Recommendation for Prioritization of PBN Procedures

A Report of the NextGen Advisory Committee in Response to Tasking from The Federal Aviation Administration

September 2013
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Background/Introduction

The number of flight (arrival, departure, and approach) procedures that the FAA has implemented and then has to track and maintain numbers in the tens of thousands. The process of implementing, tracking and maintaining is exacerbated due to the mix of “classic” and “advanced” navigation equipage on aircraft that operate at any of the 5,000 plus public airports in the National Airspace System (NAS). Mixed equipage will exist for the foreseeable future and must be effectively considered in any planning. Also with the expanded utilization of Performance Based Navigation (PBN), it is not uncommon for a single airport to have a number of procedures to each runway end. For example, The FAA Digital Terminal Procedures web site lists over 115 pages of procedures (24 pages for arrivals, 63 for approaches and 29 for departures) for Hartsfield-Jackson Atlanta International Airport.

With this daunting number of existing procedures, and with the growing number of new ones requested to take advantage of aircraft equipage and new types of procedures, FAA Order 8260.43B Flight Procedures Management Program established the Regional Airspace and Procedures Team (RAPT) process. This order:

a. Describes how to request the development, amendment or cancellation of an Instrument Flight Procedure.
b. Defines the Federal Aviation Administration (FAA) process for coordinating, approving and prioritizing each request.
d. Addresses how the FAA ensures standard application of this guidance.

The RAPT process brought some organization to the process and incorporated a high-level three (3) tier priority scheme into the approval process. These tiers are:

a. CRITICAL - Procedures requiring amendment to correct a known flight safety deficiency, procedures based on newly installed or relocated navigational aids or airport runway addition/change and Mag Var at those locations affecting Cat II and III Instrument Landing System (ILS).
b. HIGH - Procedures at airports without existing instrument flight rules (IFR) approach, procedures providing flow improvement, more efficient routing, reduced communication, or reduced coordination or complexity, procedures that test or implement an FAA national initiative, procedural amendments or cancellations that provide substantial benefit but require minimal IFP development resources for completion.
c. Routine - All other procedures that do not provide any of the aforementioned benefits. RAPT may, on a case-by-case basis, elevate the priority of any procedure, as well as procedures developed by FAA for the Department of Defense (DOD).

NOTE: All PBN procedures are assigned prioritization level HIGH

PBN encompasses a set of enablers with a common underlying capability of constructing a flight path that is not constrained by the location of ground-based navigation aids.
Even though FAA Order 8260.43B brought some organization to the process, the current IFP request process lacks specific submission standardization and request traceability between the various RAPT teams and the requestors. This is accentuated by the fact that almost all new or revised procedure requests are classified as PBN and thus fall in the same HIGH prioritization category. Further refinement to this RAPT process, especially in the HIGH prioritization category, would enforce a single process among the various RAPT teams, including thorough evaluations, consistent approval rationalization and prioritization, traceability and documentation retention.

Just as important as priority for new and revised procedures, is the priority for the elimination of unneeded or minimally used procedures. Continued publication of unneeded procedures causes unnecessary expense for both the FAA and the user. The FAA has to maintain the procedure, including flight checks, obstacle evaluations, etc., and the user has to pay for inclusion in their aircraft navigation databases.

It is noted that automated initial screening and revised prioritization may not eliminate the need for human judgment to be applied to the screening process. Also detailed proponent input, including input from all interested parties, will be needed to provide perspective and agreement before final priority can be assigned.

**Executive Summary**

The Operational Capabilities Work Group (OCWG) found that FAA Order 8260.43B and the RAPT process, whose development was comprehensive and lengthy, has added structure and organization to the procedure request and revision prioritization process. There are however, insufficient standardized decision tools used by all the RAPT’s to ensure uniformity of the process nationwide. This process is only as good as the information provided by the proponent or FAA ATC facility and the collaborative process used in developing the new procedure or revision.

Although prioritization and development processes may seem to be two different and separate elements, the work group found they have a direct link. For example, how can the RAPT prioritize the implementation or revision if the proponent or FAA facility does not use a collaborative all-inclusive process to develop the procedure that will accomplish a specific operational goal or objective? Although the RAPT is not responsible for development of the procedure or inclusiveness of said development, these items must be known to the RAPT so that different procedures from different proponents can be prioritized.

FAA Order 8260.43B Flight Procedures Management Program and the high-level three (3) tier prioritization work of CRITICAL, HIGH, and ROUTINE works well to identify safety and critical issues, which of course warrant the highest priority. Since almost all PBN requests or revisions, which are a vast majority of the RAPT’s workload, fall into the HIGH category, further granularity is required to properly prioritize procedures within this category.

To provide this information for HIGH category granularity to the RAPT, the work group developed a two-phase checklist.
The first phase is termed as PRE-REQUISITE:
1) What is the goal or aim of the procedure being proposed or amended?
2) What metrics will be used to measure success?
3) What are the implementation hurdles?
4) Will PBN training, recommended in the NAC at their June 2013 meeting, be accomplished?
5) Does the procedure require an EIS?
6) Was the procedure developed in a collaborative process with appropriate representation of navigation equipment in simulator trials?
7) Does the procedure have controller aids, such as similar fix names to other procedures, to promote application and usage?

Note: If these and other pre-requisites are not present, they are not disqualifiers but they certainly limit the success of implementation and thus should warrant a lower the priority of implementation.

The second phase is termed as BENEFIT or ACCESS:
1) To what degree is capacity or efficiency increased?
2) Does it provide access or lower minima to a particular runway that did not have previous access?
3) How many operations are impacted by the procedure?
4) Does the procedure supply redundancy in case of a NAVAID outage?
5) Does the procedure reduce terminal or approach flight time?
6) Are conflicts between adjacent airports resolved?

Again if many of these benefits are not present, they are not disqualifiers. For example, at a general or business aviation airport, a new PBN procedure may simply provide access to an airport/Runway that did not previously exist. This may be the only benefit but it is certainly a worthy benefit that the subjective RAPT process would consider.

Almost as important as prioritizing new and revised procedures, is the elimination of unneeded PBN procedures primarily at major airports. The FAA has a program that is reviewing legacy procedure elimination but has yet to eliminate unused PBN procedures, which incur cost for both the FAA and the user. Due to variances of airport configuration, need for redundancy, changing aircraft equipage, changing controller procedures, etc., the workgroup recommends the use of a collaborative process of all parties concerned. This can be done through user groups at the FAA ATC facility level, through OAPM projects or during major airspace changes. This will ensure all aspects of the PBN procedure are reviewed and that certain procedures, though unused, are retained so as to provide redundancy in the event of an ILS or NAVAID failure.

It should be noted, that one constant theme kept appearing in the workgroup’s research: implementation of a PBN procedure is a complicated process. Notwithstanding the skill and intent of the proponent, procedures must be developed and implemented in a collaborative manner to achieve success. The recent implementation in the Denver area involved more than two (2) dozen groups and organizations. Since it is integral to success, collaboration must be a key factor in the prioritization
process and the local FAA ATC facility must be actively involved to ensure that the proper inclusion takes place.

Methodology and Structure of Analysis
The work group was comprised of a cross section of aviation expertise, from service provider, to operator, to research, to decision support tool developers.

The work group reviewed pertinent materials including:

a. FAA Order 8260.43B Flight Procedures Management Program
b. FAA NextGen Implementation plan
c. ICAO PBN Manual

The work group received FAA briefings from the following

c. Flight Standards Service, Mark Steinbicker, Manager Performance Based Flight Systems Branch, AFS-470

The work group reviewed recent PBN implementations such as Greener Skies in Seattle and the expansion of PBN procedures in the Denver Terminal area to ensure that broad scale PBN activities such as these had appropriate prioritization. Additionally the work group included members that had participated in the RAPT teams and benefitted from their experience.

Using this robust set of background materials, the OCWG collected individual member inputs and began to characterize these inputs into major benefit and implementation categories. These bins represent the primary attributes concerning implementation and utilization of PBN procedures. These categories are described in the next section, “Findings”. Following the categorization of the identified attributes, the OCWG analyzed the attributes in each category, and developed a checklist for prioritization of PBN procedures and revisions. This assessment was largely qualitative and formed by the operational expertise available from the OCWG membership.

The full roster of OCWG membership is included in Appendix 2. While the FAA did not participate in the deliberations, they provided subject matter expertise to the OCWG.

Findings
The work group found that FAA Order 8260.43B and the RAPT process, whose development was comprehensive and lengthy, has added significant structure and organization to the procedure request and revision prioritization process. Since the RAPT process is always going to be a subjective one and since allocation of resources through prioritization is a key component, the RAPT members must be
knowledgeable and receive comprehensive training. The RAPT process, however, is only as good as the information provided by the proponent and/or the local FAA ATC facility and also the collaborative process used by the FAA facility and the proponent in developing the new procedure or revision. This proponent and/or FAA ATC facility information is a key step in determining priority for implementation of new procedures and needed revisions. In addition, there are no standardized decision tools used by all the RAPT’s to ensure uniformity of the process nationwide.

Although prioritization and development processes may seem to be two different and separate elements, the work group found they had a direct link. For example, how can the RAPT prioritize the implementation or revision if the proponent does not use an all-inclusive collaborative process to accomplish a specific operational goal or objective? Although the RAPT is not responsible for development of the procedure or inclusiveness of said development, these items must be known to the RAPT so that different procedures from different proponents can be prioritized.

FAA Order 8260.43B Flight Procedures Management Program and the high-level three (3) tier prioritization work of CRITICAL, HIGH, and ROUTINE works well to identify safety and critical issues, which of course warrant the highest priority. But the fact that almost all PBN requests or revisions, which are a vast majority of the RAPT’s workload, fall into the HIGH category, further granularity is needed to properly prioritize procedures within this category.

To provide this information for HIGH category granularity to the RAPT in order to determine prioritization, the work group developed a two-phase checklist (see Appendix 3). The checklist is not meant to be a disqualifier, but a means to determine priority.

The first part of the checklist contains the list of prerequisite actions. It defines the goal or aim of the procedure being proposed and sets forth a list of best practices that will enhance the development of the procedure including the parameters on how the procedure should be developed. The second part of the checklist identifies potential benefits of capacity, efficiency or access. This checklist asks for measurements that can determine the potential benefits once the procedure has been implemented.

The checklist information, will enable the RAPT to make a more informed decision on priority. Additionally, use of a checklist by all the RAPT’s should result in more uniform decision-making. It is understood that the RAPT is not the organization determining the information. That is the proponent’s and/or FAA’s task. But the information will not only enable the RAPT to prioritize, but also evaluate and critique the proposal, which should in turn provide information for future implementations.

Almost as important as prioritizing new and revised procedures, is the elimination of PBN procedures that lack value. The FAA has a program that is reviewing legacy procedures for possible elimination, but no process is in place as of yet to eliminate unused PBN procedures. These massive inventories of procedures, many of which are unnecessary, incur costs for both the FAA and the user. Due to variances of airport configuration, need for redundancy, changing aircraft equipage, changing controller procedures, etc. there needs to be a collaborative process of all parties concerned to make these critical decisions. This can be done at the local ATC facility level, through OAPM projects or other major
airspace changes. PBN procedures can provide redundancy in the event of an ILS or NAVAID failure but multiple PBN overlays of legacy approaches to the same runway may not be needed.

**Recommendations**

Based on the analysis of the OCWG, the work group recommends that the following actions be considered:

- The FAA continue to use FAA Order 8260.43B and the RAPT as a process to evaluate and prioritize proposed procedures. However, the process needs to have a better foundation with similar data to base its decisions. Utilization of a standardized checklist that identifies best practices and requires the proponent to identify objectives and goals for the procedures is a good place to start.

- Use the 2-part checklist found in Appendix 3 as a starting point for any proposed procedure. It will aid the proponent in developing the procedure to quantify the projected benefits. This checklist should become part of the RAPT process.

- The procedures development process should be “time bound.”

Any new procedure must have a demonstrated benefit. In order to reduce costs to all stakeholders, those procedures that only provide marginal benefits should be eliminated.

- The work group recommends that a collaborative process be developed involving all concerned parties. Due to the variances of airport configuration, need for redundancy, changing aircraft equipage, and changing controller procedures, these collaborative processes should be done on a local level. For example, leveraging the workgroups involved in the OAPM process or local FAA facility stakeholder meetings would be a good place to begin this process to collaborate on identifying procedures for removal.
Appendix 1: Tasking Letter

U.S. Department of Transportation
Federal Aviation Administration

Office of the Administrator
800 Independence Ave., S.W.
Washington, D.C. 20591

September 21, 2012

Ms. Margaret Jenny
President, RTCA, Inc.
1150 18th Street NW.
Washington, DC 20036

Dear Ms. Jenny:

As you know, the predecessor of the NextGen Advisory Committee (NAC), the Air Traffic Management Advisory Committee, helped the Federal Aviation Administration (FAA) determine the criteria for our current Optimization of Airspace and Procedures in Metroplexes (OAPM) effort. As we look toward the conclusion of Round One of OAPM, the Agency would like to consider ways to build on the gains we are making through airspace and procedures. Therefore, we would like to task the NAC with addressing the following, with the suggestion that they be worked jointly by the Airspace and Procedures and the Integrated Capabilities Work Groups, to benefit from the knowledge and experience of experts from both groups.

Task 1: Obstacles to Performance Based Navigation Utilization

An internal FAA work group was commissioned to provide an overview of obstacles to Performance Based Navigation (PBN) utilization that have been encountered throughout the National Airspace System. The results were relayed in three areas: PBN accountability and responsibility; Instrument Flight Procedures design and amendments; and PBN Instrument Flight Procedures Utilization. The FAA has been aware of some of the identified issues and has been actively working at the national and local levels to resolve them. To assist in this effort, we request that the NAC:

- Examine and expand, if necessary, on the potential obstacles to PBN utilization already identified by the FAA’s internal analysis, including both technical and non-technical obstacles (e.g., training, culture, and varying business/operational models). FAA will provide information from our internal review; and

- Provide specific remedies and incremental action steps, including both technical and non-technical, the FAA can take as well as specific remedies and incremental action steps, including both technical and non-technical, for industry to take in order to relieve these obstacles in the near term.
Task 2: Input on the Criteria for Prioritizing Production of PBN Procedures

For some time, the FAA has been working diligently to produce PBN procedures. Now that we have reached a “critical mass” of published procedures, we have an opportunity to evaluate our approach to developing and managing our inventory of procedures. Our intent is to make the best use of our resources while ensuring the most effective, efficient, and useful routes and RNP procedures for both the FAA and operators. As input to this effort, the FAA would like the NAC’s recommendations on criteria for:

- prioritizing requests for new PBN procedures;
- modifying existing PBN procedures; and
- eliminating PBN procedures that do not provide measurable benefits.

Task 3: Revalidate OAPM Criteria for Future Use

The FAA would like industry’s assistance in validating criteria for selection and prioritization of OAPM sites, specifically:

- Review and revalidate the criteria used to select and prioritize the current OAPM sites. This task could result in modifications, additions, and/or deletions of the original criteria so the OAPM process continues to meet the needs for an expedited and systematic analysis of airspace and procedures in designated metropolitan areas.

The FAA will make subject matter expertise available to the NAC, but would not participate in deliberations. The FAA appreciates RTCA’s many past contributions and looks forward to a continued long and productive relationship that serves the best interests of the public. If I can be of further assistance, please contact me or our point of contact for this activity, Mr. Dennis Roberts, Director of Airspace Services, by phone at (202) 267-9205 or email at dennis.roberts@faas.gov.

Sincerely,

Michael P. Huerta
Acting Administrator

cc: Victoria Cox, Assistant Administrator, NextGen
    David Grizzle, Chief Operating Officer, Air Traffic Organization
    Elizabeth Ray, Vice-President, Mission Support Services
    Dennis Roberts, Director, Airspace Service
Appendix 2: Members of Operational Capabilities Work Group

Dan Allen, FedEx Express
Philip Basso, DoD Policy Board on Federal Aviation
Chip Beall, Delta Air Lines, Inc.
Joe Bertapelle, JetBlue Airways

Tom Bock, Port Authority of New York & New Jersey – Co-Chair
Grady Boyce, Delta Air Lines
John Brandt, The MITRE Corporation
Chris Brinton, Mosaic ATM
Lee Brown, Landrum and Brown
Steve Brown, National Business Aviation Association
Lorne Cass, Delta Air Lines, Inc.
Mark Cato, Air Line Pilots Association
Perry Clausen, Southwest Airlines
Bill Cranor, JetBlue Airways
Brad Culbertson, Lockheed Martin Corporation
Mel Davis, Federal Aviation Administration
Steve Dickson, Delta Air Lines
Sylvan Drakes, U.S. Air Force
Brett Easler, U.S. Navy
Leo Eldredge, Federal Aviation Administration
Bob Everson, Southwest Airlines
Scott Foose, Regional Airline Association
Jeff Formosa, MITRE Corporation
Rob Goldman, Delta Air Lines
Pamela Gomez, Federal Aviation Administration (Observer)
Jim Hamilton, United Parcel Service
Aslaug Haraldsdottir, The Boeing Company
Richard Heinrich, Rockwell Collins
Jens Hennig, General Aviation Manufacturers Association
Mike Hines, Metropolitan Washington Airports Authority
Mark Hopkins, Delta Air Lines
Carol Huegel, Metron Aviation
George Ingram, Airlines for America
Jennifer Iversen, RTCA
Pascal Joly, Airbus Americas
Christian Kast, United Parcel Service
Paul Kinstedt, Republic Airways Holdings
Tom Kramer, Aircraft Owners and Pilots Association
Bob Lamond, National Business Aviation Association
George Ligler, Project Management Enterprises Inc.
Angela Martin, Wood Consulting Services
David Medina, Federal Aviation Administration
Paul Meyer, Hartsfield-Jackson Atlanta International Airport
Joe Miceli, Airline Dispatchers Federation
Jeffrey Miller, International Air Transport Association
Glenn Morse, United Airlines

Bill Murphy, International Air Transport Association – Co-Chair
David Newton, Southwest Airlines
Mark O'Neil, National Air Traffic Controllers Association
Chris Oswald, Airports Council International - North America
Susan Pfingstler, International Air Transport Association
Wilson Riggan, Allied Pilots Association
David Rinehart, Sensis Corporation
Mike Sammartino, Metron Aviation
Phil Santos, Fed Ex Express
Bill Sears, Beacon for Federal Aviation Administration (Observer)
Rico Short, Beacon for Federal Aviation Administration (Observer)
Molly Smith, Federal Aviation Administration (Observer)
Joseph Spelman, The MITRE Corporation
Mark Steinbicker, Federal Aviation Administration
Chris Stephenson, National Air Traffic Controllers Association
David Strand, Strand Aviation Solutions
Chris Sutherland, Harris Corporation
Ron Thomas, US Airways
Steve Vail, Mosaic ATM
Heidi Williams, Aircraft Owners and Pilots Association
Appendix 3: Prioritization for New/Revised RAPT Category 2 (High) PBN Procedures

PRE-REQUISITE (to be completed by proponent and/or local FAA ATC facility):

List the goal or aim of the procedure being proposed and how attainment of the goal or aim achievement be measured (include current baseline for effective measurement)?

1. IMPLEMENTATION (check those that apply and complete info requested)

- [ ] What are the implementation hurdles?
- [ ] Procedure implementation has specific metrics of measurement identified to determine goals achievement
- [ ] Procedure design staff has completed PBN training (including TERPS expertise) prior to developing the proposed procedure
- [ ] Necessary controller decision support will be installed at time of procedure implementation
- [ ] Controllers will receive PBN training, including purpose/goals of the proposed procedure, prior to the time the procedure is to be implemented
- [ ] Nav data base will be made available for testing for at least 90% of the FMS box types presently serving target airport
- [ ] Implementation of procedure does not require an EIS

2. DESIGN (check those that apply and complete info requested)

- [ ] Procedure developed in a collaborative process with ATC, operators, airports and other interested parties
- [ ] Mitigates a relocated or decommissioned _________ NAVAID
- [ ] Mitigates the negative impact of airport construction ____________________________

- [ ] Number ________ of fix names of other current procedures at the same airport were utilized to the extent possible
- [ ] Procedure can be utilized in current operational environment without any additional automation or decision support
- [ ] Procedure resulted as part of the OAPM process
- [ ] Procedure provides vertical guidance where none existed to runway ________

NOTE: SAFETY is an understood priority and all applicable safety of flight procedures are in RAPT Category 1 and thus not included in this prioritization list
**BENEFIT** to be completed by proponent or local FAA ATC facility (check those that apply and complete info requested)

1. **CAPACITY**

- Number _________ of operations impacted positively by the procedure
- Increases arrival rate from ___________ to __________ per hour to the airport
- Increases departure rate from ___________ to __________ per hour to the airport
- Increase capacity of the metroplex by ___________ per hour
- Conflicts between adjacent airports/airspace resolved __________________________
- Conflicts between adjacent airports/airspace resolved __________________________ (list conflict resolved)
- Allows approach capability to Runway __________ where none existed
- Provides redundancy to Runway __________ at the airport
- Reduces current lowest approach minima by ___________ feet

2. **EFFICIENCY**

- Reduces approach flight time (after the IAF) by ___________ miles/minutes
- Reduces terminal area flight time by ___________ miles/minutes
- Reduces delays from the current level of ___________ to ______________
- Reduces operational environmental impact with more fuel efficient profiles or reduced vectoring/holding (please list)
- __________________________________________________________________________
- __________________________________________________________________________
- The need for circling procedures eliminated