NAC Task 23-2: NAS Airspace Efficiencies

Lee Brown (JetBlue Airways) & **Ron Renk** (United Airlines)

Chris Southerland (FAA)

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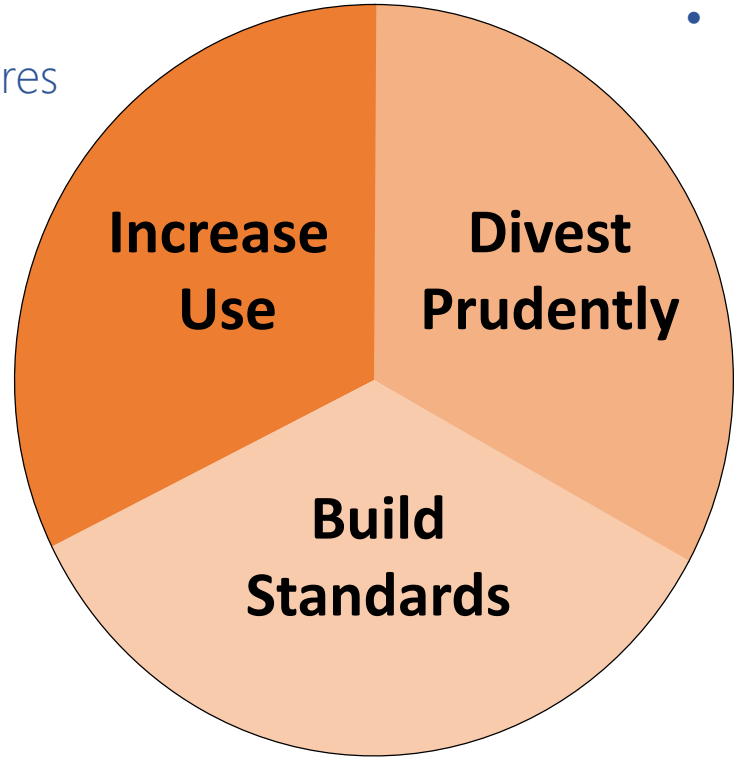
5. Identify a recommended baseline PBN and non-PBN IFP infrastructure to provide the minimum service level and airport access for both non-Global Positioning System/Area Navigation equipped aircraft and aircraft with advanced avionics for each Navigation Services Group Airport Category (1-5).
6. Identify any trends in IFP/SID/STAR inventory suggestions that might be used as a national standard.
7. Explore opportunities for even greater efficiencies with the use of Advanced Required Navigation Performance (A-RNP) as is being pursued by the Performance Based Operations Aviation Rulemaking Committee.
8. Work with the NAC Subcommittee Minimum Capabilities List (MCL) Team to capitalize on any cross- cutting issues that might support both taskings and industry achieving MCL-level of equipage.

NAS Airspace Efficiencies

- Increase utilization of existing PBN procedures
- Modify existing PBN procedures
- Capitalize on any cross- cutting issues with MCL



- Leverage avionics so FAA can divest from legacy NAS elements
  - Remove existing and infrequently used procedures

- Baseline minimum service level
- Identify trends that support national standards
- Consider efficiencies with the use A-RNP

Methodology

- Clarified scope and task expectations
- Conducted data gathering and background briefings
  - Obtained briefings from the FAA on past and present divestiture efforts, including NPA Review, IFP Streamlining, ILS Rationalization
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- Extrapolated Minimum Service Level definitions from 2016 NAS Nav Strategy
- Applied criteria/definitions to series of site-specific case studies
- Identified three prong approach to improving utilization
  - Highlighted utilization barriers and proposed mitigation
  - Collaborated with FAA on EoR expansion
  - Drafted measurement and reporting proposal
- Addressed NAC-level questions on equipage and investment

Promoting Utilization - Addressing Barriers

- Leadership advocacy
  - Biggest barrier is culture
  - Need FAA Air Traffic advocacy for facilities and controllers
  - Need airline/operator advocacy to pilots to request/accept PBN approaches
  - Need to promote value of these approaches to airport authorities
    - Trades (ACI-NA, AAAE) and individual airports (LAX, DEN)
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- Operational supporters
  - Grass roots support - cross-coordination at local level
- Lessons learned - highlight sites with high usage
  - Review high-usage site characteristics, determine what can be replicated
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Measuring and Reporting RNP Utilization

- "Measurement is the first step that leads… eventually to improvement"
- Build awareness at appropriate advocacy levels through measurement
  - Where do we have opportunity – clearly identify when RNP procedures are being used (i.e., turns vs. straight-in)
  - Where do we have equipage – aircraft equipped/trained for RNP
  - Where do we have advocacy – carriers and facilities that have interest to encourage utilization
- Objective is to understand what is/is not used and why
- Tying utilization to realized impacts
  - Utilization can translate to distance and time
  - Can help support sustainability objectives
- Data comparison and cross validation
  - IOAA and operator specific data

Proposed Sites for Measurement and Reporting

Service Area	Airport	Equipped	RF Legs
East	BNA – Nashville International	~52%	Yes
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	MCI – Kansas City International	~70%	Yes
	MSP – Minneapolis-St. Paul International	~73%	Yes
West	LAS – Las Vegas/McCarran International	~62%	Yes
	PDX – Portland International	~54%	Yes
	SMF – Sacramento International	~71%	Yes

Continue reporting on EoR sites (DEN, LAX, IAH), with broader operational metrics
Potential based on pending procedures – MCO, PHX, SLC

Recommendations for Tasking Elements 1/4/8

- Addressing barriers:
  - Develop and execute CRDA (or subsequent tool) roll-out with action team
  - Standardize ATIS communication
  - Conduct detailed analysis of request/acceptance/denial of PBN/RNP approaches (vs. ILS) using voice data; use results to inform guidance
  - Develop leader advocacy statements
- Measuring, reporting, improving:
  - Agree on trial sites – at least one per service area
  - Develop prototype utilization report, including validating metrics and data to be used in reporting
  - Begin regular reporting and discussion during future NAC SC and NAC meetings
  - Based on review and discussion, set goals and actions plans
- Providing benefits - expanding EoR:
  - FAA and operational stakeholders work collaboratively on EoR expansion
  - FAA continue to explore opportunities to lower the barriers to entry for EoR (i.e., lower navigation standard)
  - FAA and operators begin work on procedure modification to minimize lead time to capability implementation
  - FAA expand list of potential airports to include JFK, SEA, SDF

Questions/Criteria for Inventory Planning

Basic IFP Inventory Overview
Operator Mix
Fleet Mix (Aircraft Types/Fixed Wing/Helo/etc.)
Military Presence (Type of Operations, Fleet Mix, etc.)
Equipage Levels
Runway Configuration/Airport Layout
Common Weather Patterns (Fog, Low Vis, etc.)
General Airport Operations/Business/Mission
Flight Training
Terrain Constraints/Obstacle Constraints
Operation Peaking/Limitations Due to Throughput
Airspace Constraints
Airport Lighting Consideration
Noise Constraints/Environmental Review Currently Underway

Special Events Held At/Near Airport
Airport Planned Changes (New Runways, Construction, Closed Areas)
Contingency Procedures (ATC Assigned Only)
Airport Access
Circling Approaches
Recent Divesture Activities
Recent Airspace Modernization Activities
Operational Trial Activities/Potential Activities
Procedure Connectivity
Operator-Requested Approaches
ATC Resources
Controller Tools Available
Redundant Procedures
Procedure Usability

Other Divestiture and MSL Considerations

- Considering inventory of RNAV (GPS) procedures
  - Understanding that written tasking targets legacy nav systems, NAC leaders have emphasized closer look at underutilized procedures
  - Over a period of approximately 10 years, the FAA was required to develop and implement several hundred RNAV (GPS) approaches a year
  - Many of these procedures were overlays of conventional approaches and offered no reduction in minima or track distance savings
    - Additional inventory can hinder operational transition

- Divestment and MSL are inter-related topics
  - Team findings (through case studies) emphasized airport specifics producing two similar perspectives:
    - "Do not go below" baseline definition (safety net for divestiture)
    - Foundational building blocks – standard starting point by NSG level

Recommendations for Tasking Elements 2/3/5/6/7

- Integrate "Questions/Criteria for Inventory Divestment and Planning" into FAA IFP divestiture efforts
- Account for resiliency and continuity of operations (i.e., PARC GPS Disruption Action Team recommendations, June 2024)
- ILS Rationalization should be collaborative with operational stakeholders and should consider all appropriate candidate airports
- Limited value and underutilized RNAV (GPS) approaches could be considered for divestiture

- Stay connected to PARC activities on A-RNP (currently paused awaiting use/business case given changes in standards)
- Continue to review and update NAS Nav Strategy and NSG levels
- Refine definition of resilient NAS and append findings to NAS Nav Strategy

Additional NAC Questions - Costs Associated with Procedures

- FAA cost information for procedure maintenance
  - $3.5K-$5K per procedure a year
  - Flight check more complex for ground-based systems
  - Other potential costs – training, ops transitions
- FAA costs for ground systems
  - $10K to over $100K for maintenance annually (depending on system)
  - New system costs can be order of magnitude more
- Operator costs
  - Navigation Database/IAP Charting maintenance: anecdotally $10K-$15K/month – this cost would not necessarily go down with fewer procedures
  - Equipage costs – new, retro-fit, maintenance
  - Lost opportunities have cost/negative value
  - Other costs include recurrent training

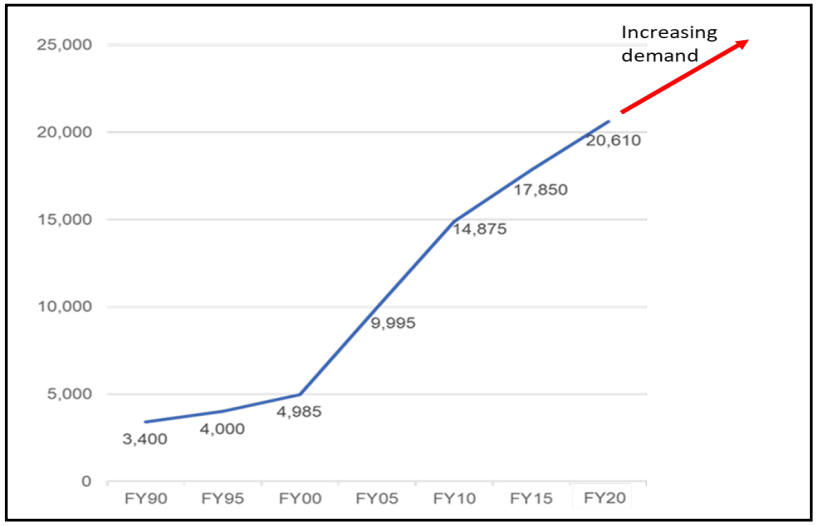
Closing and Thoughts for Next Steps

- Request NAC approval on current task outcomes…
  - Alignment on how to increase use and value from current inventory
  - Set of questions/criteria that should be considered in procedure inventory divestment and planning
  - Reinforced support for strategy-level guidance on service levels and identified critical guiding principles

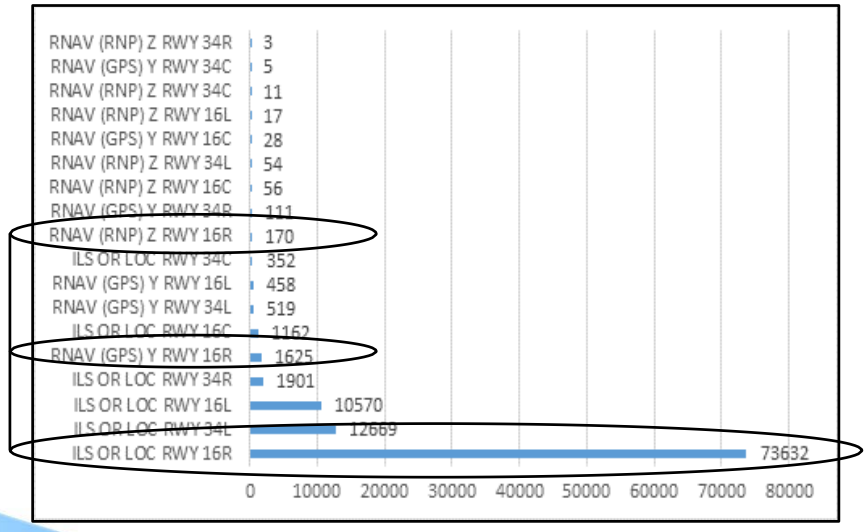
- Request NAC support to refine findings and build on recommendations…
  - Planning criteria can be used to fortify team's findings on MSL
    - Use planning criteria to look at a set of airports
    - Illustrates MSL at an airport-level
    - Opportunity to flesh out and test assumptions
    - Build stronger guidance
  - Opportunity to address in the future to solidify direction on MSL

Full Report Out Details

Motivation



Modernizing the airspace has increased the number of published procedures – increasing resources needed to develop and maintain this national inventory…



However, FAA analysis of procedure usage shows preference for conventional procedures.

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*Original tasking letter January 2023, extension October 2023

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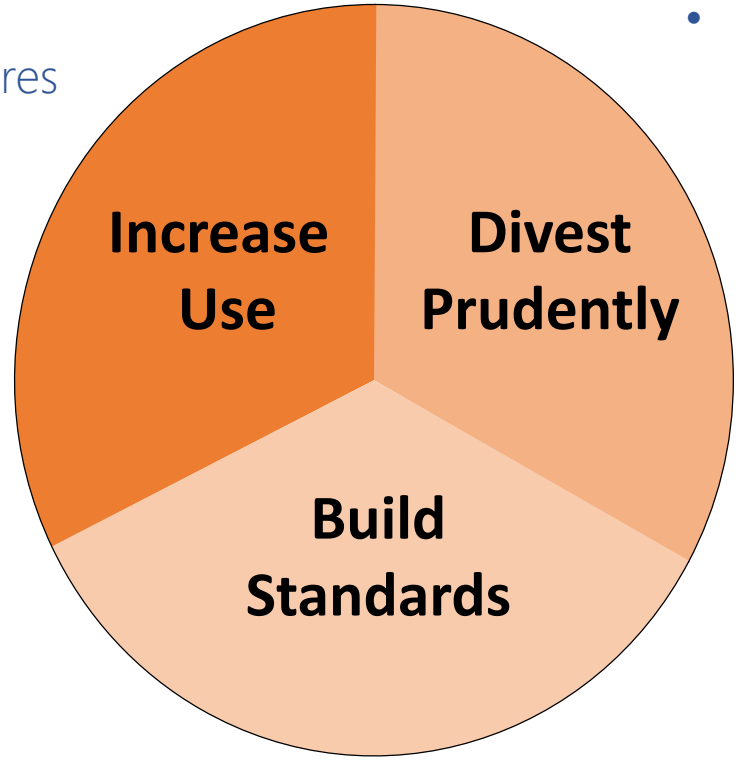

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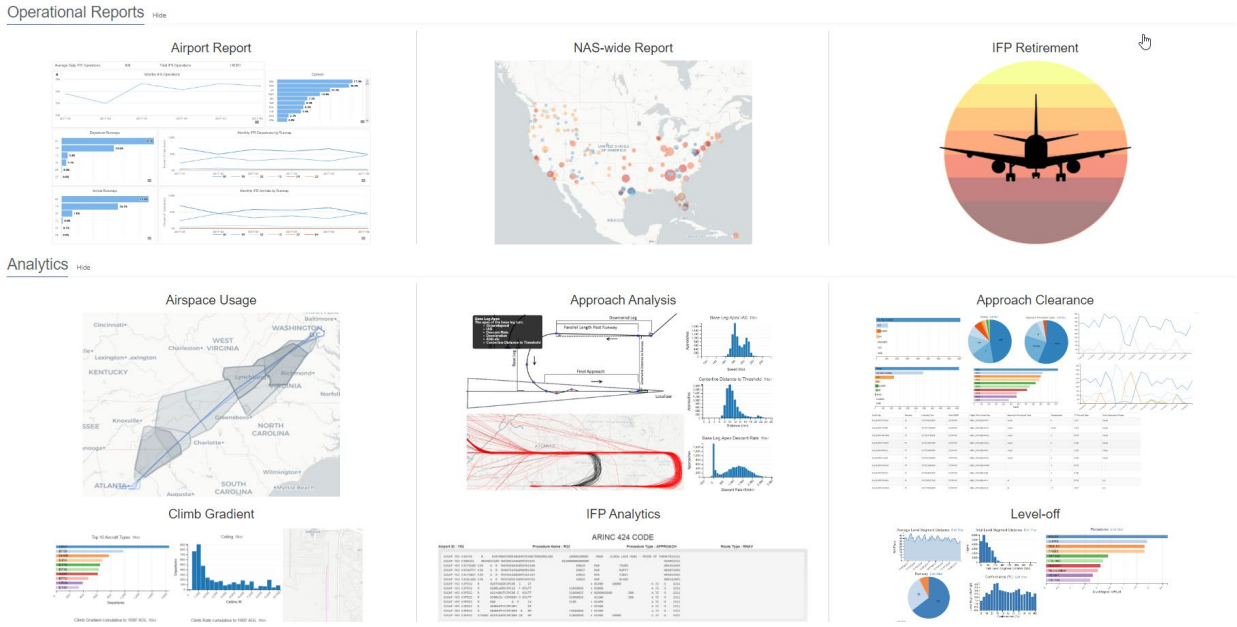
Airport Case Studies

	Initial FLL	NSG 1 DEN	NSG 3-4 HUT/PVD	Military HNL	Multiple Airports NY/PHL Metro*
Busy airspace?	X	X			X
Diversity of operators?	X	X	X	X	X
Redundant procedures?	X	X			
Limited inventory?					X
More than one airport?					X

*JFK, LGA, EWR, TEB, HPN, MMU, SWF, FRG, ISP, PHL, PNE

IFP, Operations, and Airspace Analytics (IOAA) Tool

Web-based tool that provides rapid access to aggregated operational metrics and underlying flight-level datasets, interactive plots and data for customized analysis, and track and instrument flight procedure (IFP) visualization capabilities.



MITRE CAASD developed the IOAA Tool to assist the FAA in data-driven operational analysis of airport operations, equipage IFPs and utilization, aircraft performance, and weather conditions; and operational or safety issues related to implementation and use of IFPs.

Background on Inventory, Use and Equipage

Procedure Inventory

Approaches

NSG	Airport Count	NDB	LOC	VOR	ILS	ILS CAT II/III	RNAV (GPS)	RNP	Other IAP
1	15	0	1	5	177	74	139	62	32
2	59	2	16	33	293	97	304	201	32
3	316	23	54	326	482	59	971	132	91
4	532	37	75	280	359	6	1,305	18	35
5	2,345	92	71	468	158	0	3,425	5	38
6	1,943	32	7	141	232	9	728	11	357
		186	224	1,253	1,701	245	6,872	429	585

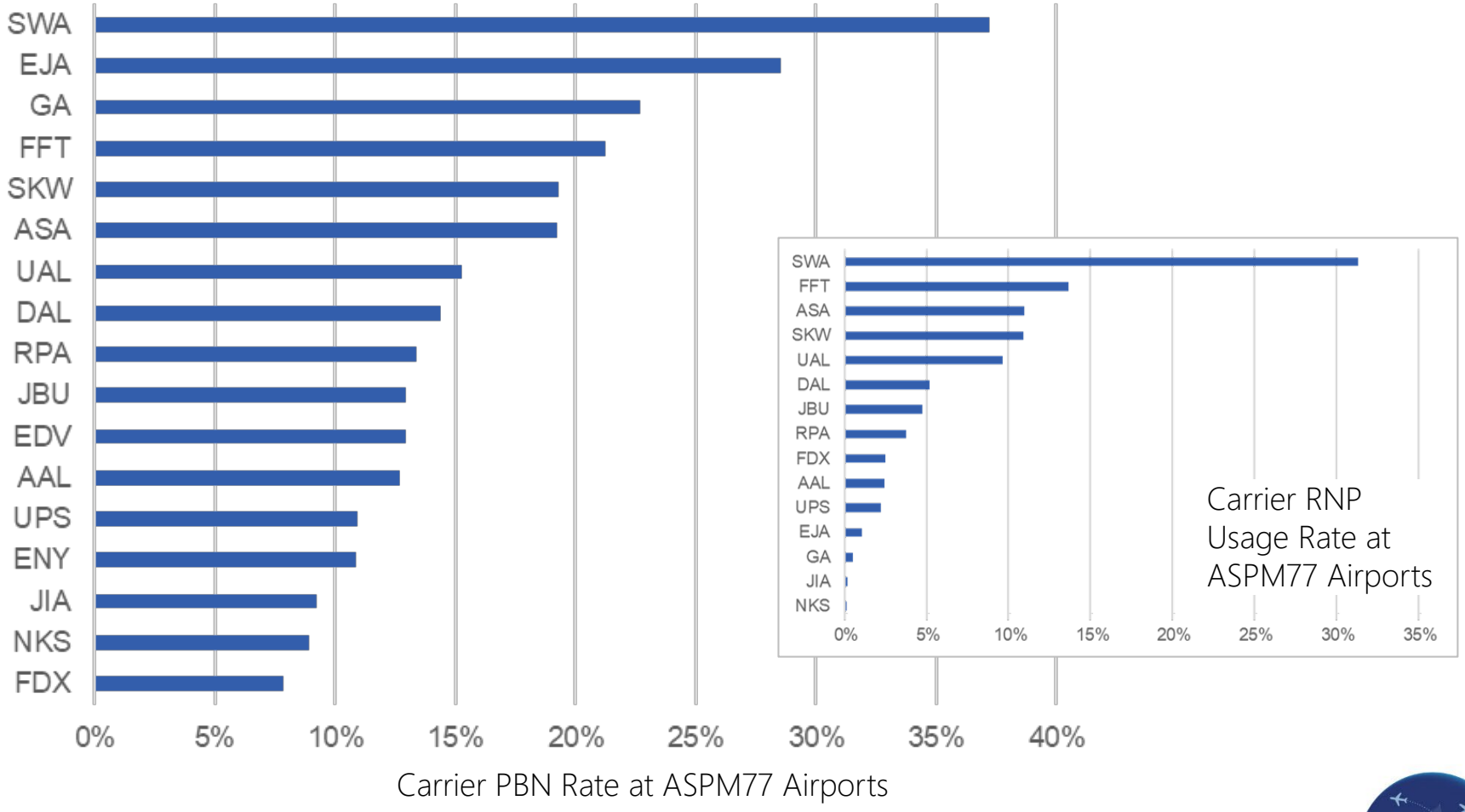
Arrivals/ Departures

	RNAV	CONV
SID	567	479
STAR	454	246

Notes:
- Source: IOAA
- Values count procedures, not lines of minima.
- LOC is LOC only, LOC/DME, and LOC BC (no ILS); ILS includes ILS or LOC and ILS PRM; Other IAPs include TACANs, Visuals, LDA, PRM, Copters, etc.

Summary of PBN Approach Usage – by Operator

PBN clearances as a percentage of all IAP clearances: May 2023-April 2024



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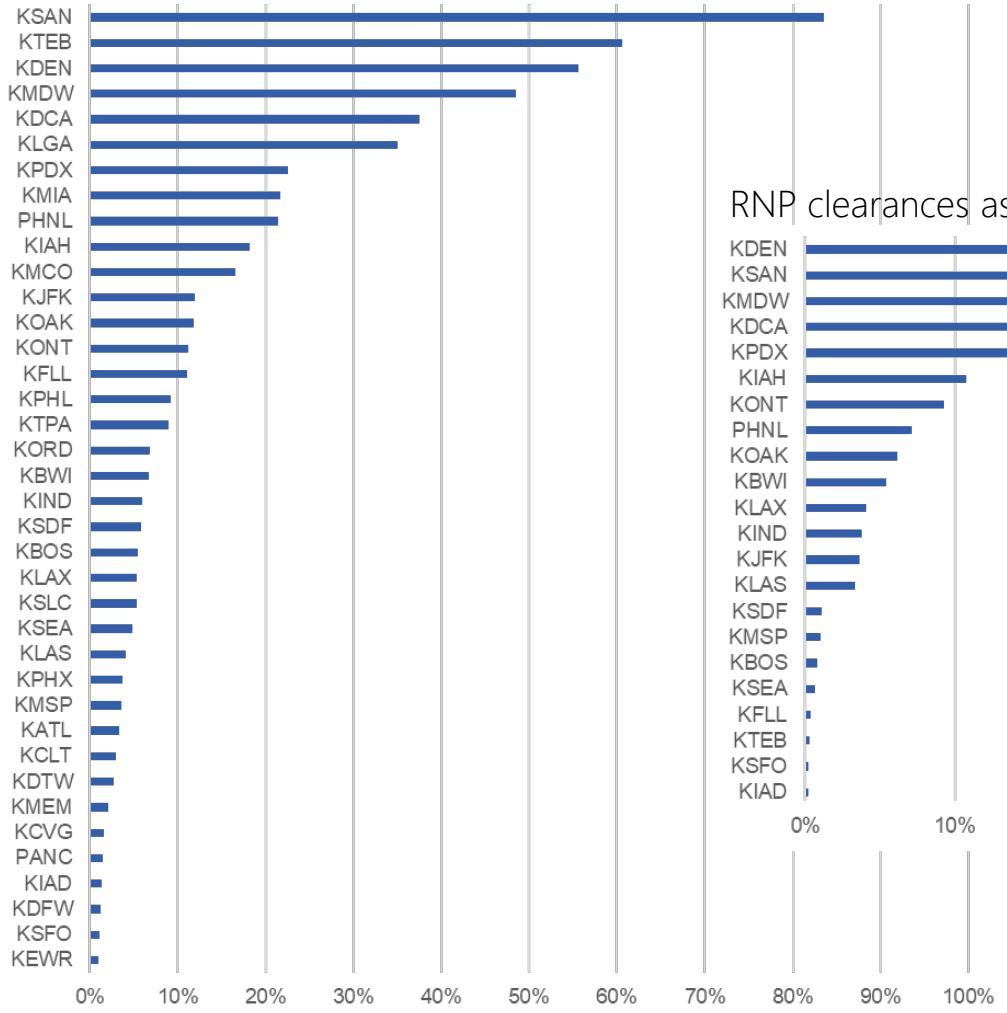
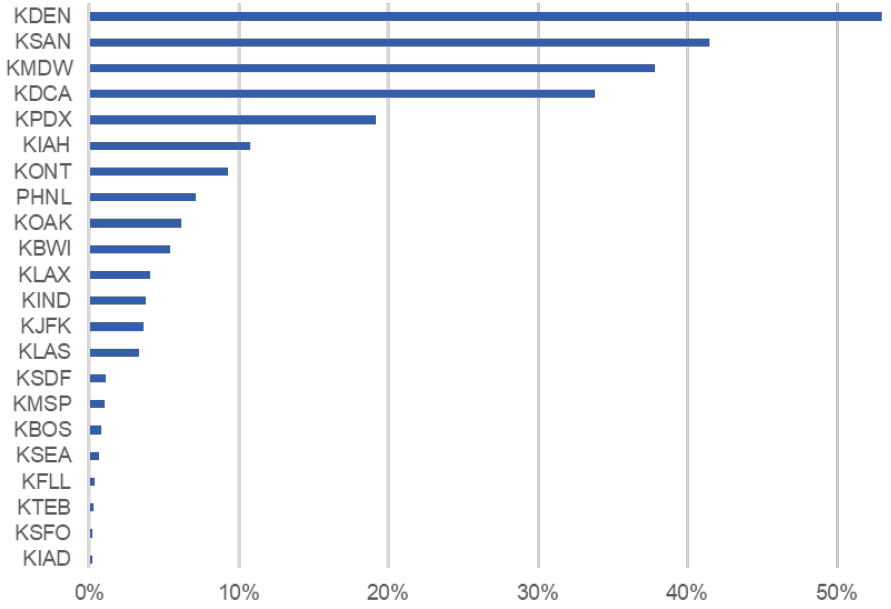


RNP clearances as a percentage of all IAP clearances



Focus 40 PBN Approach Usage

Source: IOAA

RNP AR Operator Authorization (August 2024)

Fully Authorized *(all aircraft)*

- Alaska
- American
- Frontier
- Horizon
- JetBlue
- Republic
- Southwest
- United

Partially Authorized

Airline	Authorized	Not Authorized
Delta	ALL except:	A330-200/300 (Early 2025 Authorized) B712
FedEx	B757/B767 B777	A300 MD11 (Early 2025 Authorized)
SkyWest	ERJ-175	CRJ-2/7/9
UPS	B757/B767 MD11/A300	B747 (Mid 2025)
Air Canada	All except:	A319/A320/A321/A330
Executive Jet	CL35, CL60, GL5T, GL7T, GLEX, C68A	Comprises 58% of the Fleet Query Pilots for Authorization
Business Fleet	Some Authorized	Query Pilots

Not Authorized *(all aircraft)*

- Air Shuttle Mesa
- Air Wisconsin
- Allegiant
- CommutAir
- Endeavor
- Envoy
- GoJet
- Hawaiian
- Piedmont
- PSA
- Spirit Air

Findings and Recommendations

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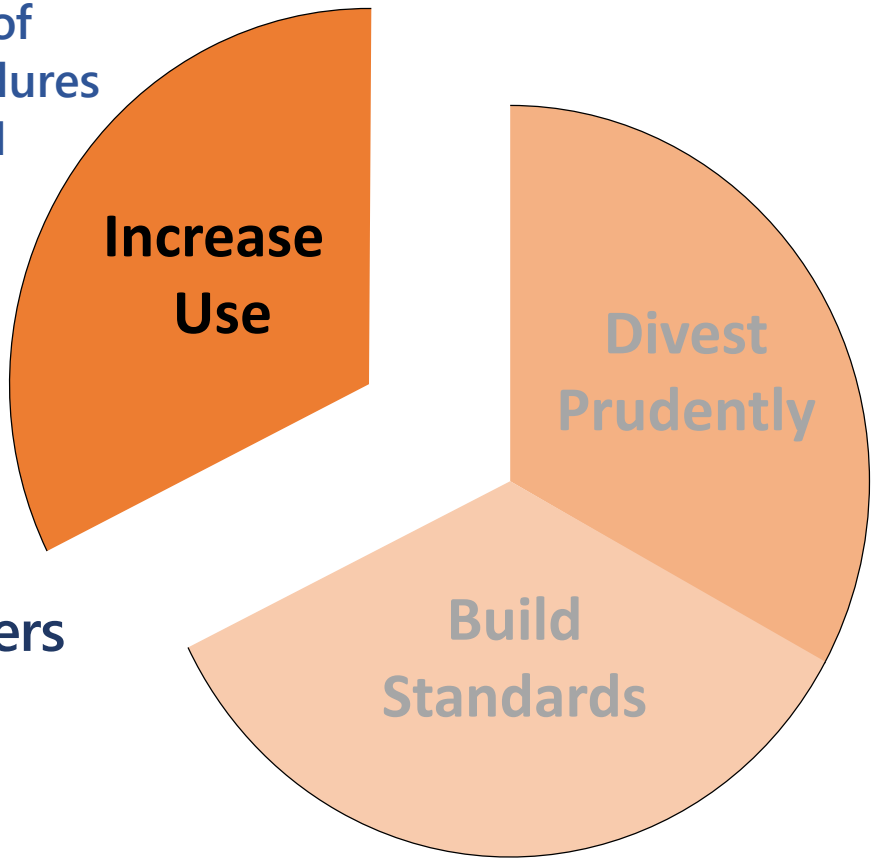

- Addressing barriers
- Measuring, reporting, and improving
- Providing benefits

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Potential based on pending procedures – MCO, PHX, SLC

Providing Benefits – EoR Expansion Example

- Early in 2024, the FAA Air Traffic Organization shared that it would be exploring expansion of Established on RNP (EoR*)
- Summary of feedback from discussions with operators:
  - Operators would like to be part of the planning visits; can provide sim visits for facilities and act as "go-to" POC for any questions about operator readiness
  - FAA using "readiness" as primary criteria for new site evaluation; need to include overall value assessment as part of decision making
    - Throughput will continue to be primary operational driver for many airports, especially those in the Focus 40 list
    - Value assessment should be based on current and projected operational needs
    - Need to engage operators in value assessments
  - There were other sites that the group would like included for consideration

*EoR is not an equipage level; it is a separation standard

Recommendations for Tasking Elements 1/4/8

- Addressing barriers:
  - Develop and execute CRDA (or subsequent tool) roll-out with action team
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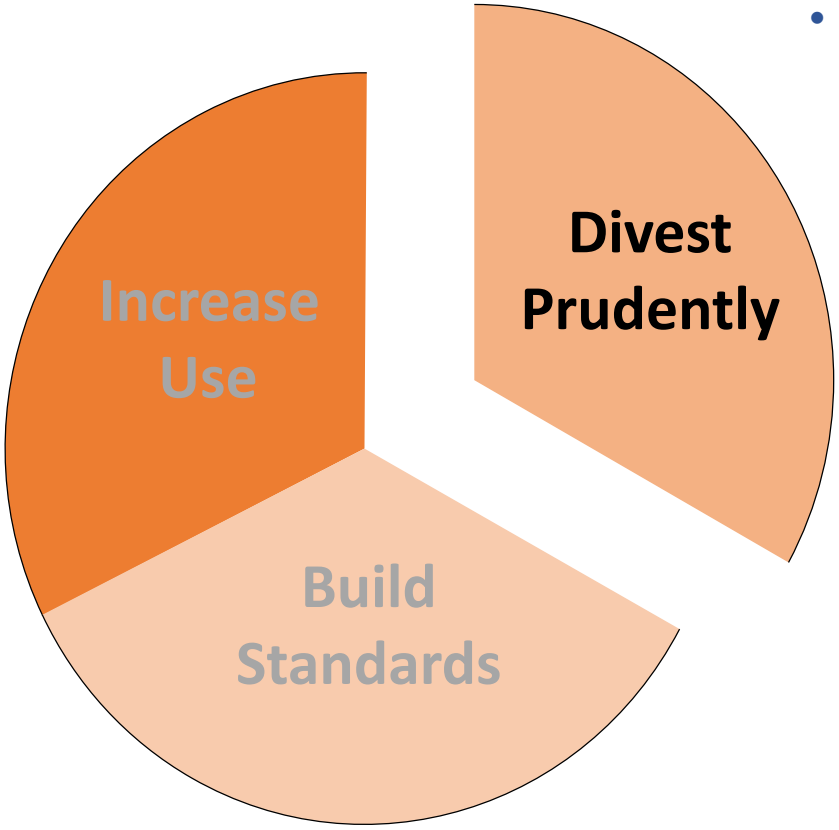

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- Operational continuity as foundation
- Operational integrity focus
- Procedure utilization to inform

Questions/Criteria for Inventory Planning

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Resiliency/Operational Contingency Considerations

In July 2024, the FAA Performance Based Operations Aviation Rulemaking Committee (PARC) GPS Disruption Action Team (GDAT) provided its final report. The report concluded that:

- NAS wide operations are heavily dependent on GPS/SBAS support for all forms of PBN procedures (RNP, GLS, LPV)
- GPS, as a spaced based navigation system, is very susceptible to interference (jamming or spoofing)
  - Jamming – overpower the GPS signal with interference such that the receiver cannot process the signal for use by the FMS
  - Spoofing – Create a false GPS/GNSS signal that can cause the receiver to provide an incorrect position to the FMS
- Many part 25 aircraft (Boeing & Airbus) integrate GPS receiver output with other sensors (Inertial platforms, DME, VOR, and LOC) to allow for RNAV 1,2 operations with the loss of GPS position inputs due to spoofing or jamming.
  - SIDs & STARs can still be used given they are RNAV procedures (DME/DME/IRU system is a substitute for GPS)
  - RNP procedures cannot be used as they require GPS
  - Ground based Nav Aids still needed for approach procedures not requiring GPS (ILS/LOC/VOR)

Resiliency/Operational Contingency Considerations (concluded)

- Many part 23 aircraft, and a considerable number of regional aircraft do not have multi sensor integration that can support RNAV or RNP operations
  - Loss of GPS forces these aircraft to only use conventional land based nav aids for SIDs, STARs, and instrument approaches
  - Continued operation of critical VORs is needed to support conventional SIDs and STARs at NSG 1 & 2 airports for these aircraft to continue operations without continual ATC vectoring to a conventional instrument approach
  - Ground based Nav Aids still needed for approach procedures not requiring GPS (ILS/LOC/VOR)
- Dual Frequency Multi Constellation (DFMC) GNSS constellations are also as vulnerable to jamming and spoofing as the GPS constellation is currently
- Future PBN resiliency is predicated on using all current and future aircraft navigation sensors to provide position accuracy and integrity to support PBN operations without the use of GPS
  - DME or DME/Inertial navigation (near term possibility) - proper rationalization of the DME network is needed to support this navigation mode
  - Enhanced Digital LORAN (EDL) (midterm possibility) - reintroduction of LORAN stations into the NAS is needed to support this. Other countries still support this system today
  - Enhanced resilient GPS signals that are secure to prevent the effects of spoofing - use of authentication or other security measures to protect the GPS signal.

Other Considerations – RNAV (GPS)

- Understanding that written tasking targets legacy nav systems, NAC leaders have emphasized closer look at underutilized procedures
- Over a period of approximately 10 years, the FAA was required to develop and implement several hundred RNAV (GPS) approaches a year
  - Produced thousands of procedures
  - No records kept on which existing procedures are associated with these efforts
- Many of these procedures were overlays of conventional approaches and offered no reduction in minima or track distance savings
  - Additional inventory can hinder operational transition
- If addressing underutilized inventory is FAA priority, these procedures (with little to no utilization or operational value) could be candidates for divestment

Recommendations for Tasking Elements 2/3

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- Account for resiliency and continuity of operations (i.e., PARC GPS Disruption Action Team recommendations, June 2024)
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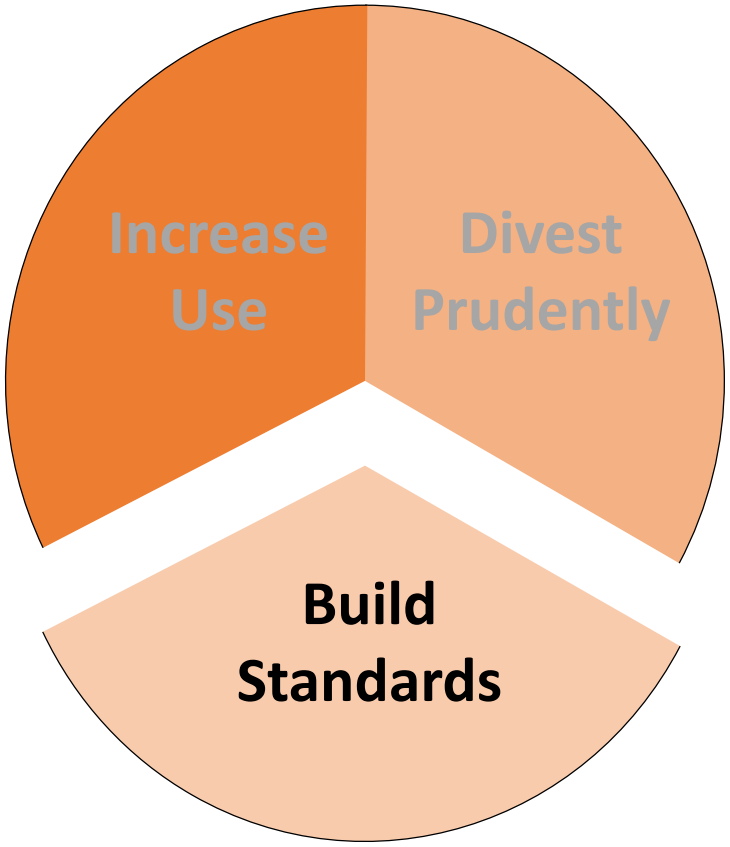

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- Identify trends supporting standards
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→ • NAS Nav Strategy

Minimum Service Level (MSL)

NAS Nav Strategy Category
NSG 1 - Low visibility (<200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures
NSG 2 - Low visibility (<=200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures
NSG 3 - CAT I mins, redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals/departures where needed
NSG 4 - Instrument approaches to ensure runway access, procedures to meet operational needs of primary airport users.
NSG 5 - Instrument approaches (where users equipped) to ensure runway access, Approaches to meet operational needs of primary airport users. Consideration for equipage should given to ensure any approaches available are useable by airport users.

Considerations by approach type:

ILS's should not be retired if:

- Considering aircraft equipage, it is the only vertically guided approach
- Provides significant reduction in approach minima (Ceiling or Visibility)
- Resiliency for GPS jamming/spoofing
- Training (flight school)

RNAV (RNP) should not be retired if:

- Contains a curved Radius to Fix (RF) segment
- Provides significant reduction in approach minima (Ceiling or Visibility) versus RNAV (GPS)
- Part of a NextGen program (EoR, MARS, Fuel/Noise/Time efficiency)
- Airport Access (only public approach type that works)
- Resiliency for ILS outage and no RNAV (GPS)

RNAV (GPS) should not be retired if:

- Considering aircraft equipage, it is the only vertically guided approach
- Resiliency for ILS outage
- Training (flight school)

MSL with Current Procedures Inventory

Category	Percent with ILS Appr	Percent with RNAV (GPS) Appr	Percent with RNAV (RNP) Appr	Percent with VOR Appr	Percent with NDB Appr	Percent with RNAV SID	Percent with RNAV STAR	Percent with CONV SID	Percent with CONV STAR
NSG 1 - Low visibility (<200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures	100%	100%	100%	20%	0%	87%	100%	100%	93%
NSG 2 - Low visibility (<=200' HAT), redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals, departures	100%	100%	85%	32%	5%	76%	88%	90%	78%
NSG 3 - CAT I mins, redundancy (spaced-based/ground-based, DEP/ARR runway), arrivals/departures where needed	86%	98%	16%	63%	6%	12%	10%	27%	9%
NSG 4 - Instrument approaches to ensure runway access, procedures to meet operational needs of primary airport users.	57%	97%	2%	42%	8%	19%	26%	19%	25%
NSG 5 - Instrument approaches (where users equipped) to ensure runway access, Approaches to meet operational needs of primary airport users. Consideration for equipage should given to ensure any approaches available are useable by airport users.	6%	75%	0%	19%	4%	2%	2%	1%	2%

Recommendations for Tasking Elements 5/6/7

- Stay connected to PARC activities on A-RNP (currently paused awaiting use/business case given changes in standards)
- Continue to review and update NAS Nav Strategy and NSG levels
- Refine definition of resilient NAS and append findings to NAS Nav Strategy

Additional NAC Discussion Questions

Costs Associated with Procedures

- FAA cost information for procedure maintenance
  - $3.5K-$5K per procedure a year
  - Flight check more complex for ground-based systems
  - Other potential costs – training, ops transitions
- FAA costs for ground systems
  - $10K to over $100K for maintenance annually (depending on system)
  - New system costs can be order of magnitude more
- Operator costs
  - Navigation Database/IAP Charting maintenance: anecdotally $10K-$15K/month – this cost would not necessarily go down with fewer procedures
  - Equipage costs – new, retro-fit, maintenance
  - Lost opportunities have cost/negative value
  - Other costs include recurrent training

Moving Forward

Closing and Recommendations for Next Steps

- Request NAC approval on current task outcomes…
  - Alignment on how to increase use and value from current inventory
  - Set of questions/criteria that should be considered in procedure inventory divestment and planning
  - Reinforced support for strategy-level guidance on service levels and identified critical guiding principles

- Request NAC support to refine findings and build on recommendations…
  - Planning criteria can be used to fortify team's findings on MSL
    - Use planning criteria to look at a set of airports
    - Illustrates MSL at an airport-level
    - Opportunity to flesh out and test assumptions
    - Build stronger guidance
  - Opportunity to address in the future to solidify direction on MSL

Contributors and Acronyms

Organizations Contributing to Ad-Hoc Tasking Team

Air Line Pilots Association (ALPA)

Airlines for America (A4A)

Aircraft Owners & Pilots Association (AOPA)

Airports Council International – North America (ACI-NA)

Alaska Airlines

American Airlines

Collins Aerospace

Delta Air Lines

DoD Policy Board on Federal Aviation (PBFA)

DoD United States Air Force

DoD United States Army

DoD United States Space Force

FAA Air Traffic Organization

FAA Office of NextGen

FedEx

General Aviation Manufacturers Association (GAMA)

JetBlue Airlines

The MITRE Corporation

National Air Traffic Controllers Association (NATCA)

National Business Aviation Association (NBAA)

NetJets

Port Authority of New York & New Jersey (PANYNJ)

Professional Aviation Safety Specialists (PASS)

SkyWest Airlines

Southwest Airlines

United Airlines

United Parcel Service (UPS)

Acronyms

A-RNP	Advanced Required Navigation Performance
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
CAT	Category
CRDA	Converging Runway Display Aid
EOR	Established on RNP
FAA	Federal Aviation Administration
GDAT	GPS Disruption Action Team
GPS	Global Positioning System
IAP	Instrument Approach Procedure
IFP	Instrument Flight Procedure
ILS	Instrument Landing System
IOAA	IFP, Operations, and Airspace Analytics
LOC	Localizer
LPV	Localizer Performance with Vertical guidance
MCL	Minimum Capabilities List
MON	Minimum Operating Network
MSL	Minimum Service Level
NAC	NextGen Advisory Committee
NACSC	NAC Subcommittee
NAS	National Airspace System
Nav	Navigation
NDB	Non-Directional Beacon
NSG	Navigation Service Group
PARC	PBN Aviation Rulemaking Committee
PBN	Performance Based Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
ROI	Return on Investment
SID	Standard Instrument Departure
STAR	Standard Terminal Approach
VOR	Very High Frequency Omni-directional Range

Airport Codes

ATL	Hartsfield-Jackson Atlanta International Airport
BOS	Boston Logan International Airport
BWI	Baltimore/Washington International Thurgood Marshall Airport
CLT	Charlotte Douglas International Airport
CVG	Cincinnati/Northern Kentucky International Airport
DCA	Ronald Reagan Washington National Airport
DEN	Denver International Airport
DFW	Dallas/Fort Worth International Airport
DTW	Detroit Metropolitan Wayne County Airport
EWR	Newark Liberty International Airport
FLL	Fort Lauderdale/Hollywood International Airport
FRG	Republic Airport
HNL	Honolulu International Airport
HPN	Westchester County Airport
HUT	Hutchinson Regional Airport
IAD	Washington Dulles International Airport
IAH	George Bush Houston Intercontinental Airport
IND	Indianapolis International Airport
ISP	Long Island MacArthur Airport
JFK	New York John F. Kennedy International Airport
LAS	Las Vegas McCarran International Airport
LAX	Los Angeles International Airport
LGA	New York LaGuardia Airport
MCO	Orlando International Airport
MDW	Chicago Midway International Airport
MEM	Memphis International Airport
MIA	Miami International Airport
MMU	Morristown Airport
MSP	Minneapolis/St. Paul International Airport
OAK	Oakland International Airport
ONT	Ontario International Airport
ORD	Chicago O`Hare International Airport
PDX	Portland International Airport
PHL	Philadelphia International Airport
PHX	Phoenix Sky Harbor International Airport
PNE	Northeast Philadelphia Airport
PVD	Rhode Island T. F. Green International Airport
SAN	San Diego International Airport
SDF	Louisville Muhammad Ali International Airport
SEA	Seattle/Tacoma International Airport
SFO	San Francisco International Airport
SLC	Salt Lake City International Airport
SWF	New York Stewart International Airport
TEB	Teterboro Airport
TPA	Tampa International Airport

Airline Codes

AAL	American Airlines
ASA	Alaska Airlines
DAL	Delta Air Lines
EDV	Endeavor Air
EJA	NetJets
ENY	Envoy Air
FDX	FedEx
FFT	Frontier Airlines
JBU	JetBlue Airlines
JIA	PSA Airlines
NKS	Spirit Airlines
RPA	Republic Airways
SKW	SkyWest Airlines
SWA	Southwest Airlines
UAL	United Airlines
UPS	United Parcel Service

Questions/Criteria to be Considered for Procedure Inventory Divestment and Planning

Questions/Criteria to be Considered for Procedure Inventory Divestment and Planning

Focus Area	Qualitative and Qualitative Questions/Criteria
Basic IFP Inventory Overview	How many arrival/departure runways? How many IAPs/SIDs/STARs does this airport have? How many are conventional? How many are PBN? Of IFPs, which have higher/lower usage?
Operator Mix	What is the operator mix at this airport? Scheduled air carrier, regional, business aviation, general aviation?
Fleet Mix (Aircraft Types/Fixed Wing/Helo/etc.)	What is the fleet mix? This should include specific aircraft categories, aircraft types, aircraft equipage.
Military Presence (Type of Operations, Fleet Mix, etc.)	What types of military activities/ops? Are there training missions, operational units based at the airport, special use airspace, specific military mission requirements, etc.?
Equipage Levels	What percent of the daily operations (aircraft) are PBN equipped?
Runway Configuration/Airport Layout	How many different runway configurations exist, and what is the percentage of utilization for each? Which runways are generally arrival runways? Which are departure runways? Are there operating requirements that stipulate precision or vertical guidance?
Common Weather Patterns (Foggy, Low Vis, etc.)	Are there weather patterns (marine layers, fog, or winds) that require utilization of certain instrument flight procedures?
General Airport Operations/Business/Mission	What mission types does this airport support? This could be multiple missions (passenger, cargo, law enforcement, medical evacuation, firefighting, military operations, flight training schools, maintenance bases, parachute jumping, and other pertinent activities).
Flight Training	Are there specific flight training considerations? What is the closest alternative procedure for training purposes (e.g., 50 nm)?
Terrain Constraints/Obstacle Constraints	What terrain/and or obstacle clearance requirements influence the need for specific IFPs? Is there a need for higher climb gradients, curved intermediate or final segments, availability of laterally and vertically guided approaches? Does IFP exist because of an obstacle that would result in the straight-in minimums being higher than the circling minima?
Operation Peaking/Limitations Due to Throughput	Are there periods of notable high or low traffic volume that affect which IFPs and/or configurations are used? Is IFP an offload during peak or used only during low traffic periods?
Airspace Constraints	Are there any IFPs that are specifically needed due to airspace constraints or other operational factors? Are there airspace constraints that help explain IFPs? Are there larger/busier airports within 30 nm?
Airport Lighting Consideration	Are there any airport lighting considerations (SA CAT I, SA CAT II, or LAHSO) that would influence IFP inventory/requirements?
Noise Constraints/Airfield/Flight Procedure Environmental Review Currently Underway	Are there noise abatement agreements/procedures that require the use or non-use of specific IFPs? Are there any other environmental/noise-related factors that influence the airspace configurations, runway configurations, and/or routes?

Special Events Held At/Near Airport	Are there any routine special events (air shows, flight testing, sporting or other large "fly-ins")? IFPs utilization may impacted during the events (either more use or less use).
Airport Planned Changes (New Runways, Construction, Closed Areas)	Are there airport infrastructure projects underway or planned that could impact the type, frequency or IFPs used? Do these changes require modification of existing or new IFPs?
Contingency Procedures (ATC Assigned Only)	Are certain IFPs required due to contingency procedures/resiliency/OCPs? May only be used when normally used IFPs are unavailable.
Airport Access	Is this the only IAP at the airport to a specific runway end? Will removal eliminate lowest landing minima to an individual runway?
Circling Approaches	Is this circling-only procedure (1) at an airport where not all runway ends have a straight-in IAP, and (2) does it have a Final Approach Course not aligned within 45 degrees of a runway which has a straight-in IAP?
Recent Divesture Activities	Has the airport had procedures identified for divestment in NPA, VOR MON, etc.? Has the airport or terminal facility expressed an interest in getting rid of any underused procedures?
Recent Airspace Modernization Activities	Was this airport part of a Metroplex or single-site PBN project within the last 10 years? If so, when was that completed? Do we have the study, design, and implementation team reports? Has the airspace utilization level changed since last project?
Operational Trial Activities/Potential Activities	Does this airport support collection of data or operational demonstrations?
Procedure Design Criteria	Has design criteria made the procedure unnecessarily exclusive? Could it be updated to meet a lower standard and increase utilization? Would a planned or potential change to IAP design criteria increase utilization?
Procedure Connectivity	Are STARS connected to IAPs? If so, are aircraft normally cleared from the IAP from the STAR? If not connected, why not and should they be?
Operator-Requested Approaches	Are/were any existing IFPs requested by an operator? These IFPs often have detailed information about purpose and need.
ATC Resources	Are there ATC resource constraints at overlying ATC facilities that impact IFP utilization? This could include sector consolidation, throughput rates, runway configurations needing final monitors, and/or runway assignments.
Controller Tools Available	Are decisions support tools that enable specific IFPs available, trained and used?
Redundant Procedures	Do any IFPs stand out as redundant? Examples include overlays (not needed for resiliency), IFPs designed for specific aircraft types (turboprops vs turbojets) that are not relevant, multiple STARS/SIDS to/from the same general direction.
Procedure Usability	Are there currently-published IFPs that are not used due to operational limitations (e.g., airspace geometry, staffing, etc.)?