International Declaration Signals the Strength and Depth of PBN Support

There’s strength in numbers. That’s why Performance-based Navigation (PBN) is becoming the foundation upon which airspace will be designed in the decades ahead.

Last month, at the 4th Aviation and Environment Summit, organized by the Air Transport Action Group (ATAG), in Geneva, leaders of 10 international aviation organizations signed a Declaration supporting rapid implementation of Performance-based Navigation.

The Declaration stated their intent clearly and without ambiguity:

- Performance-based Navigation must be implemented swiftly around the world.
- Aviation stakeholders must cooperate to accomplish the task.
- The aviation community must provide assistance to states that need help planning and executing PBN.

Signatories to the declaration represent airline operators, air navigation service providers, air traffic controllers, airline pilots, aviation regulators and more.

So why is there so much attention to PBN now?

“PBN will help reduce airport and airspace congestion, conserve fuel and protect the environment, reduce the impact of aircraft noise near airports, and ensure reliable, all-weather operations,” said President of the Council of the International Civil Aviation Organization, ICAO, Roberto Kobeh Gonzáles.

“PBN enhances the safety and efficiency of the global air traffic system – and is a great example of what industry and governments can accomplish working together,” says Giovanni Bisignani, Director General and CEO of the International Air Transport Association (IATA).

The Secretary-General of the Civil Air Navigation Services Organization (CANSO) Alexander ter Kuile, agreed: “From the perspective of air navigation services, it does not get any better than this,” ter Kuile said. “With PBN we can develop an arrival and departure procedure that offers a better service, with enhanced safety, that is environmentally friendly, and with a lower cost than what we have today.”

At the heart of the PBN revolution is an awareness that aviation cannot afford to be limited by conventional navigation technologies that date to the mid-20th century.

Performance-based Navigation, which leverages GNSS, advances in aircraft systems, improvements in cockpit displays and modern aircraft auto-flight capabilities, unlocks a world of potential improvements. PBN precision and predictability can reduce route-structure track miles and can facilitate environmentally sound operations, such as Continuous Descent Arrivals (CDAs) and optimized departures.

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These advantages are foremost on the minds of aircraft operators and air navigation service providers around the world who are concerned about aircraft emissions, noise, safety and airspace capacity.

Evidence of this is seen in Airservices Australia’s recent announcement that it intends to transform Australia’s airspace to Performance-based Navigation over the next several years.

In Sweden, LFV also is actively investigating a nationwide PBN transformation.

The FAA calls Performance-based Navigation, "…. a cornerstone of the FAA’s NextGen vision."

And in Europe, NextGen is a fundamental part of the SESAR program.

Even airport operators recognize that improved navigation technology will help them do their job more effectively and help them become better stewards of the environment.

The Director General of Airports Council International, Angela Gittens, a signatory to the PBN declaration, summed up her thoughts on PBN very succinctly: “We need to make better use of existing facilities,” she said.

**PBN Perspectives**

**PBN Implementation: A Global Effort**

Nancy Graham, ICAO

Over the years, aviation has faced a wide range of distinct challenges. Today, however, there is an underlying multidimensional challenge: how to successfully address aviation’s safety, environmental and efficiency objectives for the present as well as into the future. ICAO’s Performance-based Navigation (PBN) concept, developed to tackle air navigation issues, is a dynamic approach to meeting these objectives.

**PBN implementation**

The many benefits of Performance-based Navigation can only be realized through global implementation. This was recognized by the 36th Session of the ICAO Assembly in 2007 when it urged all Member States to have PBN implementation plans ready by 2009, which is where ICAO’s efforts are now strongly focused. Two future air transportation systems, the Next Generation Air Transportation System (NextGen) of the United States and SESAR in Europe, are based on the application of PBN. They also both support the ICAO Global Air Navigation Plan which was developed to ensure global harmonization and standardization.

**Global PBN Task Force**

Successful implementation on a world-wide basis of a new complex navigation concept such as PBN requires a proactive and creative approach that engages all stakeholders. To this end, ICAO, in partnership with IATA, States and industry, established the Global PBN Task Force to address many of the issues associated with PBN implementation. The Task Force has three main goals: the promotion of PBN and its benefits; the prompt development of guidance and educational material to bridge any gaps that could slow or even block PBN implementation; and the provision of direct turnkey advice to States.

ICAO has been active in promoting PBN implementation. The PBN concept is clearly outlined in the ICAO Performance-based Navigation Manual (Doc 9613) and a coordinated action plan is now available to assist States. In addition, all ICAO Regional Offices have established PBN task forces with participation from States. Also, through the cooperation of States in the Asia-Pacific Region, a flight procedures programme is being established in China to assist States with implementation of PBN in the region.

Recognition of the importance of PBN for aviation today and in the future has never been stronger. This is evident by the recent signing in Geneva of the Industry Declaration in support of PBN by leaders of the global aviation community. ICAO, State and direct industry involvement is a win-win situation and is providing the synergy needed to accelerate PBN implementation.

**Australia Committed to PBN**

Rick Leeds, CASA

While still in its early days, Australia has committed to the PBN concept with the Safety Regulator (CASA) establishing a project team that will develop relevant navigation standards in line with the ICAO PBN manual. In the first instance, the project team will ensure existing RNAV/RNP legislation is consistent with the PBN manual. They will then move to develop new navigation standards, with relevant guidance and training material, through the normal NPRM process.

Together with Australia’s ANSP, CASA is preparing its PBN implementation plan, including Approach with Vertical Guidance utilizing Baro-VNAV, for submission to the ICAO Asia/Pacific office. It is expected that Australia will meet
the agreed time frames established by ICAO for full PBN implementation.

Notwithstanding this commitment, CASA does see some major implementation challenges to overcome along the way. Firstly, writing new regulation, considering required industry consultation and legal drafting, can take many months if not years. It will be important, therefore, to ensure that CASA prioritizes its PBN regulatory development effort to maximise potential benefits to the greatest extent possible.

Secondly, it has become apparent in more recent times, that there is significant confusion regarding the differences between RNAV and RNP specifications and the functionality of relevant aircraft navigation equipment. Understanding the capability of a particular navigation system, in terms of its certified functionality, is a critical factor for operational implementation. In this regard, significant emphasis will need to be placed on industry awareness and training requirements.

For further information regarding Australia’s PBN implementation contact the project manager - Navigation Authorizations, rick.leeds@casa.gov.au.

**ANSP Outlook**

**Performance-based Navigation Can Raise ATM Performance**

Chris Goater, CANSO

Perhaps the most central aim of the Civil Air Navigation Organization (CANSO) is to assist its members to raise the level of ATM Performance. As an organization, we champion all new technologies and techniques which will strengthen the aviation system, and there is no doubt that PBN is just such a technology and technique. ATM performance covers a wide variety of areas. The most important has always been safety. However, ATM Performance also encompasses a number of other issues, such as capacity and efficiency, and a topic that has been at the forefront of CANSO’s thinking this year—the environment.

Historically, environmental performance for an ANSP has meant minimizing noise for communities close to airports. However, in recent years this has changed in many countries to also include climate-changing emissions. With the financial crisis and economic slowdown of the last 12 months, the need to cut fuel burn has become even more acute. ANSPs have come under increasing pressure to adopt measures to reduce fuel use, for both environmental and economic reasons.

At the recent Aviation Environment Summit in Geneva, CANSO Secretary General Alexander ter Kuile introduced the pledge on behalf of the world’s aviation community to deliver ICAO’s call for PBN implementation. In his speech he acknowledged not only the significant fuel savings to be made from PBN, but also the global effort needed to introduce PBN. Working together across aviation partnerships to deliver PBN is the key to raising ATM performance and delivering ATM targets.

As this project unfolds, we will see many examples of the industry cooperating together to implement PBN, and you will read about the ANSP perspective on overcoming these challenges right here in Waypoints.

**Operator Insight**

**PBN: The Way Forward**

David Behrens, IATA

The airline industry is excited about the introduction of PBN and views the potential enhancements to safety alone as extremely significant. PBN enables airports located in the poorest areas of the world to have safe, precise and efficient instrument procedures that do not require the installation, calibration and monitoring expenses of ground-based navigation aids. This allows all States with the means to design stabilized approaches with lateral and vertical guidance to all runway ends.

PBN also offers new market opportunities for airlines by providing safe and consistent access to terrain and weather-challenged destinations, which is an improvement for each country’s air transportation system.

Operational, fuel and environmental savings also can be significant as a result of PBN implementation. For example, PBN procedures at Brisbane, Australia allowed Qantas to fly 7,300 fewer track miles on its first 1,612 approaches, saving the environment 650 tonnes of CO₂ emissions.

“All of this is great news for airlines, since PBN is the airline-preferred solution to navigation,” said Guenther Matschnigg, IATA senior vice president for Safety, Operations and Infrastructure. “However, we need States to adopt PBN for all of our navigation needs – departure, en route and arrival,” he said.

To help smooth out some of the bumps that sometimes occur in the PBN regulatory approval process, IATA developed the General Guidelines for Obtaining Airworthiness and Operational Approvals for PBN Navigation Specifications. These guidelines provide direction for obtaining approvals for all the ICAO PBN navigation specifications. Adopters will benefit from the great potential PBN can have on the global air traffic system.
Q&A

Question: What’s the differences between PBN and RNP?

Answer:

Performance-based Navigation (PBN) is a term used to describe the broad range of technologies that are moving aviation away from a ground-based navigation system and toward a system that relies more on the performance and capabilities of equipment on board the aircraft.

Performance-based Navigation reduces the need to maintain sensor-specific routes and procedures, and their associated costs. According to the ICAO PBN Manual, “PBN offers a number of advantages over the sensor-specific method of developing airspace and obstacle clearance criteria.”

Required Navigation Performance (RNP) is a form of Performance-based Navigation in which the onboard aircraft navigation system provides performance monitoring and alerting, thereby providing assurance that navigation performance is maintained throughout the flight.

In RNP navigation, routes are designed not according to the accuracy of a sensor system along the route, but rather by the aircraft’s ability to fly within a specified volume of airspace along the route. According to the ICAO PBN Manual, “RNP systems provide improvements on the integrity of operation … and can provide sufficient integrity to allow only these systems to be used for navigating in a specific airspace.”

PBN Fast Facts

- All jet transport aircraft currently in production have the capability to fly some type of PBN procedure.
- ICAO Assembly resolution A36-23 resolves that States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve among others, implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30% by 2010, 70% by 2014.
- The FAA has developed more than 8,000 PBN procedures including 157 RNP-AR procedures and 1,515 APV procedures (as at 12 March 2009). It plans to publish 300 additional RNP-AR procedures by 2013.

PBN Events Calendar

- Avionics USA
  June 1-2
  San Diego, CA USA

- IATA Annual General Meeting
  June 7-9
  Kuala Lumpur, Malaysia

- ICAO/ENAC PBN Procedure Design Course for experienced procedure designers from the North America, Central America and Caribbean regions
  June 8-19
  Havana, Cuba

- RTCA Symposium
  June 10-11
  Chantilly, VA USA

- APEC New Aviation Technologies Workshop II
  June 17-19
  Bangkok, Thailand

- CANSO AGM and CEO Conference
  June 22-25
  San Diego, CA USA

- ICAO/ENAC PBN Procedure Design Instructor Course
  for select graduates of the Asia and Pacific Regions’ PBN Procedure Design Courses
  July 20 – August 7
  Toulouse, France

- Aviation Week RNP Forum
  August 5-6
  Dallas, TX USA

- ALPA Air Safety Week
  August 5-6
  Washington, DC USA

- RNAV/RNP course
  September 1-11
  ICAO Lima Regional Office, Peru

- Asian Aerospace Expo & Congress
  September 8-10
  Hong Kong, China

- FAA Intl. Safety Forum
  September 9-11
  Washington, DC USA

- Naverus Global PBN Summit
  October 1-2
  Seattle, WA USA

- RNP-AR Approach course
  October 5 - 16
  ICAO Lima Regional Office, Peru

- SAM/IG/4 Meeting
  October 19-23
  ICAO Lima Regional Office, Peru

Send your calendar items to: PBNnewsletter@icao.int
News Briefs

++ On March 26, 2009 ICAO and the Civil Aviation Administration of China (CAAC) signed a letter of intent to establish a Flight Procedure Programme (FPP) with the goals of developing the capabilities in the instrument flight procedure domain of the States of the Asia/Pacific Regions. The FPP is expected to begin operation in early Fall of this year in Beijing, China. ICAO anticipates that similar Flight Procedure Programmes may be established in other regions of the world in the future.

++ The ICAO PBN Study Group held its second meeting in March 2009 in Montreal and decided which new navigation specifications should be developed to meet present and future operational requirements from the aviation community. The group also agreed to review and, if necessary, make changes to the PBN Manual to make it more user-friendly for the many stakeholders involved in implementation of PBN.

++ Argentina, Bolivia, Brazil, Chile, Ecuador, Venezuela and Uruguay delivered an Aeronautical Information Circular (AIC) notifying the intent to implement RNAV 5 on 18 November 2010 according with the PBN roadmap schedule.

++ DGAC Peru and LAN validated an RNP-AR approach to Cuzco with the assistance of Naverus in May.

++ Following a successful implementation of approach procedures based on RNP APCH specification at Phuket international airport, Aeronautical Radio of Thailand (AEROTHAI) is now implementing two additional RNP APCH procedures at Samui International Airport and expects initial operation by 2009. The PBN work at Samui Airport involves cooperation among key stakeholders, including the Department of Civil Aviation of Thailand, Thai Airways, Bangkok Airways, Thai Pilot Association, and the Airport of Thailand.

++ PBN RNAV-1 SIDs and STARs have been developed by AAI-India with the assistance of Mitre for Chennai TMA, which handles the third largest number of aircraft movements in India. Procedures are currently being evaluated by users and are likely to be implemented in July/August 2009.

++ IATA launched its Performance-based Navigation modular training, PBN I and PBN II. The units are designed to provide PBN training from a general understanding of concepts up to procedures design capability. The training includes learning about PBN documentation, technology, certification, issuance of approvals, and procedure design.

++ The Ministry of Transport and Communications of Mozambique awarded a contract to IATA to perform WGS-84 surveying, procedure design, flight validation and procedure charting at eight Mozambican aerodromes; Pemba, Lichinga, Nampula, Quelimane, Tete, Chimoio, Vilanculos, and Inhambane. RNP APCH and basic RNP 1 were selected as the navigation specification. All procedures have been successfully flight validated and should be published by early summer.

++ LFV, the Swedish ANSP, has contracted with Naverus to complete an analysis of its airspace. The National Airspace Assessment, expected to be completed in June, will provide a roadmap for implementing PBN procedures at 14 Swedish airports.

Send your News Briefs to: PBNnewsletter@icao.int