



# NAC Meeting

August 6, 2020



# Opening of Meeting

Chip Childs, NAC Chairman  
President & CEO, SkyWest Inc.

# August 6 NAC Administrative Announcements

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- Reminder: Please keep your phones and/or computer mics on mute.
- We ask that those observing today to please keep your mics muted at all times.
- For **NAC members with comments or questions, presenters, and pre-approved speakers only**, when called upon to speak by the Chairman:
  - Please announce your name and organization
  - If using Zoom computer audio, click the Mute/Unmute button in the bottom left corner
  - If using the phone line audio without a participant ID, dial \*6 to unmute, as well as your phone's mute button if enabled
  - If using a phone line and entered a participant ID, click the Zoom Mute/Unmute button, dial \*6 to unmute your phone line, as well as your phone's mute button if enabled
- Rather than do a roll call, please feel free to scroll through the Zoom Participants list by clicking the Participants button at the bottom of the Zoom window. All meeting participants will be captured in the meeting summary.



# PUBLIC MEETING ANNOUNCEMENT

## NextGen Advisory Committee

### August 6, 2020

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This meeting is being held pursuant to a notice published in the Federal Register on July 13, 2020. The agenda for the meeting was announced in that notice, with details as set out in the agenda provided today. The FAA Deputy Administrator, Dan Elwell, is the designated Federal Official responsible for compliance with the Federal Advisory Committee Act, under which this meeting is conducted.

The meeting is open to the public, and members of the public may address the NAC with the permission of the Chair. The public may submit written comments in advance of the meeting. In addition, the Chair may entertain public comment if, in his judgment, doing so will not disrupt the orderly progress of the meeting and will not be unfair to any other person.





# Public Statements

Members of the Public



# Chairman's Report

Chip Childs, NAC Chairman  
President & CEO, SkyWest Inc.

# Motion for NAC Approval

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- December 12, 2019, NAC Meeting Summary Package Draft





# FAA Report

Dan Elwell, FAA Deputy Administrator

NAC Designated Federal Official



# NAC Subcommittee (SC) Chairman's Report

Craig Drew, NAC SC Chairman, Southwest Airlines



# Opportunities Discussion

Craig Drew, NAC SC Chairman, Southwest Airlines

Teri Bristol, ATO Chief Operating Officer, FAA

# Recommended Opportunities

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- **Test/Implement LGA RNAV Expressway Visual 31 Approach:** Improve the efficiency of the Expressway 31 approach and allow for future technologies to enhance operations.
- **Test/Implement TEB/HPN Escape Route:** Provides for an alternate route out of the airspace for capable business aviation aircraft.



# NAC Tasks 18-4 & 18-5: Focus Area Risks/Mitigations

FAA NIWG Subject Matter Experts (SMEs)

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Multiple Runway Operations (MRO)

Surface & Data Sharing

Performance Based Navigation (PBN)

Data Communications (Data Comm)

Northeast Corridor (NEC)



# Multiple Runway Operations (MRO)

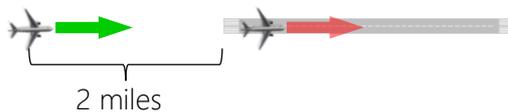
Natee Wongsangpaiboon, FAA & Raul Zamora, Jr., FAA

Glenn Morse, United Airlines & Phil Santos, FedEx

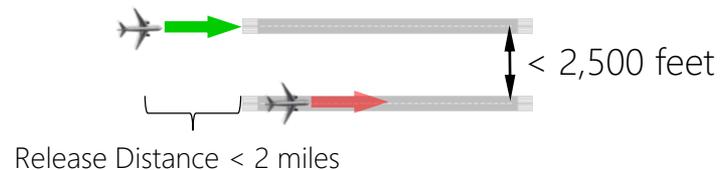
# MRO Update – Accomplishments

- **Use of RNAV for SFO 7110.308 Procedures**
  - FAA pre-implementation milestone complete; preliminary analyses show some combinations may be feasible
  - Industry discussions with AJT planned
- **Reduced Minimum Radar Separation (MRS) – FAA/Industry Milestones Complete**
  - Industry comments delivered to FAA in June with implementation recommendations
  - Additional FAA safety studies in progress; concurrence to pursue extension (2.5 nm w/in 20) before reduction (2.0 nm w/in 10)
  - Identified by “Opportunities ad hoc” as game changing concept
- **Wake Turbulence Encounter Reporting**
  - Industry Milestone Complete - Encouraged increased wake encounter reporting based on new FAA reporting guidance
- **Converted 2 original 2.0/1.5 RECAT sites (DTW and IAH) to Consolidated Wake Turbulence (CWT) standards**
- **Integrated Arrival/Departure (IAD) concept for Closely-Spaced Parallel Runway (CSPR) Operations**
  - FAA pre-implementation milestone complete, additional FAA safety studies in progress

Currently Authorized “2 increasing to 3 rule”



IAD Concept (reduced separation)



# MRO Update – COVID Impacts and Looking Ahead

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- **CWT Implementation – FAA Milestone**
  - Remaining sites planned for conversion in 2020 and 2021 are delayed until facilities can accept CWT training
  - New schedule TBD
- **Consolidated Wake Turbulence (CWT) Separation Standards Benefit Analysis – Industry Milestone**
  - Assess benefits from implementation of CWT separations at initial CWT locations (Q4 2020)
  - Preliminary discussions held to identify study locations (IAD, DFW, SEA, BOS) and carrier support
  - Benefits related to fleet mix and traffic demand at each airport/runway; assessment will focus on CWT separation changes within aircraft pairs
  - Potential Risk – Industry resources post-COVID to conduct detailed analysis. Industry may need JAT support for this task based on previous JAT analyses



# Surface and Data Sharing

Doug Swol, FAA & Ayaz Kagzi, FAA

Rob Goldman, Delta Air Lines & Steve Vail, Mosaic ATM

# COVID Impacts to Terminal Flight Data Manager

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- All TFDM-related travel, since March 20<sup>th</sup>, has been restricted only to activities related to sustainment of critical NAS systems.
- Limited access to the FAA Atlantic City tech center for testing
  - Currently, no access to training academy (for training technicians)
- No access to air traffic facilities (to conduct installation, testing, training)
- NAC Milestones on “TBD” status until there is better fidelity of information regarding re-planning efforts and COVID-related constraints
  - TFDM B1 IOC in PHX will postponed till 2021
- While TFDM deployment activities are restricted, FAA continues to make progress:
  - TFDM software development and adaptation continues
  - TFDM software “remote testing” initiated

# NAC Milestone Impact

SURFACE AND DATA SHARING		
PRE-IMPLEMENTATION COMMITMENTS	Old Date	New Date
TFDM program will complete the operational testing for Build 1	Q2 CY2020	<b>Q2 CY2021*</b>
NASA ATD-2 interim technology transfer from Phase 2: Fused IADS at CLT	Q4 CY2019	Complete
NASA ATD-2 final technology transfer from Phase 3: Terminal departure IADS at DFW/DAL	Q3 CY2020	Q4 CY2021
IMPLEMENTATION COMMITMENTS	Old Date	New Date
TFDM program will achieve key site IOC for Build 1 at PHX	Q2 CY2020	<b>Q2 CY2021*</b>
TFDM program will achieve the in-service decision (ISD) for Build 1 to allow additional TFDM system deployments into the NAS	Q4 CY2020	TBD
TFDM program will achieve IOC at 3 additional sites	Q1 CY2021	TBD
TFDM program will achieve the key site IOC for Build 2 at CLT	Q4 CY2021	TBD
TFDM program will achieve ISD for Build 2 to allow additional deployments of the full TFDM capabilities into the NAS	Q1 CY2022	TBD
TFDM program will achieve IOC at 5 additional sites	Q1 CY2022	TBD

\* Notional Dates dependent on ability of program to travel, access FAA facilities, conduct training and conduct testing. If dependencies are not met, the program will not meet these dates.



# Engagement and Commitment Remains Strong:

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- NIWG meetings provide programmatic and operational updates as well as exploration of virtual opportunities
- NASA ATD-2 phase 3 extended from Q4 FY2020 to Q4 FY2021
- SWIFT quarterly (virtual) meetings continue to address SWIM and the data/information sharing needs of the entire community to support iTBO / TBO, Future Flow Management, actionable analytics and more
- TFDM connection testbed option available later this Fall
- FAA will sustain NASA ATD-2 in Charlotte until TFDM is deployed
- FAA will lead Collaborative Site Implementation Team (CSIT) Meetings





# Performance Based Navigation (PBN)

Juan Narvid, FAA; Aaron Wilkins, FAA; Wendy O'Connor, FAA

Brian Townsend, American Airlines & Bill Whyte, RAA

# PBN Key Issues

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- COVID-19 impacts are affecting JIP due to travel restrictions, training and access facility
  - Annual update to JIP is in DRAFT with new JIP dates
- EoR
  - Barriers to EoR report complete
  - Industry assessing ways to further next steps
- VNAV
  - VNAV issue continues to impact EoR implementation
  - FAA continuing work with ALPA

# PBN NIWG Commitment Status

Milestone	Date	Status (New updated JIP dates)
CLE/DTW Post-impl. phase complete	1QCY20	Completed - 10/10/19
DEN Implementation phase start	1QCY20	Completed - ACM 1/28/20
Implementation phase complete	2QCY20	Completed - 3/26/20
Post-impl. phase complete	1QCY21	TBD
LAS Implementation phase start	2QCY20	Completed – 7/7/20
Implementation phase complete	3QCY20	<b>1QCY21</b> - Targeting 11/2020
Post-impl. phase complete	2QCY21	<b>TBD</b>
Florida Implementation phase start	4QCY20	On Track - Expect to commence 10/2020
Implementation phase complete	3QCY21	On Track - Expect to publish procedures 8/2021
Provide input, validate data, review findings and confirm conclusions to post-impl. analyses for implemented PBN procedures.	CLE/DTW Q3CY20 DEN Q3CY21 LAS Q4CY21	On Track – FAA delivered data to Industry focals <b>TBD</b> <b>TBD</b>
Implement select iTBO capabilities in NEC and Denver	NEC Q4CY21  DEN Q4CY21	On track - Currently maturing the time-based metering design and coordinating with field facilities to prepare for departure scheduling from multiple ARTCCs.  On track - Currently planning the implementation of enroute metering improvements in 2020.



# Data Communications (Data Comm)

Jesse Wijntjes, FAA

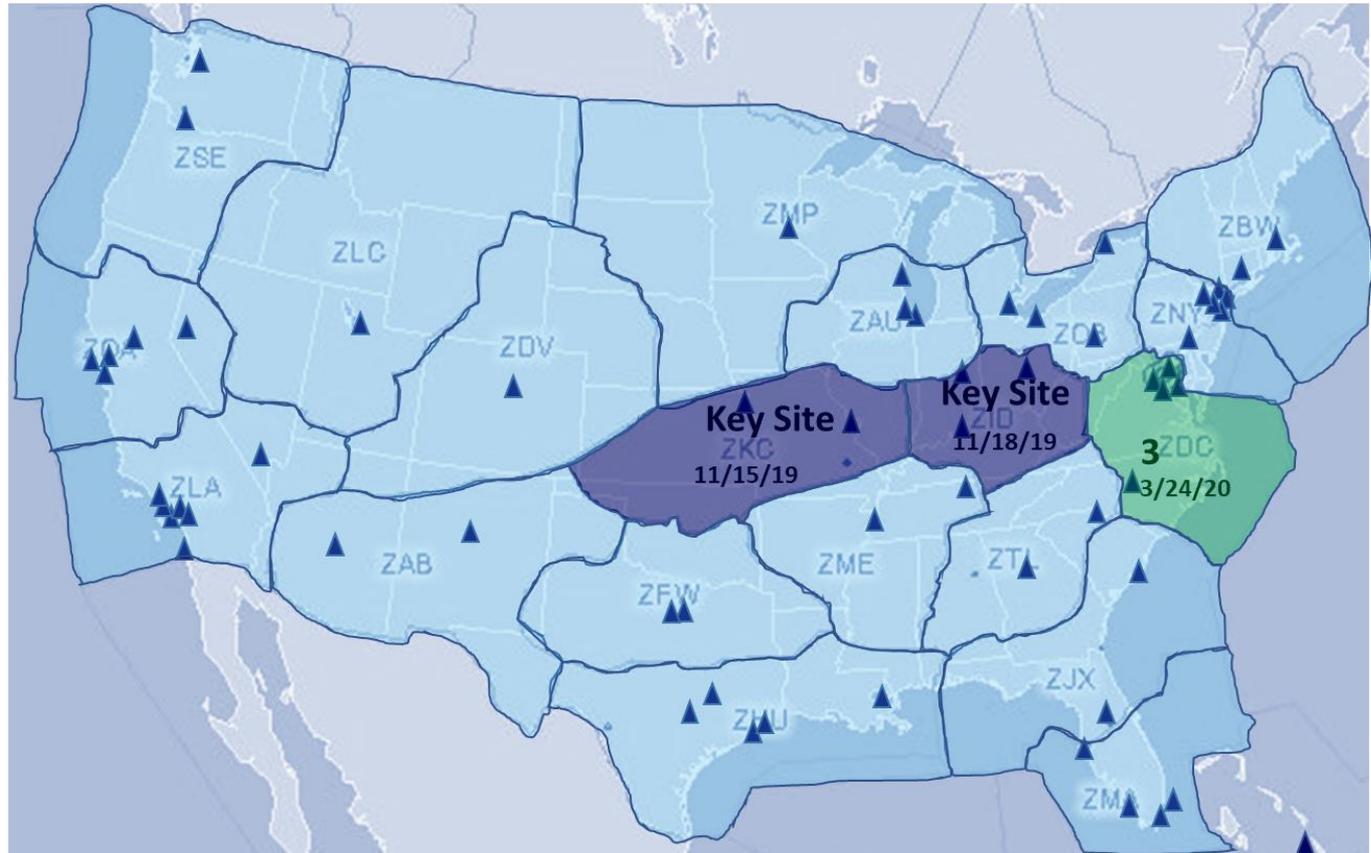
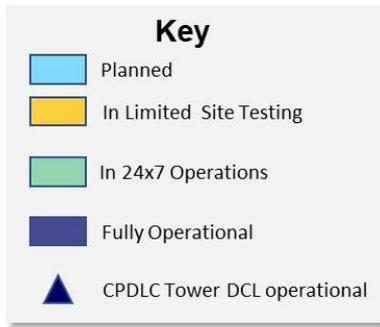
Chris Collings, L3Harris & Chuck Stewart, United Airlines

# Data Comm Accomplishments

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- **Activated Data Comm services at first 3 En Route Centers**
  - En Route services exceeding operational performance targets – best performing data link capability in the world
- **Air-ground interop issues fault isolated & addressed**
  - Avionics software updates delivered and/or in development for all identified issues
  - Implemented fixes and upgrades to air-ground networks
  - ERAM system performance & enhancements have been and continue to be critical to program success
- **Operators purchased & installed upgrades to enhance air to ground system performance**
- **Business/General aviation & DoD communities addressing avionics issues and resuming En Route participation**

# Data Comm Operational Status



# Industry Avionics Accomplishment

## Completed Actions

Operator & Fleet Actions Complete	Status
<b>American Airlines:</b> B777	Operating en route, no action required
<b>FedEx:</b> B777	Operating en route, no action required
<b>Southwest Airlines:</b> B737	Operating en route, no action required
<b>UPS:</b> B744, B757, B767, MD11	Operating en route, no action required

## Avionics Actions In Progress

Avionics Action	Operator/Fleet	Status
<b>Collins CMU 900 Core 16</b>	FedEx	In progress
<b>Collins VDR Update</b>	FedEx	In progress
Boeing 777 AIMS 2 BP17B	United	In progress
<b>Boeing 787 CMF BP6</b>	American, United	In progress

## Pending Avionics Actions

Avionics Action	Operator/Fleet	Status
<b>Collins CMU 900 Core 16</b>	Alaska, American, Delta, United	Delayed – On hold due to COVID
<b>Collins VDR Update</b>	Alaska, American, United	Delayed – Installs slowed due to COVID
Airbus ATSU CSB 7.5	Alaska, American, Delta, JetBlue	Delayed – Release delayed Q3 2020 due to COVID
<b>Boeing Pegasus 1 Fix</b>	FedEx, UPS, United	Planned – February 2021
Boeing 747-8 ATN-204	UPS	Planned – Q2 2021

Data Comm Critical Path Action	Operating, no action required	Operating, pending action	Planned	Delayed / Not operating
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# Data Comm COVID-19 Impacts

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## FAA

- COVID-19 caused the suspension of all En Route facility training and testing activities beyond site 3

## Industry

- Installation of avionics updates delayed or slowed by COVID-19
  - Collins CMU 900 Core 16
  - Collins VDR update
  - B787 & B777 updates
- Airbus delayed A320/330 ATSU release 7.5

# Data Comm Forward Plan

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## FAA

- The team continues to focus on reducing implementation risks once we restart the waterfall
- Completion of the waterfall will be executed as safely and efficiently as possible

## Industry

- Despite the impacts from COVID-19, multiple operators continue to make plans to resume avionics updates
- Boeing and Honeywell are in development on a fix for the B757 & B767 FMS

Industry & FAA Data Comm team is ready to resume the national deployment of En Route services





# Northeast Corridor (NEC)

Aaron Wilkins, FAA; Juan Narvid, FAA; & Wendy O'Connor, FAA

Mark Hopkins, Delta Air Lines & Ralph Tamburro, PANYNJ

# Northeast Corridor - Key Issues and Status

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- **2020/2021 Commitments**
  - Due to COVID-19, facility access limitations, travel restrictions and fiscal austerity will delay completion of several commitments (e.g. ACR and GBAS)
  - Virtual meetings allow continuation of coordination and planning (e.g. Industry TOS discussions)
- **Advancing pre-implementation milestones**
  - LGA Runway 31 RNAV GPS collaborative meetings are continuing
  - High-performance escape routes for TEB/HPN
- **Looking ahead – meetings planned thru Nov NAC**
  - Additional discussion on pre-implementation milestones
  - Support to Ad Hoc Teams and other NIWGs
  - Focus on priorities that support agile recovery, specifically within the NEC

# Outlook for CY2020 Commitments

Type	Commitment/Milestone	NJIP Date	Status
Implementation*	Improved departure management for flights destined for LGA	Q3 CY2020	TBD
Implementation*	DSP enhancements	Q4 CY2020	TBD
Implementation*	Atlantic Coast Routes	Q4 CY2020	Q4 CY2021
Implementation*	PDRR/ABRR Enhancements	Q4 CY2020	TBD
Pre-implement*	FIM review and analyses	Q3 CY2020	Completed**
Industry	GBAS evaluation at BOS	Q2 CY2020	Q4 CY2021
Industry	DCA north end hold pads	Q3 CY2020	TBD
Industry	PHL 27R analyses	Q3 CY2020	Completed
Industry	GBAS at LGA	Q4 CY2020	TBD

\* Implementation and Pre-implementation milestones are all jointly shared by FAA and Industry for the NEC efforts

\*\* Additional coordination between NEC NIWG and Equip2020 WG4 expected





# NAC Task 19-1: Minimum Capabilities List (MCL)

Ron Renk, United Airlines

Greg Young, Delta Air Lines

# How We Got Here...

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- NextGen Integration Working Groups (NIWGs):
  - Northeast Corridor (NEC)
  - Performance Based Navigation (PBN)
  - Data Comm
  - Surface
  - Multiple Runway Operations (MRO)
- Many had a common thread in their reports:

\*MIXED EQUIPAGE impedes NextGen\*

# Refresher – What is MCL?

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The Minimum Capabilities List is a **forward-fit** list of equipage that was created by a large segment of the aviation industry to avoid mixed-equipage issues when implementing NextGen in the National Airspace System.

# Tasking:

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## NAC Task 19-1:

NAS Aircraft Minimum Capability List (MCL) Oct 4<sup>th</sup>, 2019

### Sub-Task #1

*Collaborative analysis* of current fleet equipage with respect to the MCL capabilities

### Sub-Task #2

*Socialization* of the MCL with additional stakeholder groups, including aircraft and equipment manufacturers and regional airlines not involved in discussions to date

### Sub-Task #3

*Recommendations on steps to encourage MCL adoption* and commitments to equip aircraft with the associated capabilities

# Sub-Task #1: Analysis

Air Transport Aircraft	Total Count	Baseline MCL						
		Approach					Terminal	En Route
		RNP AR	A-RNP		RNAV (GPS)		RNP-1 w RF	RNP-2
			Capable	Ops Spec	Coupled VNAV	Advisory VNAV only		
WB/NB	5,355	4,827	4,859	4,088	5,130	225	4,859	5,303
Regional	2,033	702	887	509	1,106	927	887	2,021
WB/NB	5,355	90%	91%	76%	96%	4%	91%	99%
Regional	2,033	35%	44%	25%	54%	46%	44%	99%

Air Transport Aircraft	Total Count	Baseline MCL	
		Data Comm	
		DCL	Enroute CPDLC
WB/NB	5,355	3,603	3,134
Regional	2,033	34	31
WB/NB	5,355	67%	59%
Regional	2,033	2%	2%

Air Transport Aircraft	Total Count	Baseline MCL
		Resiliency
		DME/DME/IRU
WB/NB	5,355	5,242
Regional	2,033	705
WB/NB	5,355	98%
Regional	2,033	35%

\* Pre-COVID numbers, Regional = 90 seats or less

# Sub-Task #2: Socialization

- Baseline and Supplemental matrices complete

NextGen Enabling Category	Aircraft Enabling Capability	Key Missing Components	Benefit	Example Use Cases	Areas Receiving Benefit	Ground Investment	Risks to ROI
<b>Performance Based Navigation</b>	<ul style="list-style-type: none"> <li>RNP-2 (Enroute)</li> <li>RNP-1 w/ RF (Terminal SID/STAR)</li> <li>RNP APCH w/ RF (Approach)</li> <li>A-RNP or RNP AR 0.3 w/ RF (Approach)</li> <li>RNP Scalability</li> <li>Autopilot-coupled VNAV</li> </ul>	<ul style="list-style-type: none"> <li>RF Leg Type</li> <li>Autopilot-coupled VNAV</li> <li>Auto-throttle</li> <li>RNP AR capability</li> <li>FMC database size</li> </ul>	<ul style="list-style-type: none"> <li>Precise deconflicted arr and dep with reduced separation reqs</li> <li>Shorter track miles</li> <li>Reduced fuel burn</li> <li>Maximize poor weather capacity</li> <li>Predictable flows</li> <li>Increased access</li> <li>Reqd for Trajectory Based Operations (TBO)</li> </ul>	<ul style="list-style-type: none"> <li>Established on RNP (EoR)</li> <li>RNAV/RNP arrivals/departures</li> <li>Optimum Profile Descents (OPD)</li> <li>Q/T/Y routes</li> <li>LNAV/VNAV apch minima</li> <li>Apchs where ground based navaid does not exist or is being removed.</li> </ul>	<ul style="list-style-type: none"> <li>North East Corridor (NEC)</li> <li>NSG-1/NSG-2 Airports</li> <li>Terminal Airspace</li> <li>GA Airports with restricted access due to conflicts with terrain or other airports                             <ul style="list-style-type: none"> <li>SMO, G3ADS, PWK</li> <li>HHR, MRI, OPL</li> </ul> </li> <li>Enroute (more efficient routing)</li> <li>Maintain access after NAVAID decommissioning</li> </ul>	<ul style="list-style-type: none"> <li>Airspace and procedures enhancements</li> <li>Reduced lateral separation between routes</li> <li>Controller training</li> <li>Procedure implementation process (IAP, EoR)</li> <li>FAA Policy</li> </ul>	<ul style="list-style-type: none"> <li>Reqd environmental work</li> <li>Non-equipped a/c</li> <li>Decision Support Tools</li> <li>Automation enhancements</li> <li>Requires pre-conditioned flows</li> <li>Right sizing development</li> <li>Maintenance and removal of procedures</li> <li>FMC database size to support new procedures &amp; wpts</li> </ul>
<b>Data Comm</b>	<ul style="list-style-type: none"> <li>FANS-1/A with "Push to Load" over VDL Mode 2 with multi-frequency</li> </ul>	<ul style="list-style-type: none"> <li>CMU/CMF/ATSU</li> <li>VHF Digital Radios</li> <li>FANS 1/A capable FMC/FMGC</li> </ul>	<ul style="list-style-type: none"> <li>Shorter ground delay for clearances</li> <li>Reduced communication errors</li> <li>Efficient delivery of complex clearances</li> <li>Reduce long voice communications</li> <li>Reduced freq congestion</li> <li>Accurate re-route</li> <li>Weather avoidance</li> <li>Pilot requested re-routes</li> <li>Enables Trajectory Based Operations (TBO)</li> <li>CTOP/TOS</li> </ul>	<ul style="list-style-type: none"> <li>High rate clearances during SWAP</li> <li>Efficient wx re-route</li> <li>Improved human factors (errors in re-route entries)</li> <li>More efficient routing</li> </ul>	<ul style="list-style-type: none"> <li>NAS ground ops</li> <li>Enroute ops</li> </ul>	<ul style="list-style-type: none"> <li>Development / delivery of Data Comm svcs</li> <li>Enhanced automation and Decision Support tools</li> <li>Controller training</li> </ul>	<ul style="list-style-type: none"> <li>Pilot/Controller training during implementation</li> <li>Non-equipped a/c</li> <li>Actual system performance</li> <li>Conformity of equipment to use FANS messages (older spec being adapted for modern use)</li> <li>Partially equipped aircraft - Meets some but not all FANS 1/A requirements</li> </ul>
<b>Surveillance</b>	<ul style="list-style-type: none"> <li>ADS-B Out - Mandate</li> </ul>	<ul style="list-style-type: none"> <li>Transponder</li> <li>Highly accurate position source with integrity</li> </ul>	<ul style="list-style-type: none"> <li>Enables 3NM enroute separation</li> <li>Reduced separation in select situations</li> <li>Improved surveillance in non-radar areas (including surface)</li> <li>More accurate position; more frequent update rate</li> <li>Enables improved safety via ATC automation and TFM Decision Support tools</li> <li>Improved Planning and TFM Services</li> <li>Improved SAR</li> <li>Enables ADS-B IN applications</li> </ul>	<ul style="list-style-type: none"> <li>3NM enroute separation</li> <li>Western Atlantic Route System (WATRS) operations surveillance</li> <li>Reduced terminal vectoring due to conflict</li> <li>Enhanced SAR</li> </ul>	<ul style="list-style-type: none"> <li>Enroute</li> <li>Terminal</li> <li>Non-radar environments</li> <li>Mountainous terrain</li> </ul>	<ul style="list-style-type: none"> <li>Ground infrastructure</li> <li>ERAM/STARS enhancements</li> <li>Controller training</li> <li>Reduced Spacing</li> </ul>	
<b>Performance Based Navigation, Low Vis Ops, Surveillance</b>	<ul style="list-style-type: none"> <li>Resilient NextGen Ops (DME/DME/IRU)</li> </ul>	<ul style="list-style-type: none"> <li>Airworthiness approval for DME/DME, IRU Hardware</li> </ul>	<ul style="list-style-type: none"> <li>Resilient terminal and enroute ops with GPS loss (Jamming or hardware failure)</li> </ul>	<ul style="list-style-type: none"> <li>Q/T/Y Routes</li> <li>RNAV SIDs and STARS</li> </ul>	<ul style="list-style-type: none"> <li>Navigation and surveillance resilience for all NAS ops; needed most in remote areas.</li> </ul>	None	

# Sub-Task 2: Socialization (cont.)

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Southwest®

UNITED 

 DELTA

AIRBUS

 BOEING®

American Airlines 



 Collins Aerospace

**RAA**  
Regional Airline Association

 **MITSUBISHI**  
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# Sub-Task #3: Adoption and Commitment

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- Scope – To whom does the MCL apply? (**DONE**)
- Retrofit – “If I took delivery of airplanes just last year, what items would I need to buy so as not to become an impediment to NextGen?” (**DONE**)
- Cost/Benefit – “What will this cost me and what will I get in return?” (**INCOMPLETE**)

# Conclusion

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- 2 year effort: Level of interest and collaboration was robust
- The Baseline and Supplemental matrices are complete
- No doubt a “WIN” for all stakeholders
  - Path forward to use technology to improve NAS operations
- In order to assure MCL success, it needs:
  - High level of participation/adoption from Industry, and
  - Corresponding FAA investment response

# Conclusion

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- Best outcome – Airlines and General Aviation Operators, that are within scope, elect to use the MCL to establish aircraft equipage specifications for OEMs (MCL Baseline becomes standard equipment).
- Though NAC tasking, in spirit, is “complete;” completion of the final three issues are critical to its success. Due to COVID issues we request one additional meeting cycle to finalize the effort and provide the NAC a more detailed conclusion.



# NAC Task 19-3: Joint Analysis Team (JAT)

David Knorr, FAA

Alex Burnett, United Airlines

# NEC Phase 1 Implementations

	Initiative	Initial Ops Availability	Supporting Org.	Study Periods	Benefits Assessment
1	Implement EDC at ZNY	Q1 2018	FAA MITRE	Mar-Sep 2017 vs.	Preliminary: Oct 2018 Initial: Feb 2019
2	Implement TBFM IDAC at 4 NY Towers	Q1 2018	AA, DL, UA, JB	Mar-Sep 2018	Final: Apr 2019
3	Implement BOS SWIM Visualization Tool at ZBW	Q2 2018			
4	Implement SCIA to PHL 9R/17	Q3/Q4 2018	FAA MITRE AA	Jan -Jun 2018 vs. Jan -Jun 2019	Preliminary: Apr 2019 Initial: Oct 2019 Final: Jan 2020
5	Implement CRDA DCIA application for PHL 27R/35 for RNAV approaches	Q1 2019	FAA MITRE AA		
6	Improve airborne metering to PHL	Q1 2019	FAA MITRE AA	Apr -Oct 2018 vs.	Preliminary: Oct 2019 Initial: Feb 2020
7	<b>Expand consistent usage of defined and existing capping and tunneling for departures/arrivals to/from the NEC through required advisories</b>	Q1 2019	FAA MITRE DL,AA,UA,othr	Apr -Oct 2019	<b>Final: Apr 2020</b>
8	Implement TBFM Pre-Departure Scheduling at selected airport	Q1 2019			

\* Implementations with measurable quantitative benefits in bold

Note: 1 & 2 will be studied together as systems combine to produce measurable benefit



# Background

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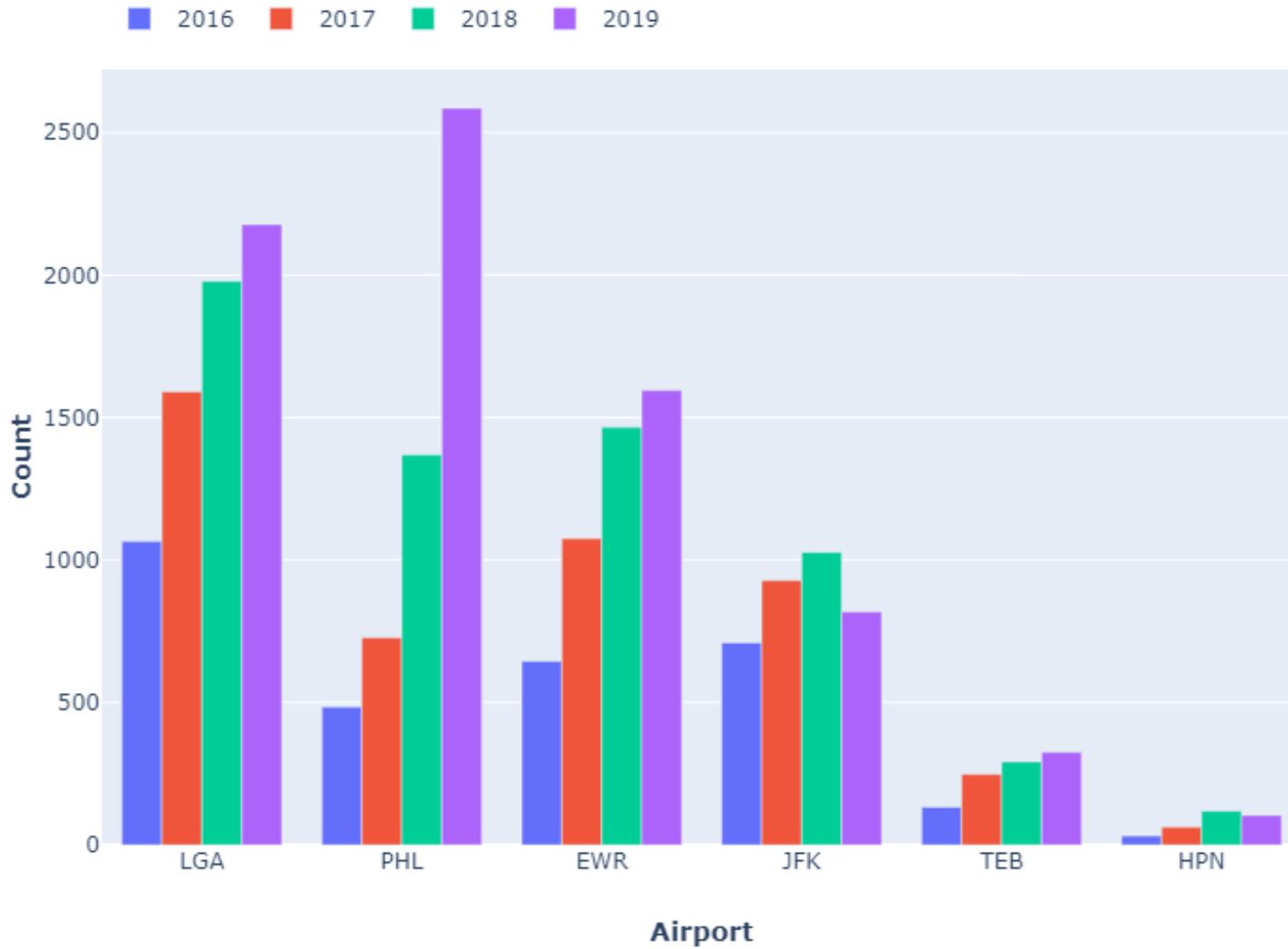
- JAT Tasking:
  - Evaluate expanded consistent usage of defined and existing capping and tunneling (escape routes) for departures/arrivals to/from the NEC through required advisories
- What is an escape route?
  - Escape routes offer a means to increase departure capacity during significant Severe Weather Avoidance Plan (SWAP) events and during special events or holiday traffic volume situations

# Escape Routes - Summary Findings

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- Escape route usage increased 92% from 2016/2017 baseline to 2019
- Additional average flight time of ~11 minutes for each escape route flight
- System delay savings estimated at 10 times the average additional flight time for escape route usage. Additionally, estimated a savings of one cancellation for every four escape routes used
- Conservative estimate of achieved benefits delivers increase from baseline
  - Baseline: 2016/2017 is \$15.5M
  - 2018 resulted in \$8.7M additional savings over Baseline
  - 2019 resulted in \$14.6M additional savings over Baseline

# Escape Route Usage





## NAC Task 19-4: PBN Clarification

Ad Hoc Co-Chairs: Steve Brown, Brian Townsend, & Bill Whyte

FAA SMEs: Clark Desing, Wendy O'Connor, & Aaron Wilkins

# Task 19-4: Performance Based Navigation (PBN) Clarification

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The NAC is asked to provide aviation community consensus advice by:

- Developing consensus agreement on a PBN baseline
  - FAA Procedures
  - Industry Equipage;
- Developing consensus agreement on a joint definition of a PBN NAS;  
and
- Developing consensus agreement based on gaps in baseline analysis at Core 30 airports (minus HNL, plus TEB), on a list of specific desired outcomes.

# Aviation Community Representatives

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- The Airline Co-Chair for the PBN NextGen Integration Working Group (NIWG) Brian Townsend, American Airlines
- A representative from Regional Aviation Bill Whyte, Regional Airline Association (RAA)
- A representative from Business/ General Aviation Steve Brown, National Business Aviation Association (NBAA)
- Additional support provided by A4A with member and non-member airlines with carrier provided Air Traffic Management and Technical Pilot expertise
- Also included participation from RAA and NBAA



# FAA Support

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- FAA Subject Matter Experts (SMEs) from the Air Traffic Organization (ATO):
  - Wendy O'Connor
  - Aaron Wilkins
  - Clark Desing
- Additional invited technical support:
  - NATCA
  - MITRE

# PBN Baseline for Procedures

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- Existing procedures in the NAS
  - RNAV SIDs and STARs
  - RNAV GPS Approaches
  - RNP AR Approaches
  - RNP to xLS (ILS/GLS)`
  - Advanced RNP (A-RNP) (SIDs, STARs, Approaches)
  - Ground Based Augmentation System Landing System (GLS) Approaches
  - RNAV Visual Flight Procedures (RVFP)
- A-RNP exists in the NAS but is in various stages of development and maturity
- All but RNAV Visuals are part of the NAS NAV Strategy

# PBN Baseline Equipage

- NAC Minimum Capabilities List (MCL) was used to identify the PBN capabilities for Approach and Terminal phases
- Information from Table 1 from Operations Specifications (Ops Specs) C052, C063 and C384 were used along with the total fleet size to calculate equipage percentages
- Updated in June 2020, but subject to change

Air Carrier	Counts	Baseline MCL						Supplemental MCL	
		Approach					Terminal	Approach	
		RNP AR	A-RNP		RNAV (GPS)		RNP-1 w RF	GLS	LPV
			Capable	Ops Spec	Coupled VNAV	Advisory VNAV only			
Majors	4,644	76%	89%	65%	98%	2%	90%	14%	1%
Regionals	1,881	23%	23%	0%	43%	57%	23%	0%	0%

# Consensus Agreement on a PBN NAS

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- The Ad Hoc Team endorses the 2016 NAS NAV Strategy as the definition of a PBN NAS
  - Including the “Key Principles” and “Navigation Strategy Overview”
- The introductory remarks of then-FAA Administrator Michael P. Huerta are still relevant and are an accurate reflection of the definition of a PBN NAS:

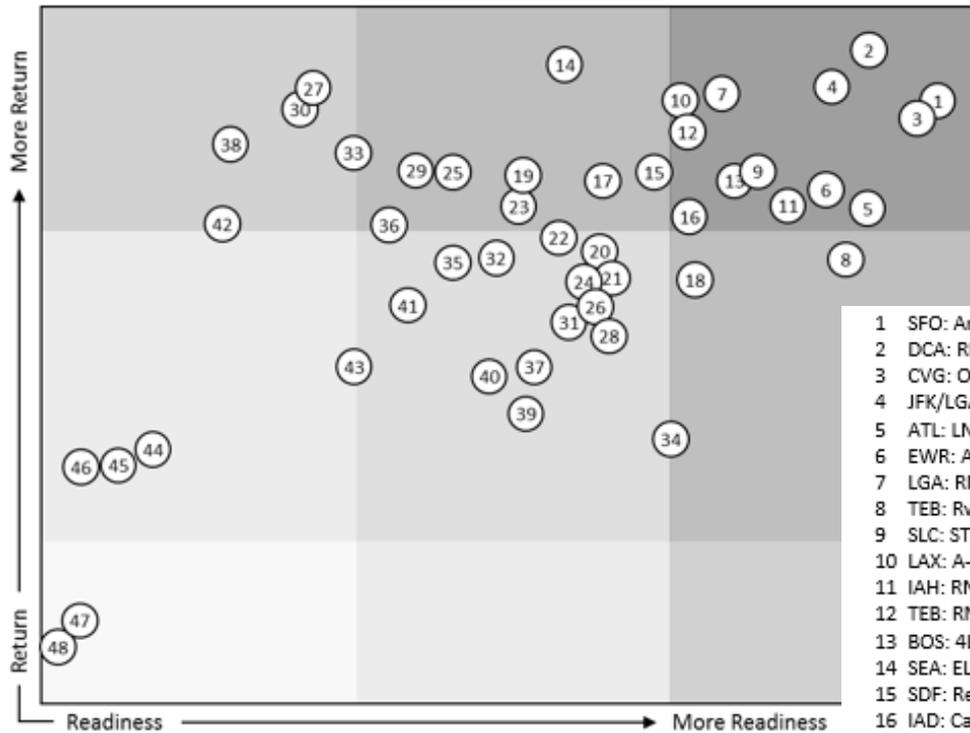
*“A truly PBN-centric NAS, that is, a NAS where PBN is used as the basis for daily operations. It charts a course that will allow the public and private sectors to advance the NAS collaboratively and constructively for the benefit of all aviation stakeholders, including aircraft operators, the traveling public, as well as new entrants such as unmanned aircraft systems and commercial space vehicles.”*

# Consensus Agreement On Specific Desired Outcomes

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- Identify gaps in baseline analysis at Core 30 airports (minus HNL, plus TEB)
- Post tasking airport considerations
  - Cargo Carrier airports and other vital airports outside of the Core 30
  - DEN, LAS and Florida Metroplex excluded
- Airports were individually prioritized by the operators
  - Desired PBN outcomes proposed for each airport
- Ranking the procedures was based on Readiness and Return scoring metrics

# Summary of Aviation Community Readiness and Return



- |   |  |
|---|--|
| 1 SFO: Amend SSTIK and retire OFFSHORE          | 25 ORD: Optimized SIDs/STARs                     |
| 2 DCA: RNAV (GPS) for Rwy 19                    | 26 PHX: EAGUL6 STAR optimization                 |
| 3 CVG: OPDs, CCOs, RNP w RF                     | 27 EWR/TEB: MARS application                     |
| 4 JFK/LGA: SKORR/GLDMN departures               | 28 DCA: RNAV (RNP) for Rwy 01                    |
| 5 ATL: LNAV for parallel ops                    | 29 MEM: xLS transitions and A-RNP to all runways |
| 6 EWR: Align RNAV with ILS, revise RNP Rwy 29   | 30 DAL/DFW: MARS application                     |
| 7 LGA: RNAV (GPS) for Rwy 31                    | 31 PHL: RNAV (GPS) for Rwy 09L/R                 |
| 8 TEB: Rwy 19 offset and RUUDY departure        | 32 DCA: CLIPR/DEALE optimization                 |
| 9 SLC: STARs/SIDs in IFP gateway                | 33 SEA: RNAV STARs and RNP from east             |
| 10 LAX: A-RNP approaches (enables EoR)          | 34 HOU: RNAV (RNP) to Rwy 13R, 31L, 22, 04       |
| 11 IAH: RNP(AR) for Rwy 27 & 08L (enables EoR)  | 35 SLC: Curved approach for Rwy 35               |
| 12 TEB: RNAV SID for Rwy 19                     | 36 SLC: RF/TF overlay with xLS (enables EoR)     |
| 13 BOS: 4L GPS offset with VNAV                 | 37 SFO: GLS applications/procedures              |
| 14 SEA: ELSO in existing departure corridor     | 38 SFO/OAK: MARS application                     |
| 15 SDF: Redesigned SIDs/STARs (enables EoR)     | 39 FLL: Metroplex RNP approaches                 |
| 16 IAD: Capital Redesign (enables EoR)          | 40 BOS: RNP(AR) for Rwy 22L with GPS overlay     |
| 17 EWR: Replace vectors SIDs                    | 41 MCO: Metroplex RNP approaches                 |
| 18 DAL: Approaches for Rwy 13L/R and 31L/R      | 42 EWR: .308 procedures for parallel operations  |
| 19 TEB: RNAV to replace conventional procedures | 43 SFO: .308 procedures for Rwy 19L/R operations |
| 20 PDX: EoR with waiver                         | 44 EWR: GLS applications/procedures              |
| 21 BNA: A-RNP approaches (enables EoR)          | 45 LGA: GLS applications/procedures              |
| 22 JFK: Approaches for Rwy 13L/R (enables EoR)  | 46 JFK: GLS applications/procedures              |
| 23 ATL: RF/TF overlay with xLS (enables EoR)    | 47 IAH: GLS applications/procedures              |
| 24 DFW: Offload RNAV STAR for NE corner         | 48 ATL: GLS applications/procedures              |

*NOTE: This is the list the FAA will work from to determine what procedures are within scope and can feasibly be developed*

# FAA Procedures Analysis and Final Outcome

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- The Aviation Community has submitted 48 proposals as “Desired Outcomes” from the modified Core 30 airports and some airports not included in the tasking letter
- The FAA SMEs have conducted an initial internal analysis to determine the status of some recommendations. Further FAA analysis needs to be conducted regarding scope, feasibility, environmental considerations, and available resources to provide a final list of procedures consistent with FAA planning.
- The PBN Clarification Ad Hoc Report contains the list of recommendations to move PBN development forward in the near term

# Motion for NAC Approval as Advice to the FAA

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- Performance Based Navigation (PBN) Clarification Ad Hoc Team  
NAC Task 19-4 Report





# New NAC Taskings

Dan Elwell, FAA Deputy Administrator

NAC Designated Federal Official



# Summary of Meeting & Action Item Review

Greg Schwab, FAA

# NextGen Advisory Committee (NAC) Upcoming Meetings

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- Winter 2020
  - \*November 17, 2020
- Spring 2021
  - March 2021 (target month)
- Summer 2021
  - July 2021 (target month)





# Closing Comments & Adjourn

Chip Childs, NAC Chairman  
President & CEO, SkyWest Inc.