



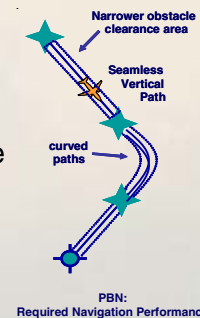
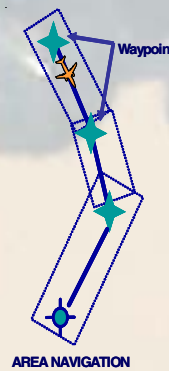
## Meeting Aviation Challenges Through Performance-Based Navigation

**Performance-Based navigation (PBN)** defines performance requirements for aircraft navigating on an ATS route, terminal procedure or in a designated airspace. It is ICAO's effort and objective to redefine the regional differences of various Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications into a globally harmonized set of PBN applications. To better understand the concept of PBN, let's take a look at the events leading up to PBN, benefits associated with the use of PBN, and what is being done to implement PBN around the world.

The global aviation community is facing significant challenges. As demand for air transportation services increase, States are faced with finding solutions to safely increase capacity, efficiency, and access, e.g. to terrain

challenged airports. These constraints are largely a result of reliance upon conventional ground-based navigation aids (e.g., VOR, NDB, ILS), which limit routes and procedures to the physical locations of ground-based navigation aids. These ground-based systems have served the aviation community well since inception; however, they do not permit the flexibility of point-to-point operations available with PBN to meet the challenges of today and the future.

ICAO has adopted PBN to address these challenges. Through the application of Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications, PBN provides the means for flexible routes and terminal procedures. The illustrations depict the constraints associated with conventional, ground-based sensor specific routes/procedures and the flexibility and



benefits of performance-based, non-sensor specific navigation (both RNAV and RNP).

PBN is helping the global aviation community reduce aviation congestion, conserve fuel, protect the environment, reduce the impact of aircraft noise and maintain reliable, all-weather operations, even at the most challenging airports. It provides operators with greater flexibility and better operating returns while increasing the safety of regional and national airspace systems.

### PBN Is Environment-Friendly

- Reduces emissions by saving fuel. 3.19 kg of CO<sub>2</sub> emissions are eliminated for every 1 kg of fuel savings achieved through shorter and vertically optimized PBN flight paths. IATA estimates that globally, shorter PBN routes could cut CO<sub>2</sub> emissions by 13 million tonnes per year. Additionally, PBN provides a mechanism for optimized profile descents that allow aircraft to descend from high altitudes to the airport at minimum thrust settings.
- Reduces noise pollution. Consistent, precise paths can be routed to avoid noise sensitive areas. Noise levels can often be reduced through use of optimized profile descents, which allow lower, quieter thrust levels.

## PBN Improves Safety

- Reduces the risk of Controlled Flight Into Terrain (CFIT) accidents by providing a very precise lateral and vertical flight path
- Provides consistent, predictable and stabilized approaches. Aircraft arrive at the runway aligned with the centerline, in the same configuration and at the same speed every time.
- Reduces diversions caused by adverse weather conditions, enabling aircraft to reliably access airports with lower visibility restrictions.

## PBN Improves Operating Returns

- Reduces fuel waste through shorter flight tracks, optimized profile descents and fewer diversions. Enables more direct and closely spaced parallel tracks en route for increased fuel efficiency and reduced flight time variance.
- Creates new market opportunities by providing safe access to terrain and weather challenged destinations. PBN also provides a path for airline growth as emissions caps are implemented around the world.
- Provides a degree of precision approach capability without the investment required for expensive ground-based infrastructure.
- Improves customer satisfaction/customer

loyalty by allowing airlines to more consistently access airports serviced at higher on-time rates.

## PBN Increases Airspace Capacity

- Increases traffic capacity through more efficient routes and smoother flows. Reduces airspace conflicts between adjacent airports and prohibited or special use airspace.

## The Global Rollout of PBN

At the 2007 36th International Civil Aviation Organization (ICAO) General Assembly, States agreed to Resolution 36/23, which urges all States to implement routes and airport procedures in accordance with the ICAO PBN criteria. Regional PBN Implementation Task Forces were developed to coordinate the regional implementation programs.

From a global perspective ICAO and IATA formed the Global PBN Task Force, where States and industry are collaborating on global solutions, such as the required operational approval process and the development of educational material for PBN. A detailed reference library for PBN is available at <http://www.icao.int/pbn>. Additional enquiries can be sent to [pbn@icao.int](mailto:pbn@icao.int).

