent navigation infrastructure. The introduction of the PBN concept represents a shift from sensor-based navigation to performance-based navigation.



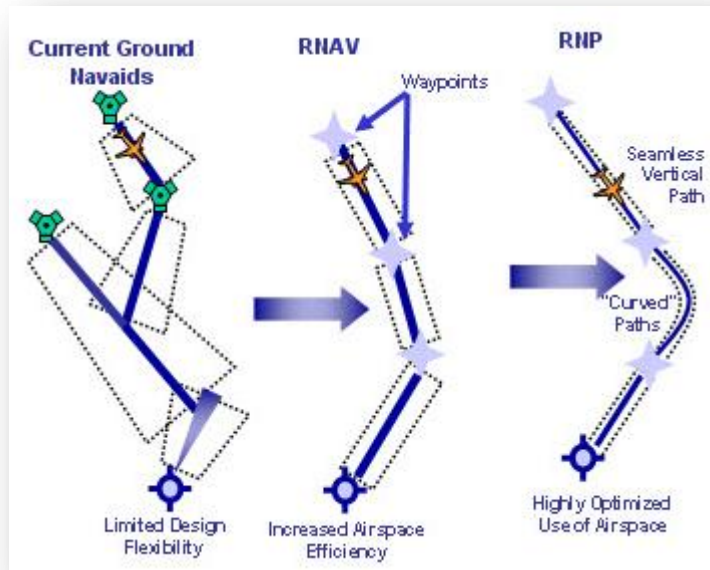


FIG. 1 - Performance Based Navigation RNAV/RNP

The PBN concept has introduced a change of perspective in the framework of ATM aspects related to navigation and equipment needed to operate inside airspaces along routes and procedures.

PBN supports a new concept based on navigation performance achievable by aircraft rather than focusing on the carriage of specific equipment.

The target is the standardization of navigation applications avoiding unnecessary growth of ad-hoc applications, equipment and standards.

The key elements of the PBN concept are:

- **Navigation infrastructure:** comprised of both airside (IRS, GNSS and so on) and landside (conventional nav aids).
- **Navigation specification:** performance required in terms of navigation, aircraft and crew capabilities. It's the

basis for the development of airworthiness and operational approval requirements. It specifies the kind of on-board equipment which is required in order to achieve the desired level of performance expressed in terms of accuracy, integrity, continuity and availability requirements. In addition requirements are placed towards the flight crew in order to support the desired level of performance.

- **Navigation application:** routes and procedures which can be developed inside an Airspace according to the above mentioned requirements can be divided into RNAV applications, where no integrity requirement is required, and RNP applications, with integrity requirements (see table 1).

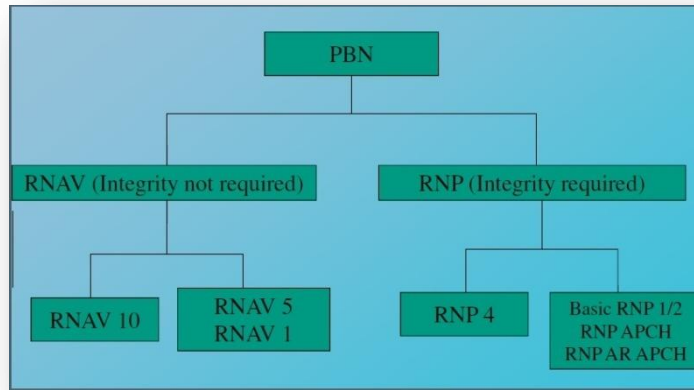


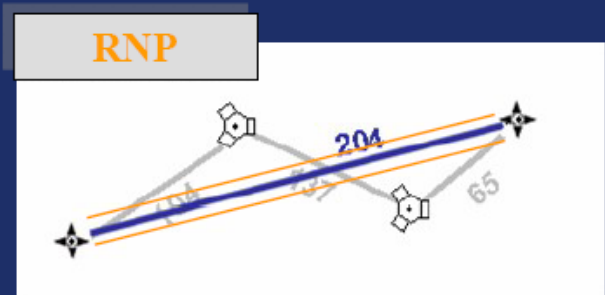
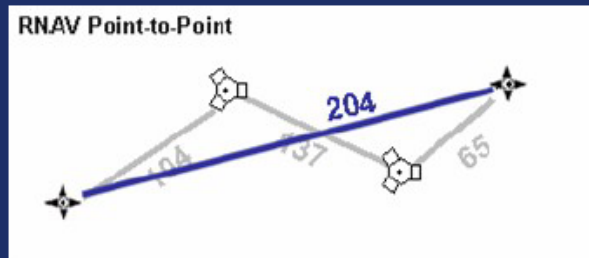
Table 1 – Navigation Application summary

The PBN concept is also connected to an Airspace Concept developed in order to properly support a dedicated PBN environment according to ICAO and Eurocontrol guidelines.

Most operators in the Europe and in Italy are approved to perform RNAV navigation applications (in particular RNAV 5/B-RNAV and RNAV 1/P-RNAV) whereas some operators are already approved to perform RNP-APCH applications.

Definitions

- **RNAV** - a method of navigation enabling aircraft to fly on any desired flight path within the coverage of referenced NAVAIDS or within the limits of the capability of self-contained systems, or a combination of these capabilities
- **RNP** is RNAV operations with the added feature of on-board navigation performance monitoring and alerting



The PBN concept shall be developed in accordance with the EU SESAR project,

which the Italian Air navigation Provider, ENAV, is a relevant member of.

Operational benefits

The need for the introduction of PBN-based instrument flight procedures comes from several factors, the following are among the most important:

Efficiency: the use of PBN in en-route phase and especially in terminal areas will improve flight planning and flight profiles, by effectively shortening the distance travelled. Moreover, a reduction in Air Traffic Controller and pilot workload will result. Furthermore, without any decrease of safety, the PBN will enable an increase in traffic.

Environment: better efficiency equates to lower levels of polluting carbon emissions due to less fuel consumption.

With shorter and optimal flight profiles around airports, significant reductions in noise can be achieved. In particular the possibility of achieving a better separation between departing and arriving flights can improve and encourage the use of CDO and CCO thereby also achieving reductions in fuel consumption and pollution.

Improving airspace availability: PBN procedures will optimize airspace design structure with benefits for both commercial operators and general aviation.

The possibility offered by PBN of developing tailored paths can allow ANSPs to improve airspace volumes in order to better merge the needs of commercial traffic and general aviation.

Helicopters operations: the flexibility of PBN procedures should improve helicopter operations, which are limited daily by several constraints:

- current instrument flight procedures are tailored for aircraft, but they do not fit helicopter flight operations because of different flight performances;
- difficulty in designing conventional instrument flight procedures for FATOs, due to the lack of local navaid availability;
- helicopters operations take place mostly in VFR and in northern Italian area, characterized by low visibility and foggy days during the winter. Such kind of operations could affect negatively safety,. PBN instrument flight procedures implementation should improve IFR operations of helicopters along dedicated routes and procedures, taking into account their flight performances.

Navaid rationalisation: the introduction of PBN instrument flight procedures will lead to phase out conventional navaids, starting from out-of-the-field NDB.

3. PBN policy

General

The purpose of this policy is to define a specific regulatory framework and support to ANSPs and operators in order to assist development and implementation of Airspace Concept consistent with the FAB BlueMed.

Policy framework

PBN implementation plan in Italy shall be based on the following regulation framework:

- this Policy is in accordance with SESAR development and ATM Master Plan;
- this Policy is consistent with ENAC “*Piano della Performance*” (“Performance Plan”), regarding the Safety and Environmental Protection objectives;

- this Policy is in accordance with “*ENAC Safety Plan*”, Emerging Issues, (TEM 1.2);
- this Policy is consistent with ENAC “*Piano Nazionale degli Aeroporti*” (“National Airports Plan”), regarding the future rationalization of the airports network, as well as the Environmental Sustainability.

PBN Statements

Furthermore, PBN implementation in Italy shall be based on the following statements:

1. following ICAO *Resolution A37-11*, Italy strongly recommends that new developed Instrument Flight Procedures both route, terminal and approach shall be designed according to PBN concept as defined

in ICAO Doc. 9613 “*Performance-based Navigation Manual*”;

2. this policy shall be upgraded to be consistent with the future European PBN Implementing Rules. According to EASA/UE total system approach, the new rules shall be mandatory for all the stakeholders, i.e.:
 - IFP Organizations, in order to design procedures according to PBN criteria;
 - ANSPs, in order to rationalize the radionavigation infrastructure;
 - operators, in order to have PBN approval on their AOC’s;
 - aircraft, in order to have a PBN airworthiness certification;
 - airports, in order to upgrade the ground infrastructure;
 - Competent Authorities, in order to define the appropriate level of safety oversight.

While the EASA/Eurocontrol regulation is in progress, ENAC shall issue consistent information to all the above stakeholders in order to have the PBN process implemented in a phased and timely way.

- 3 this Policy shall take into account the wishes of operators and ANSPs, as well as the current status of RNAV and RNP airspace, route and procedure in Italy.

PBN implementation criteria

The implementation of PBN-based procedures shall be driven by the following criteria:

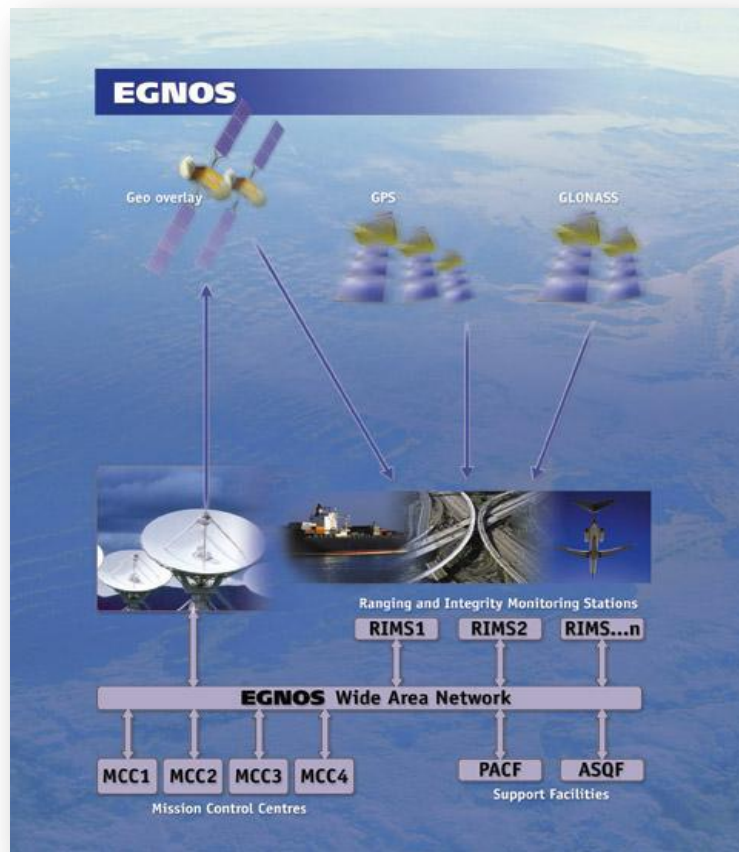
- any NPA approaches shall be replaced by L-NAV approaches as soon as practicable and according to the rationalization of nav aids, as backup for ILS procedures;
- NPA approaches shall be upgraded to APV as soon as practicable;
- about APV implementation, initially priority shall be given to procedures based on satellite-based signal, i.e. EGNOS. About BARO VNAV, feasibility analysis shall be performed where it is suitable or for those sites not covered by APV I and/or APV II requirements;
- implementation of RNP APCH procedures at least with LNAV minima for those runway ends served only by circling approach procedures, whenever feasible in terms of environmental constraints not requiring more stringent design criteria;
- for the long term, the implementation of LPV/GBAS shall have to be considered, taking into account meteorological and operational matters, where an ILS system will need to be replaced;
- about primary airports, as defined in the “Piano Nazionale degli aeroporti” (“National Airports Plan”), in order to upgrade ground infrastructure to

increase airside capacity and airport categorization, an implementation of

- o availability centred maintenance plan for all Visual Aids, for the short term;
- o Visual Aids switching to LED technology plan, For the short and long term;

shall have to be considered.

PBN implementation plan shall include instrument flight procedures for helicopters. In this contest, an ad-hoc plan shall be defined. Currently, a low-altitude IFR route has been published. Other routes linking to the heliports in the area are going to be implemented.



4 PBN in Italy

First, a general overview of the current Navaid structure in the Italian Airspace shall be provided.

Navigation infrastructure is a primary element in developing PBN applications. In Italy, there is a widespread DME network which is able to support RNAV1 applications in large part of controlled airspace covered by Radar service, enabling the possibility of designing optimized structures of arrival/departure network for the most important Italian airports.

As far as the use of GPS is concerned, an assessment of signal interference is in progress, in order to identify potential critical areas for the development of RNP APCH procedures.

Anyway international policies assess that the potential GPS weaknesses can be overcome by appropriate mitigation measures, such as operating procedures,

availability of integration instruments as IRS and ABAS, or augmentation of those ones like SBAS, on board monitoring and alerting and ATC and pilot training. Regarding EGNOS availability, all Italian airspace is covered by EGNOS signal, even though with different performances. Currently, a large part of Southern Italy cannot take advantage of APV I and APV II capabilities, while it can rely on LNAV applications supported by EGNOS.

En-route

All ATS routes above FL 95 are published as B-RNAV routes. Routes with MEL below that level are so few that at the moment they will remain as they are and will not re-classified according to RNAV standards.

Terminal Area

April 2011 Italy published the AIC introducing P-RNAV navigation inside Italian Airspace. At the moment P-RNAV SID/STAR are published for the following airports:

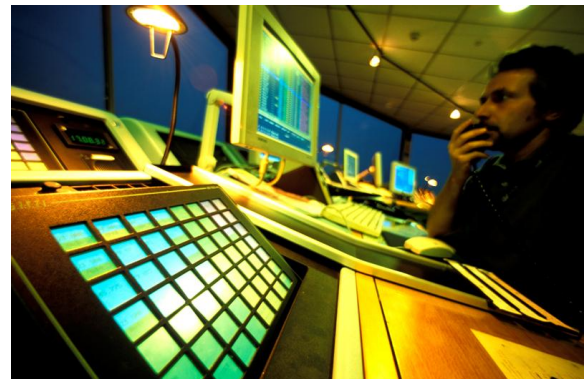
- o Milano Linate, Milano Malpensa, Roma Fiumicino, Roma Ciampino, Cuneo Levaldigi, Torino Caselle, Venezia Tessera, Palermo Punta Raisi, Bergamo Orio al Serio, Napoli Capodichino. Such instrument flight procedures have been published both as standalone P-RNAV and as overlays of conventional ones. In particular, standalone P-RNAV procedures have been published for Roma Fiumicino, Roma Ciampino, Milano Malpensa, Cuneo Levaldigi, Torino Caselle and Venezia Tessera;
- o P-RNAV procedures have been designed according to GNSS and DME/DME criteria.

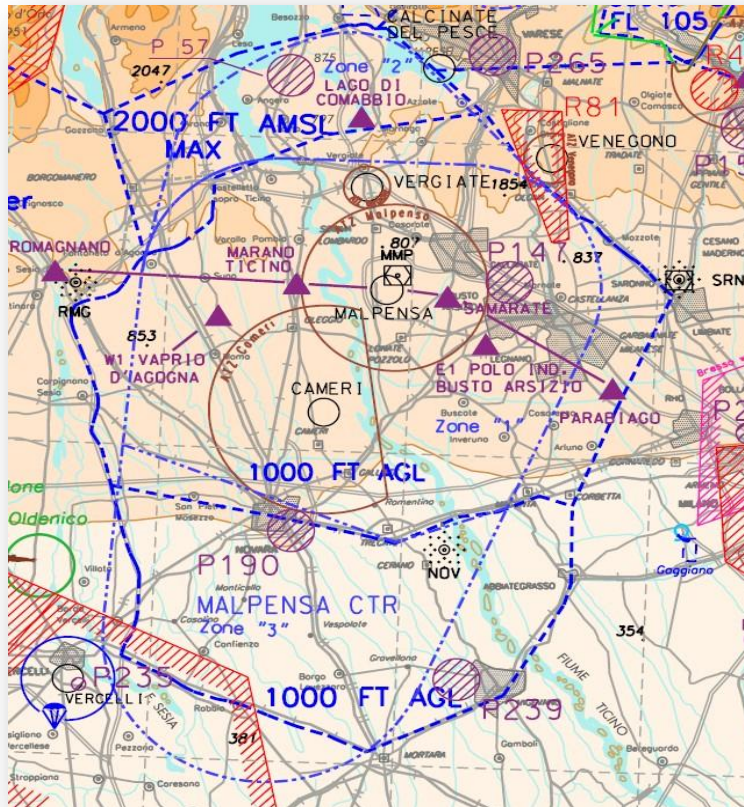
PBN training is in progress at Area Control Centers and Approach Control Centers. This training covers what has been

highlighted inside PBN Manual regarding ATC Training aspects.

In particular, ENAV has prepared two different training programs for operational people. The first one, which is related to PBN familiarization, covers terminology, concepts and applications on a general basis. The second one is focused on P-RNAV applications in Terminal Airspaces and covers applications, uses and advantages by ATCOs, navigation capabilities, aircraft equipments and contingency procedures.

Training has been already completed in Milan and Rome Area Control Center and in 2012 will start also in Approach Control Centers beginning with Bologna and Verona APPs.





Malpensa CTR

Approach

procedure of Runway 25 at Roma Fiumicino airport.

Nowadays, only one RNP APCH procedure has been implemented, as overlay of RNAV approach through NDB



Roma CTR

4.1 Short term planning: 2012-2014

En-route

New RNAV route segments based on both the framework of international coordination projects and operational advantage basis will be implemented. These new routes are expected to provide more direct and efficient plans for users. Moreover, it is expected to improve traffic management in terminal areas, by designing procedures which will segregate traffic in congested areas.

Finally, they will allow the application of CDO/CCO as much as possible.

Terminal Area

P-RNAV procedures for Milan and Rome TMA will be implemented. Regarding Milan TMA, a study of new P-RNAV SID & STAR is in progress for Milan (MXP) and Bergamo airports whose aim is the segregation of traffic flows to and from



Approach

During this timeframe ILS will remain the main instrument approach navaid. In order to guarantee a proper back-up for ILS, RNP APCH procedures will be implemented.

At the moment RNP APCH procedures have been designed

both airports in order to improve flight efficiency and ATC management.

Concerning Rome TMA, two kinds of lines of action are in progress. The first one aims at introducing selected P-RNAV SID & STARs, to improve traffic flow management and flight efficiency. The second one is focused on the implementation of Point Merge technique in order to manage inbound traffic to Rome Fiumicino airport.

Both P-RNAV procedures for Milan and Rome should achieve the objective to allow the application of CDO/CCO technique for air traffic management.

Phased introduction of P-RNAV SID & STAR in all Control Areas where Radar Service is available, with gradual introduction of CDO/CCO operations starting from ground until a defined flight level.

For those Control Areas not covered by radar service, an investigation will be carried out to possibly introduce a few P-RNAV SID & STARs based on DME/DME criteria according to the development of a specific Safety Case.

for several Italian airports, among which Malpensa, Linate, Olbia, Bologna, Roma Ciampino and are ready for validation; other studies are in progress in order to cover runway ends for the rest of major Italian airports by the end of 2012. Their implementation is subject to the definition of a Local Safety Case at national level. This work is in progress inside the National PBN Task Force.

At the beginning, these Instrument Flight Procedures will be developed according to LNAV (Non Precision Approach) and LPV (Localizer Performance with Vertical Guidance) criteria, at least until the stabilization of APV/BARO design criteria at international level will be achieved.

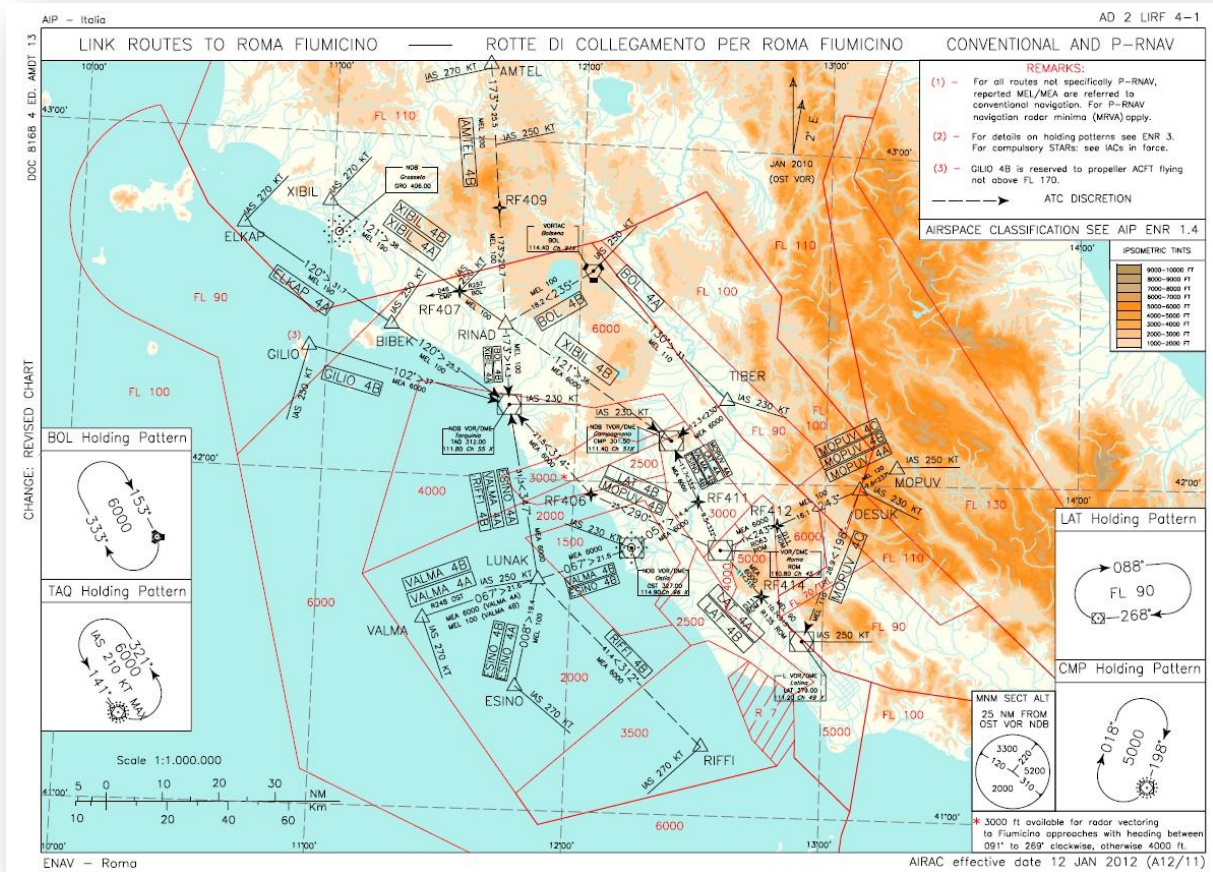
Anyway an investigation will be carried out to implement APV/BARO approach for those airports not covered by APV I & II and where practicable.

Investigations into all runway ends for those airports characterized by individual critical issues, such as limited airspace availability or terrain constraints, will be launched to verify EGNOS capabilities in order to provide GNSS approach procedures.

Airports

About airports the following will be applied:

- monitoring system of single Visual Aids enabled;
- evaluation of Availability Centered Maintenance of all Visual Aids.



Roma Fiumicino PRNAV

4.2 Medium term planning: 2014-2016

The forecast increasing number of EGNOS equipped users represents an important possibility in terms of potential implementation procedures regarding both arrival/departure phases and approach phases.

En-route

Phased introduction of RNAV1 criteria where practicable and where operationally advantageous will be done.

Terminal and Control Areas

Due to the expected increasing number of EGNOS equipped users, it will be possible to develop Basic-RNP1 SID & STAR EGNOS based, in all those airspaces where radar service is not available.

Phased introduction of RNAV1 SID & STARs allowing RF turns where needed and operationally achievable according to aircraft equipment standards and capabilities will be implemented.

Extension of CDO/CCO operations on all controlled airspaces where feasible and operationally achievable according to the airspace structure and to navigation applications will be also implemented.

Approach

During this timeframe ILS will remain the main instrument approach navaid.

The deployment of GNSS approach procedures will continue in order to match ICAO Resolution 37/11 targets;

4.3 Long term planning: 2016-2020

En-route

Extension of RNAV1 specification to all routes where operationally achievable according to the navigation infrastructure available will be done, together with a smooth transition towards RNP1 criteria depending on the applicable standards and aircraft fleet equipment.

Introduction of EGNOS based instrument approach procedures on all airports with site critical issues and where the deployment of conventional approaches is not allowed or not cost-benefit fruitful will be considered. In this context an operational assessment about the introduction of RNP AR instrument flight procedures will be carried out, and these procedures will be developed where operationally needed and beneficial.

Phased introduction of GBAS approaches where they prove to be useful in a cost-effective perspective will be considered.

Airports

About airports the following will be applied:

- monitoring system of single Visual Aids enabled;
- evaluation of Availability Centered Maintenance of all Visual Aids.

Terminal Area

Introduction of A-RNP1 STARs & SIDs with RF-leg capability is expected. Moreover in this timeframe the use of Required Time of Arrival should start to be used in order to facilitate the concept of 4D Business Trajectories developed in the SESAR framework. Anyway, all the picture

is strictly dependent on the future state of the art of the European Network and linked to the regulatory framework.

Approach

During this timeframe ILS is expected to remain the main instrument approach navaid. Anyway the gradual introduction of GBAS and expected improvement of GNSS performances in the whole national airspace will allow a cost/benefit analysis of those airports where conventional nav aids, used for approach procedures ,

could be dismissed after reaching the end of their operational life.

Airports

About airports the following will be applied:

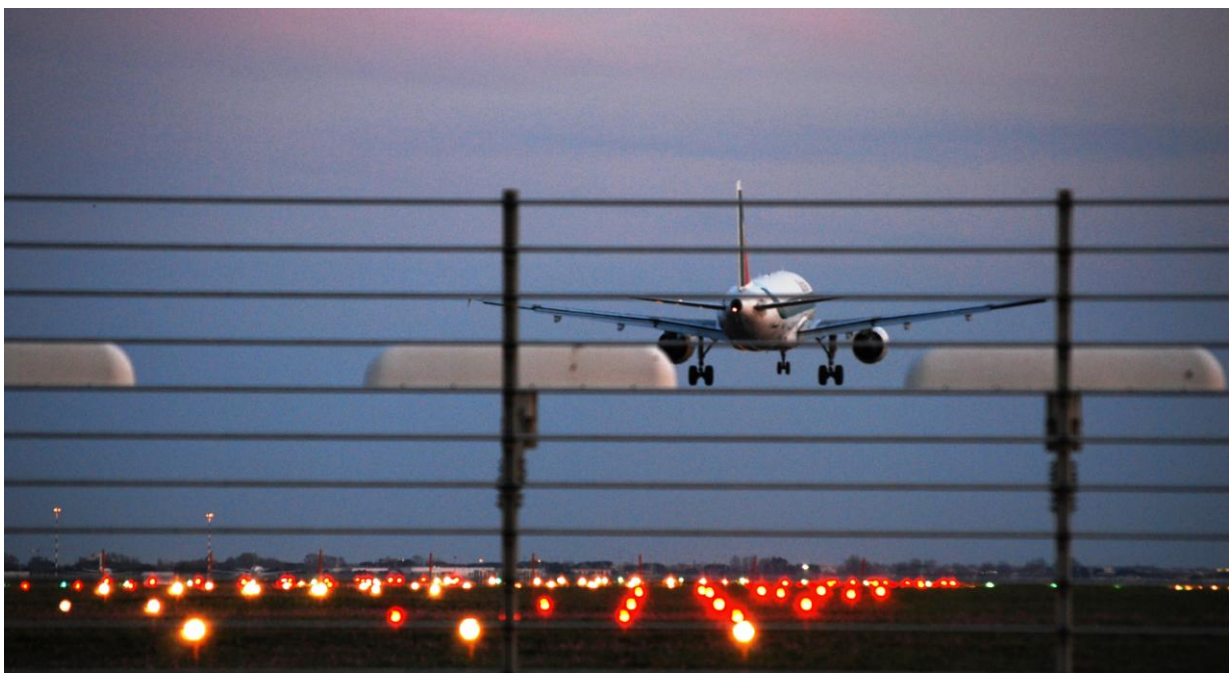
- monitoring system of single Visual Aids enabled;
- evaluation of Availability Centered Maintenance of all Visual Aids.

5 Navaids

According to the increasing introduction of RNAV/RNP instrument flight procedures, a progressive rationalization of existing navaids is expected to take place.

ENAV has already investigated, through an internal task force, a future plan for NDBs reduction. First of all, those NDBs

used for navigation, which nowadays provide for adequate VOR back-up will be discontinued. Considering that all routes are RNAV5 and taking into account the gradual introduction of RNAV1 SIDs & STARs, the need for NDBs as navigation guidance will decrease over the time, allowing their withdrawal while maintaining



VOR as back-up of these SIDs & STARs.
About homing NDBs (namely those located on the airport to provide guidance to the approach), their withdrawal will be evaluated on a case by case basis, considering the possibility to implement GNSS based approach.
Moreover, another study together with Italian Air Force is in progress, to verify the possibility to withdraw some nav aids which at the moment are under the Air Force management and responsibility.
EGNOS usage will allow a progressive “homing NDBs” withdrawal providing that

their inconvenience on a cost benefit basis is assessed and depending on the availability of other conventional nav aids to provide adequate backup.

In addition an investigation will be performed, evaluating the operational needs to increase DMEs number in order to support the transition to RNAV1 criteria for the Enroute phase and to provide the required redundancy for STARs and SIDs and for those airports characterized by poor DME availability and/or geometry.

6 Helicopters

Implementation of Helicopters instrument flight procedures based on GNSS criteria is a strategic Italian target to make national transport helicopter more efficient.

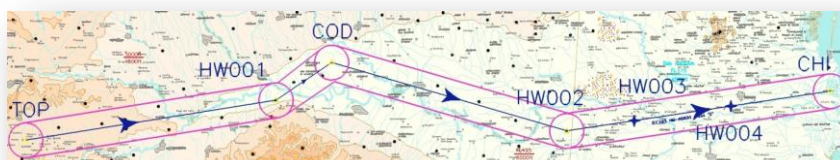
Today rotorcraft operations are in fact strictly dependent upon weather conditions and, even if several rotorcraft are certified for IFR operations, they are often forced to fly instrument flight procedures developed for fixed wing aircraft. They are consequently often penalized due to the different flight performances between fixed and rotary wing aircraft.

Furthermore the new IFR rotorcraft are often GNSS equipped and certified; this gives the opportunity to study and implement flexible and tailored instrument flight procedures. In this context, the advent of EGNOS together with the application of tailored helicopters

design criteria available from ICAO DOC 8168 Manual will be able to provide great benefits to rotorcraft operators.

Since 2011 ENAV, ENAC and the Italian rotorcraft industry are working along the following workflows:

1. introduction of low-level IFR routes (between 3000Ft – 5000Ft) based on RNAV1/RNAV2 navigation specification;
2. introduction of dedicated approach / departure instrument flight procedures to/from airports/heliports based both on conventional nav aids (where available) and mostly GNSS criteria;
3. under the ACCEPTA project LPV procedures for helicopters in Northern Italy (Milan Linate and Bergamo Orio al Serio airports) are being designed.



Low lever IFR route GNSS

