



A Flight Safety Foundation report is proposing guidelines to identify IAPs that could be decommissioned. BY LINDA WERFELMAN

Shutting Down

About 800 instrument approach procedures (IAPs) to U.S. airports are underutilized or redundant and could be shut down, according to a Flight Safety Foundation report prepared at the request of the U.S. Federal Aviation Administration (FAA).¹

The FAA's National Aeronautical Navigation Services (AeroNav Services) currently maintains about 17,000 IAPs (Tables 1 and 2, p. 37 and 38). The number is growing because of the ongoing transition from a ground-based navigation system to a satellite-based system — part of the FAA's air traffic control (ATC) modernization effort known as the Next Generation Air Transportation System, or NextGen.

Eventually, all aircraft will fly satellite-based approaches — including global positioning system (GPS) and area navigation (RNAV) approaches — but until the aircraft are appropriately equipped, older “legacy” navigation aids will continue to function and to serve as backups if GPS becomes unavailable because of interference.²

“With so many IAPs published, the FAA has expressed a desire to reduce a number of IAPs that are believed to be underutilized or redundant in nature,” the Foundation's report said. “The FAA wants to invest its limited resources in the most beneficial IAPs, based on ... RNAV and required navigation performance (RNP). By reducing the number of redundant or underutilized

J.A. Donoghue

approaches, the FAA can apply the cost savings toward the further expansion of RNAV and RNP throughout the NAS [National Airspace System].”

Retention Plans

The FAA’s plans call for retention of a distance measuring equipment (DME) network to provide “a redundant RNAV capability for en route airspace above Flight Level (FL) 180” — approximately 18,000 ft, the report said.

A “reduced network” of VHF omnidirectional radios (VORs) will be maintained for backup use in low-altitude en route airspace and in IAPs. In addition, at least one instrument landing system (ILS) approach will be retained at airports currently served by ILS approaches, “unless the ILS is not necessary as part of the backup service” and unless current use is not sufficient to justify continuation of the ILS approach, the report said, noting that these steps are intended to “reduce the threat to air transportation from disruption of GPS services in today’s operational environment.”

NextGen Progress

One measure of progress in the transition to NextGen is the number of aircraft with the avionics required to fly GPS IAPs. The Foundation estimates that, of 9,977 jet air carrier aircraft in the

United States in 2009, more than 7,500 were equipped for LNAV (lateral navigation), LNAV/VNAV (lateral navigation/vertical navigation) or LPV (localizer performance with vertical guidance).

The Foundation’s report also said that, of 202,101 general aviation aircraft in the United States, 75,730 had “approach-capable IFR [instrument flight rules] GPS equipage.”

“The [equipment] estimates indicate that the majority of aircraft operators are utilizing ILS for precision approaches and some type of RNAV procedure for nonprecision approaches (RNAV and/or RNP),” the report said.

In meetings with representatives of airspace user organizations,³ “it became immediately clear that RNAV/RNP is a mainstay for many operators and that NDB [nondirectional beacon] approaches are no longer desired, except when no other option is available,” the report said. None of the organizations opposed an FAA proposal to eliminate “all but a small number of NDBs.”

The airspace user groups voiced concerns, however, about the extent to which VORs — especially regularly used VORs — would be included in any shutdown of IAPs.

Feedback received from the user groups indicated that the FAA could “expect to reduce the number of IAPs by at least 800, provided that the airspace users respond as favorably to the FAA proposal as they did to the initial survey,” the report said. “This would represent a 12 percent reduction in ground-based IAPs and a 4 percent reduction in the FAA’s total IAP inventory of public procedures.”

Identifying and Canceling IAPs

The Foundation’s recommended process for identifying and canceling IAPs resembles the processes used by the FAA in the past but calls for improved coordination with ATC facilities and other government agencies.

Proposing a list of IAPs for shutdown could take 60 to 90 days, the Foundation said, noting that after the list has been compiled, the FAA should schedule a 30-day comment period to receive feedback from associated ATC facilities and the Department of Defense. Then the list should be published for public comment; after a review of these comments, the FAA should develop its response and, if necessary, schedule discussions with some of those who submitted comments. After that, the FAA should finalize the list, explain the decision in writing to each commenter and set dates for the shutdowns, the Foundation’s report said.

FAA Satellite-Based Instrument Approach Procedures*

Procedure Type	Number of Procedures
GPS stand-alone	425
RNAV (LNAV minimums)	4,909
RNAV (VNAV minimums)	2,280
RNAV (LPV minimums)	2,329
RNAV (RNP minimums)	237
RNAV (RNP specials)	7
Total	10,187

*as of Sept. 23, 2010

GPS=global positioning system; LNAV=lateral navigation; LPV=localizer performance with vertical guidance; RNAV=area navigation; RNP=required navigation performance; VNAV=vertical navigation

Source: U.S. Federal Aviation Administration, Flight Safety Foundation

Table 1

FAA Ground-Based Instrument Approach Procedures*

Procedure Type	Number of Procedures
ILS	1,339
ILS (Category II)	170
ILS (Category III)	121
ILS PRM	44
MLS	0
LOC	1,427
LOC (back course)	81
NDB	953
TACAN	32
VOR	1,366
VOR/DME	969
VOR/DME RNAV	33
LDA	33
LDA PRM	4
PAR	8
ASR	242
SDF	11
Total	6,838

*as of Sept. 23, 2010

ASR=airport surveillance radar; DME=distance measuring equipment; ILS=instrument landing system; LDA=localizer type directional aid; LOC=localizer; MLS=microwave landing system; NDB=nondirectional beacon; PAR=precision approach radar; PRM=precision runway monitor; RNAV=area navigation; SDF=simplified directional facility; TACAN=tactical air navigation; VOR=very high frequency omnidirectional radio

Source: U.S. Federal Aviation Administration, Flight Safety Foundation

Table 2

RNAV IAPs, the agency should conduct a thorough analysis, the Foundation said.

The report said that the analysis should include a review of all IAPs at the airports where approaches were designated to be shut down “to more fully evaluate the potential impact. The Foundation recommends reviewing the airports to ensure that other RNAV and ground-based IAPs with lower minimums are available to the same runway ends, and recommends that the FAA coordinate with DOD [U.S. Department of Defense] officials.”

The report also said that the FAA’s analysis should determine if NDB approaches are being used by flight schools that train student pilots who

The document called for “an aggressive cancellation strategy that eliminates the approaches within two 56-day update cycles” — a reference to the frequency with which the government publishes IAP charts and related information.

The Foundation recommended a two-phase effort for eliminating the selected IAPs, with the first phase for NDB and VOR/DME RNAV procedures, and the second phase to “deal with a set of underutilized or redundant VOR procedures.”

Both phases could be completed in 12 to 18 months, the report said.

Phase 1

Before the FAA publishes its proposal to cancel nearly all NDB and VOR/DME

will work in countries where NDBs are still crucial in instrument navigation. In those cases, the NDBs should not be decommissioned, the report said.

In addition, the report said, “The FAA should ensure that any airport that currently is served by VOR/DME RNAV procedures also has another ground-based IAP, as well as another RNAV-based IAP. The VOR/DME RNAV IAP should be retained only if it is the only approach to the airport.”

Phase 2

The second phase of the IAP decommissioning initiative calls for identifying airports with VOR approaches and approaches with circling minimums that are candidates for elimination.

“Nearly all [airspace user groups] agreed that they are willing to consider a reduction in IAPs with circling minimums, especially if all runways are served with a straight-in IAP,” the report said.

The report described several conditions that the Foundation said should rule out shutting down a specific airport’s IAP:

- All approaches at the airport are RNAV/RNP IAPs;
- The airport has only one VOR or ILS approach;
- The airport has only one ground-based IAP in addition to an RNAV IAP; or,
- FAA AeroNav Services has identified the airport as needing VOR approaches in case of GPS interference.

A separate set of conditions will be applied to other airports to designate their VOR and/or circling minimums IAPs for cancellation if the airport meets the following criteria:

- It is one of the 100 busiest airline airports;
- It has approaches that involve a VOR that is scheduled for decommissioning within the next three fiscal years;
- It has an NDB IAP or a VOR/DME RNAV IAP;
- It has two or more VOR IAPs in addition to RNAV IAPs; or,

- It has an ILS and a VOR IAP, in addition to more than one RNAV IAP.

After these two reviews have been conducted, selected airports — each with multiple ground-based IAPs — will be evaluated individually.

“At this point,” the report said, “the process will become much more detailed, and an airport-by-airport review will be required to apply the criteria and considerations provided by the airspace users during the Foundation’s interviews.”

Among those considerations — according to the operators who were interviewed as part of the Foundation’s study — is the need to “align any efforts associated with VOR disestablishment with efforts to identify and eliminate redundant or underutilized VOR approaches.”

The FAA should examine underutilized VOR IAPs at the 100 busiest airline airports while also evaluating the entire group of nonprecision IAPs at these sites, the operators said, adding that the agency should consider not only IAP utilization data but also the broader impact on the airports of shutting down a VOR approach.

At other airports with multiple approaches that might be eliminated, the operators said, “don’t eliminate too many approaches per reduction cycle.”

Other criteria recommended by the operators included:

- “If there are RNAV procedures to both ends of the runway, and if there is an ILS and a VOR approach to the same runway and a VOR only on the opposite-direction runway, propose eliminating the VOR that is serving the same runway end as the ILS”;
- “If there are multiple VOR approaches that are eligible for removal from an airline airport,

consider retaining VOR/DME IAPs ... because they often deliver the lowest minimums”; and,

- “If there are multiple VOR approaches that are eligible for removal from a non-airline airport, consider eliminating the VOR/DME IAP and retaining the VOR IAP because the majority of non-airline aircraft do not carry a stand-alone DME. Most general aviation aircraft rely on GPS as their source of DME.”

Circling minimums could be removed if there are RNAV IAPs to each runway end and if multiple ground-based IAPs also are available, the operators said.

They also said that eventual decisions on decommissioning IAPs should take into account how often the approaches are used in instrument meteorological conditions.

“Those interviewed remain supportive of RNAV, and they generally support the FAA’s efforts to utilize RNAV more and nonprecision ground-based navigation approaches less,” the Foundation said.

‘Focus on RNAV’

The Foundation’s recommendations emphasized the need for the FAA to “focus on RNAV everywhere” to aid in the move away from ground-based navigation.

“The Foundation recommends that the FAA establish and publish a policy that informs operators that ATC operations in the United States are now RNAV-based,” the report said. “That is, RNAV operations are the normal method of operating, and operations utilizing ground-based navigation aids (while still supported), are not the normal method of operating in the NAS.”

Another recommendation asked the FAA to publish RNAV IAPs at all airports that have ground-based procedures

The FAA will evaluate a number of instrument approach procedures, including some based on NDBs, top photo, and VORs, to determine whether they should be eliminated.



Photos: © Brazil Air Traffic Control

to “ensure that no airport has a ground-based procedure as the only option.”

All GPS overlay procedures — procedures in which pilots are authorized to use GPS avionics while flying specified nonprecision IAPs — should be eliminated, the Foundation said, and all GPS and RNAV IAPs should become stand-alone IAPs.

“If special conditions exist that would result in higher minimums for a stand-alone GPS, the FAA should develop strategies to ensure that a new RNAV approach has minimums that are equal to, or better than, the ground-based navigation approach,” the report said.

The FAA also should increase the use of IAPs that include VNAV, the report said, noting that Foundation data have shown “a dramatic increase in risk of accidents by turbine-powered

aircraft when the use of vertical guidance is not available on IAPs.”

Low-altitude “V” airways and high-altitude “J” airways also should be eliminated, the report said. “Because the majority of active IFR aircraft are equipped with RNAV, the FAA could normalize non-airway-based routing capability” — one of the more significant changes accompanying the transition to satellite navigation.

Steps also should be taken to ensure that “city-pair RNAV routings are shorter than ‘V’ and ‘J’ airway-based city-pair routings,” the report said.

In addition, the report said, the FAA should consider a requirement that, if an aircraft is equipped with a wide area augmentation system (WAAS) receiver for any aviation application, the receiver must also be used for navigation.⁴

Notes

1. Flight Safety Foundation. *A Recommended Process: Safely Reducing Redundant or Underutilized Instrument Approach Procedures*. FAA Grant No. 2010G023. A special report prepared at the request of the FAA. March 2011.
2. GPS interference is being addressed through the continuing development of spectrum diversity and improved anti-jamming capabilities.
3. The organizations were the Aircraft Owners and Pilots Association; Air Line Pilots Association, International; Air Transport Association; National Business Aviation Association; Regional Airline Association; and U.S. Air Force.
4. The WAAS provides pilots with guidance for both vertical and horizontal navigation throughout all phases of flight. It works with GPS to enhance the accuracy of GPS position information.

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