PBN & The Environment
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What is PBN?

Route or Procedure

Navigation Application

Navigation Specification

NAVAID Infrastructure

Aircraft & Crew
Why PBN?

RNAV and RNP

2008

B-RNAV

P-RNAV

US-RNAV

RNP10

RNP 4

RNP/RNAV

Future

Other States-Regions

Russia

US

Europe

Boeing

Australia

China

Airbus

Canada

Japan

South America

India

Boeing

Europe

US

Australia

Russia

Canada

Japan

South America

India

Other States-Regions
What can be done with PBN?

- Precise track keeping makes it possible to by-pass noise sensitive areas.
- Flexibility of track placement enables broader choice of route options > noise can be spread.
- Superior management of vertical path enables improved (lateral) track placement and CDOs as well as CCOs.
Key European PBN Players

PBN needs a Partnership Philosophy

- All Airspace Users
- Pilots / Controllers
- **Airport Communities**
- Regulators
- Flight Operations
- OEMs
- FMS Manufacturers
- Data Houses
- CNS/ATM Engineers
- Airspace Designers
- Procedure Designers
SOME EXAMPLES
RNAV Departures in Atlanta

Before

After
Gothenburg, Sweden (ESGG)

- Baseline scenario RNAV 1 STAR followed by ILS approach to RWY21.
- RNP AR to RWY21.

- Benefits with RNP AR:
  - 11 NM shorter than the baseline scenario.
  - Relieving a noise sensitive area of over flying aircraft

Slide courtesy of Novair
RNP AR operation from an airline perspective
Riga – RNP AR

Slide courtesy of Air Baltic
The Drivers for Performance Based Navigation

- ICAO Assembly Resolution 37-11
- PCP IR AF#1 (RNP 1+RF in 25 Major TMAS by 1.1.2024) and PBN Regulation from EASA
- Network strategic Plan SO-05 (Terminal) and SO-06 (APT); SO-08 (INFRA);
  ...and some operational needs
- Make ENR-TERM-APT connections -
  - PBN ATS Routes with PBN SID/STARs
  - PBN SID/STARs with PBN IAP
  - PBN IAP with PBN/xLS FAP

(IAP=Instrument Approach Procedure; FAP = Final Approach Procedure; xLS = ILS, MLS, GBAS Landing System)
THE DOWNSIDE
Resistance to PBN

- Environmental opposition to new airspace developments, especially those in busy terminal airspace around densely populated areas, has the potential to delay progress towards implementation of PBN
- Highly motivated, well organised opposition to any form of airspace change – use of social media, Android apps
- Extremely time consuming and costly to airports, ANSPs and regulators dealing with complaints and legal challenges
- Institutional paralysis at all levels of government
- PBN is a “dirty word” in the eyes of residents living under the flight path of repeatable and predictable tracks
New Gatwick flight path trials are 'destroying' Sussex village life
Some Public Responses to the UK Trials

- Good luck. I hope you are not planning to implement PBN below 10,000 feet or it could be 2028 not 2018 when it happens.

- Wow! PBN has been so amazing. I am now not able to sleep at night and get no respite from aircraft noise even though my family and I were not previously affected.

- PBN is torturing lives NOW, if torture is the way of the future it’s not a future I look forward too.

- Hi to all PBN sufferers. Idea: do you think we could combine £ and ideas to contest the policy of PBN… i.e., is the policy fair? Has it been reached fairly so that people’s interests were taken into account when the policy was agreed? Legally called a ‘procedural obligation; on government to do this. Use this place as a means to say if you’d be interested?

- PBN is the worst idea ever, never had an issue with planes in 20 years now there’s one overhead practically ever minute for 18 hours a day.
PBN’s greatest challenge

- PBN regulation (PCP-IR/EASA) endorsed by politicians.
  - Objective is increased flight and ATM efficiency, more capacity, improved airport access. Note that PBN part of a complex inter-dependent set of enablers providing such benefits.
  - ANSPs, Airlines compliance required.
- Airport neighbours see PBN implementation as environmental community challenge.
  - PBN not popular with those under the flight paths
  - Environmental objection blocking PBN implementation.
- In reality, air traffic over communities creates conflict irrespective of navigation means.
- RISK – PBN implementation blocked.
- Importance of perception > reality.
Many Possibilities can be Explored

- Avoiding populations below 4000ft, 7000ft and above 7000ft
- Single PBN SIDs to replace conventional routes
- Respite options for PBN SIDs
- Respite options for dual runway operations
- Alternating SID usage with offloads
- Multiple PBN routes to replicate conventional dispersal
- Traffic dispersal into new/wide areas

- Increased climb gradients
- Removal of stepped climbs
- Single PBN routes for arrivals
- Multiple PBN arrival routes for relief
- Multiple PBN arrival routes for dispersal
- Variable Final Approach joining points
- Final Approach Options (not all PBN related)
  - Steeper approaches
  - Two segment approaches
  - Displaced threshold
WHERE EUROCONTROL COULD CONTRIBUTE
Generic and common material to support RNP implementation

To be applied by particular stakeholders
Integrate toolsets for PBN regulatory compliance.

Note: RNP Toolkit easily accommodates RNAV 1/P-RNAV
IMPACT

Examples of assessment products

In Conclusion

- PBN can bring significant environmental benefits:
  - Shorter routes – less fuel
  - Ability to precisely place tracks and avoid overflying specific areas
  - Enabling more efficient vertical profile – CDO/CDA

- But there are significant challenges to be overcome
  - It is not always possible to avoid overflying communities around major airports
  - Resistance can be very strong

- EUROCONTROL Tools can help to establish objective results
  - To support engagement with local communities and select the optimum solution